U. S. Steel Corporation
Minnesota Ore Operations
P.O. Box 417
Mt. Iron, MN 55768

December 23, 2016

Erik Smith
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155

Re: United States Steel Corporation, Minnesota Ore Operations – Minntac Facility
Comments Regarding the Public Notice Draft NPDES/SDS Permit No. MN0057207

Dear Mr. Smith,

Please see the attached comments regarding the public notice draft NPDES/SDS Permit No. MN0057207 for the United States Steel Corporation (U. S. Steel), Minnesota Ore Operations – Minntac (Minntac) Tailings Basin. The attached comments are being submitted in response to MPCA's public draft notification. Because of the complexity of the issues, U. S. Steel reserves the right to submit additional comments and supplemental information in the future.

U. S. Steel has an interest in the draft permit as the owner and operator of Minntac. Many of the issues and requirements contained in the draft permit will have a significant impact on Minntac's operations, and compliance with the permit as drafted will cause significant hardship for the company. Included in our comments are statements of actions U. S. Steel requests MPCA to take, references to sections of the draft permit that should be changed, and specific reasons supporting our position.

A number of the attached comments are based on factual discrepancies or inaccuracies and/or typographic errors which should be easily resolved. Other issues are more complex, and as such, U. S. Steel requests a meeting with MPCA to discuss these issues prior to the issuance of the final permit. U. S. Steel also requests that MPCA take into consideration the previously submitted Use Attainability Analysis and Site Specific Standard requests and incorporate them into the permit before final issuance. U. S. Steel also is requesting variances from certain groundwater and surface water limits that are proposed in the draft permit.

By this letter U. S. Steel also petitions the agency to hold a contested case hearing. There are a significant number of material issues of fact in dispute concerning issuance of the final issuance of the permit. The MPCA Commissioner has jurisdiction to make a determination on the disputed material issues of fact and there is a reasonable basis underling the disputes such that the introduction of information will assist the Commissioner in making a final decision on a large number of provisions in the draft permit. We request that the Commissioner identify each of the issues addressed in the attached comments to be within the scope of the contested case. The reasons that a contested case hearing is required are described in detail in the attached comments regarding the permit. Those reasons include:

- There are disputed significant issues of material fact that must be resolved regarding the MPCA's assertion, as stated in the NPDES/SDS Permit Program Fact Sheet ("Fact Sheet") that tailings basin "seepage is causing exceedances of water quality standards in surface and groundwater in the broad area surrounding the basin" and related disputed issues of material fact regarding the extent of the exceedances, if any, attributable to any tailings basin seepage, the effect of previous and planned

mitigation measures and appropriate requirements of related compliance schedules. The vast majority of significant permit conditions are founded on the MPCA's factual conclusions regarding those issues which U. S. Steel disputes. The MPCA's record includes a plethora studies and other information, including MPCA information and information produced through U. S. Steel's work with the MN DNR over the past 3 years to advance the understanding of the transport and fate of sulfate associated with the Minntac tailings basin through the DNR's MWRAP research program, showing that there is a reasonable basis underlying the disputed material issues of fact or facts such that the holding of a contested case hearing would allow the introduction of information that would aid the commissioner in resolving those issues and making decisions on the final permit conditions. Those issues are addressed in detail in the attached comments and resolution of those material issues of fact is required in order for the Commissioner to properly respond the issues raised in the attached comments and, very likely, issues that will arise from comments by other parties.

- The MPCA states without any factual basis that for this permit "prevention of a pollutant release to the environment is easier and less costly in the long run than post-release cleanup measures" and has proposed permit conditions and compliance schedule requirements based on that assertion including sulfate concentration limits in the tailings that are improper and unsupported. The MPCA record contains a significant amount of data showing that U.S. Steel disputes that conclusion and that there is a reasonable basis underlying the disputed material issues of fact or facts such that the holding of a contested case hearing would allow the introduction of information that would aid the commissioner in resolving those issues and making decisions on the final permit conditions. A contested case hearing is required to allow resolution of material facts in dispute regarding the related permit conditions and the relative efficiency and efficacy of potential prevention and treatment measures.

- The draft permit would establish interim concentrations in the tailings basin pool water and requires actions "to determine what pollutant concentrations in the basin will result in downstream surface waters and groundwater meeting applicable water quality standards." A contested case hearing is required to resolve significant material issues of fact disputed by U. S. Steel regarding the basis for draft permit provisions related to pollutant sources and flow paths, achievability of compliance dates for final surface water and groundwater standards and the feasibility of any construction of treatment or mitigation systems consistent with schedules included in the daft permit. The attached comments contain significant information on the related disputed significant materials issues. For example, the interim limit of 800 mg/L sulfate is based on a 2012 report that is no longer representative of current conditions and near future conditions, given the required implementation of the Dark River Seep Collection and Return System. In addition, U. S. Steel disputes that the final sulfate limit of 357 mg/L should be considered to be valid since it was based on strictly conservative groundwater sulfate modeling that MPCA acknowledged was incomplete. Subsequent research by MN DNR has clearly demonstrated that sulfate is not a conservative constituent during subsurface transport and can be reduced biologically, which was not included in the model from which the 357 mg/L resulted. Although MPCA appears to allow for a revised number to be submitted the compliance schedule does not allow for the time for additional modeling to be conducted. It also does not reflect the fact that having duplicative upstream compliance limits on non-compliance points is arbitrary and capricious. Resolution of significant material facts in dispute regarding appropriate interim and final sulfate limits in the tailings basin, if any, and creation of any related compliance schedule requirements and schedules will aid the Commissioner in making a decision on the appropriate final sulfate limit, if any, in the permit and the terms of any related compliance schedule.

- There are disputed significant issues of material fact regarding the feasibility of a compliance schedule for the Dark River and Deep Seepage Collection and Return System, the hydrologic and regulatory basis

permit conditions related to additional monitoring wells and the continued operation of existing monitoring wells and the hydrologic and regulatory basis for new surface water monitoring requirements.

- There are disputed significant issues of material fact regarding the feasibility of the permit requirement to submit an application for a permit modification within 90 days of the wild rice rulemaking being filed with the Secretary of State taking into account the water quality standard to protect wild rice currently proposed by the MPCA and any future proposals that the MPCA will develop.
- There are disputed significant material issues of fact regarding the draft permit mercury monitoring limits for SD001. U. S. Steel disputes the factual basis of the requirement. Based on 3 mercury results (one from the 2009 permit renewal application and two subsequent results from monitoring performed in 2014), no RPE exists for mercury at SD001 (max result of 1.2 ng/L, resulting in a PEQ of 3.6 ng/L (CV=0.6, n=3) that is less than the limiting criteria of 6.9 ng/L). As such, mercury monitoring requirements should be eliminated.
- A contested case hearing is required to allow presentation of facts regarding the MPCA Reasonable Potential-to-Exceed (RPE) analysis performed to develop interim limits and final limits for sulfate and specific conductance. The basis of inputs (e.g. background concentrations, and sulfate standard) for the RPE calculations is unknown and the development of interim and final limits is unclear. A contested case hearing is necessary to aid the Commissioner in making a decision on the appropriate limits by allowing parties to review the details of the RPE calculations and development of interim and final limits and provide the material factual information to the commissioner regarding those issues.
- There are disputed significant material issues of fact regarding the MPCA's trout stream concentration analysis. As described in detail in the attached comments, U. S. Steel is questioning the analysis that estimates concentrations at the start of the trout reach based on SD001 data. Resolution of those issues will aid the commissioner in making decisions on related permit conditions in the final permit.

U. S. Steel does not currently know the prospective witnesses to be called, the of publications, references, or studies to be introduced and relied upon at a contested case hearing or the time required for to present the matter at a contested case hearing. If you have any questions or need additional information, please feel free to contact me at (218) 749-7364 or clbartovich@uss.com.

Sincerely,

Chrissy Bartovich
Director – Environmental, Minnesota Ore Operations
United States Steel Corporation

Cc : Ann Foss, MPCA
Suzanne Baumann, MPCA
Tishie Woodwell, U. S. Steel
Tom Moe, U. S. Steel
Lawrence Sutherland, U. S. Steel
Travis Kolari, U. S. Steel
David Smiga, U. S. Steel
Eric Williams, U. S. Steel

U. S. Steel Corporation – Minntac

Comments on Public Draft NPDES Permit # MN0057207

12/22/2016

Facility Description and Station Locations

1. **Issue: Facility Operations Description needs to be updated**

   Reference: Draft Permit, Page 4 - 7

   U. S. Steel Position: There are factual inaccuracies in the Facility Description, many of which are artifacts of the expired permit, that need to be corrected.

   Requested Change:
   U. S. Steel requests that the following redline/strikeout changes be made to the Facility Description to correct factual inaccuracies:

   Facility Location Legal Description *Paragraph 2, Page 4, 2nd sentence:* The contributing drainage area includes part of ~~an overburden/rock stockpile area to the southwest of the basin, as well as part of~~ the Minntac plant area.

   Facility Operations Description *Paragraph 1, Page 4, 5th sentence to the end:* The flocculants comprise ~~Calgon M-5729~~ChemTreat P-817E or equivalent, added to the crushing plant dust collector slurry ~~at~~ to a ~~rate~~ concentration of ~~one pound per hour (lb/hr)~~2 ppm, and ~~Calgon M-5372~~NeoSolutions NS6800 and NS3455 or equivalent ~~cationic homo~~copolymers added to the concentrator tailings slurry prior to the thickening stage, at a rate of ~~170~~ 300 lb/hr combined. The flotation reagents comprise: (a) an alkyl ether primary amine acetate or alkyl ether diamine acetate collector, ~~Arosurf MG-83, Arosurf MG-83A, Tomah DA-17-5% Acetate,~~M100-7 or equivalent ~~(alkyl chain R no greater than C_{14})~~, added at a maximum rate of ~~295~~ 425 lb/hr; (b) an alcohol frother, ~~methyl isobutyl carbinol, Arosurf 2057,~~ Nalflote ~~8848,~~9837 or equivalent (mixed C_4 to ~~C_9~~ C_{16} ~~aliphatic alcohols only~~alcohols, aldehydes, esters), added at a maximum rate of 101 lb/hr; and (c) anti-foaming agents ~~Oreprep D-202 or Nalco 7810 Antifoam~~NeoSolutions NS9548 or equivalent, added at a maximum rate of ~~162 lb/hr~~350 gal/d.

   Facility Operations Description *Paragraph 1, Page 5, 2nd and 3rd sentences:* Surface runoff from the upland area to the southeast of the basin enters through a series of ~~four~~ culverts ~~through the perimeter dam. Runoff from the stockpile area and upland area to the southwest of the basin enters by seepage through the perimeter dam~~.

Facility Operations Description *Paragraph 2, Page 5:* An average of 21 million long tons of dry fine tailings and 14 million long tons of dry coarse tailings are disposed of each year in the tailings basin. The coarse tailings are generated from the classifier, following the first stage of milling and magnetic separation. The fine tailings are generated from the crusher thickener overflow and the ~~tailings~~ concentrator thickener underflow. The fine tailings slurry and concentratror process water is directed by gravity flow through pipes from the Step I, II and III thickeners to a fine tailings pump house, which lifts the slurry for disposal through a series of open ditches to the Minntac tailings basin. The flow from the flotation process is restricted to Step I thickeners, but is mixed with discharge from Steps II and III ~~in~~ upstream of and within the fine tailings pump house. The basin is segmented into ~~several~~ discrete cells separated by coarse tailings dikes, and the fine tailings ~~spigot point~~discharge is periodically ~~moved~~ redirected from one cell to another. A permanent pumping station located within the basin returns water to the plant site reservoir. The station is located on the ~~east side~~southeast corner of Cell 1 (SE ¼, Section 15). Calcium chloride or magnesium chloride is occasionally used as a chemical dust suppressant on the basin and haul-roads in the facility. Some coarse tailings are used for sanding roads in the facility during the winter, and others are sold as aggregate product.

Facility Operations Description *Paragraph 1, Page 5, last sentence:* Peat was removed from the original ground area to be occupied by the perimeter dam, and a ten foot deep by 100 foot wide key-way was dug in the ~~glacial drift~~native soil prior to spigotting fine tailings into the core portion of this area.

Facility Operations Description *Paragraph 1, Page 6, 1st sentence:* Inventory Number SL-183) is located ~~in~~ on the ~~southwest corner~~west side of Cell ~~1~~ E-1 (~~SW~~ NW ¼, SE ¼, Section 21 and ~~NW~~ SW ¼, NE ¼, Section ~~28~~21).

Facility Operations Description *Paragraph 2, Page 6:* A minor permit modification was done in 2010 to allow for the construction of a Seep Collection and Return System (SCRS) as ~~required by~~evaluated through a Schedule of compliance originally entered into by the Company and the MPCA on November 14, 2007, and as amended by Amendment No. 1 on February 25, 2010.

Facility Operations Description *Paragraph 3, Page 6, 2nd to last sentence:* The Minntac WWTP was originally designed for an average flow of 0.06 million gallons per day (mgd) and a maximum flow of 0.09 mgd.

2. **Issue: Summary of Stations needs to be updated**

Reference: Draft Permit, Page 10

U. S. Steel Position: PLS location descriptions need to be corrected.

Requested Change:
U. S. Steel requests that the following redline/strikeout changes be made to the Summary of Stations PLS Location descriptions to correct factual inaccuracies:

GW003: ~~NE Quarter of the SE Quarter of~~ NW ¼, NE ¼, Section 15,

GW009: ~~SW Quarter of the NW Quarter of Section 10~~ NW ¼, SW ¼, Section 11,

GW013: ~~SE Quarter of the NW Quarter of the SE Quarter of~~ NE ¼, SW ¼, SE ¼, Section 04

GW014: ~~NE Quarter of the NW Quarter of the SE Quarter of~~ NW ¼, NE ¼, SE ¼, Section 05

3. **Issue: Sand River SCRS and the November 14, 2007 Schedule of Compliance (2007 SOC)**

Reference: Draft Permit, Page 6

U. S. Steel Position:
The permit incorrectly states that the Sand River SCRS was required by the 2007 SOC. The November 14, 2007 SOC required investigating alternative mitigation strategies that included evaluating the feasibility of collecting tailings basin seepage reporting to the Sand RiverWatershed. It was U. S. Steel's decision to install a surface seepage collection system along the east side of the Minntac perimeter dike without any regulatory requirements, and as such requested Amendment No. 1 to allow for the installation of the system.

Requested Change:

U. S. Steel requests that the language in the permit / fact sheet be changed as follows: A minor permit modification was done in 2010 to allow for the construction of a Seep Collection and Return System (SCRS) as evaluated through a Schedule of compliance originally entered into by the Company and the MPCA on November 14, 2007, and as amended by Amendment No. 1 on February 25, 2010.

General Comments

4. Issue: Discharges to groundwater should not be regulated as surface water under SDS Rules.

Reference: Draft Fact Sheet, Pages 6-7, 14-18

U. S. Steel Position:
U. S. Steel agrees with MPCA's conclusion concerning the exclusion of groundwater, including groundwater drained through subsurface drainage systems from the definition of "waters of the United States" under the CWA. The consequence, as MPCA correctly determined, is that discharges to groundwater cannot be regulated by the Minntac NPDES permit. Instead, discharges from the tailings basin to groundwater are properly regulated by the state's SDS rules.

However, Surface Water Monitoring Stations into which deep seepage from the tailings basin is purportedly emerging have water quality standards, narrative criteria, and monthly monitoring requirements assigned to them. MPCA cannot regulate groundwater through its NPDES permit authority directly (as it recognizes) or *indirectly*, as it is doing with thesurface water monitoring locations. For example, MPCA proposes compliance monitoring for Timber Creek because, among other reasons, "it is likely to be receiving emergent groundwater that originated at the tailings basin as a portion of its baseflow." Draft Fact Sheet p. 15.

Minnesota Rules 7053.0155 defines the MPCA's authority to requiring testing or analysis to determine compliance. According to the rule, the MPCA must establish facts showing that the activity is "*necessary* by the agency to adequately reflect the condition of the waters, the composition of the effluents, and the effects of the pollutants upon the uses specified in part 7050.0140." As noted in several portions of U. S. Steel comments, the MPCA does not have sufficient information on the tailings basin area hydrology to support that the limits and monitoring requirements are necessary to reflect any impacts from a tailings basin discharge to groundwater.

Requested Change:
U. S. Steel requests all limits and monthly monitoring requirements be removed from all Surface Water Stations and replaced with the requirement to meet water quality standards as *goals* in the permit. U. S. Steel's remediation strategies for the site focus on a goal of attaining water quality standards. Therefore, a sensible course for the NPDES/SDS permit is to reference those remediation strategies and their goals. However, because the in-stream levels reflect both groundwater and surface water inputs, U. S. Steel does not support putting the water quality standards into the permit as enforceable requirements. These issues may be better addressed through remediation based programs (such as RCRA or similar) rather than NPDES/SDS.

5. **Issue: The final Permit should not be issued until MPCA makes a determination on the pending UAA and SSS applications.**

   Reference: Previously submitted UAA and SSS applications

   U. S. Steel Position:
   U. S. Steel has previously submitted a UAA (2014) and SSS (2015) request to MPCA.

   The Use Attainability Analysis was submitted pursuant to Minn. R. 7050.0405. subpt. 1, which provides that "any person may present evidence to the agency that a beneficial use assigned to a water body in this chapter does not exist or is not attainable and petition the agency to consider a reclassification of that water body under Minnesota Statutes, section 14.09." The MPCA has not acted on the UAA petition despite Minn. R. 7050.0405. subpt. 2 which provides that "upon receiving a petition, the commissioner has 60 days to reply in writing and indicate a plan for disposition of the petition. The commissioner may request additional information from the petitioner if the request is considered incomplete, in which case the commissioner has 60 days to reply after the additional information is received and the petition is complete."

   The Request for a Site Specific Standard was submitted pursuant to Minn. R. 7050.0220, subp. 7.B. which provided that "The information supporting a site-specific modification can be provided by the commissioner or by any person outside the agency." The MPCA has not completed its duty to evalulate the request and make a determination. Minn. R. 7050.0220, subp. 7.B. provides that "The commissioner shall evaluate all relevant data in support of a modified standard and determine whether a change in the standard for a specific water body or reach is justified." (emphasis added).

   Since these requests have the ability to significantly impact the basis and development of Permit conditions, a determination on these requests should be made prior to issuance of the final Permit.

   Requested Change:
   U. S. Steel requests that MPCA make a determination on the pending UAA and SSS prior to issuance of a final Permit.

6. **Issue: The permit should allow for anticipated changes to be made without a major modification.**

   Reference: Draft Permit
   EPA NPDES Permit Writers' Manual, Chapter 5

   U. S. Steel Position:
   It is anticipated that changes to the permit will need to be made during the next permit term, and as such, language should be included so that a major modification is not

required to make changes to the permit. According to Chapter 5 of the EPA NPDES Permit Writer's Manual, permit writers may include provisions for different possible scenarios, provided those scenarios are sufficiently definite to write into the permit.

Requested Change:
U. S. Steel requests that the permit include language that allows SD001 permit requirements to be eliminated when the Dark River SCRS is installed and operational since the surface discharge will have been eliminated.

U. S. Steel requests that the permit include language that allows the limits to change at all compliance and monitoring points on both the west and east side upon approval of UAA, SSS or variance requests. The permit should include a Compliance Schedule providing that:

- if the MPCA determines pursuant to a U.S. Steel petition under Minn. R. 7050.0405. subpt. 1, that a beneficial use assigned to a water body does not exist or is not attainable and agency reclassifies that water body under Minnesota Statutes, section 14.09, the Permittee is not required to comply with any permit requirments imposed pursuant to any use removed as the result of the classification and the MPCA will propose a permit amendment to revise the permit accordingly.
- In October 2015, the U.S. Steel submitted a Request for Site-specific Modifications of Certain Class 3C (Industrial) and Class 4A (Irrigation) Water Quality Standards" supporting a site-specific modification pursuant to Minn. Rule Minn. R. 7050.0220, subp. 7. If the U.S. EPA approves a new Site Specific Standard for permit receiving waters within the term of this permit, the MPCA will propose an amendment to this permit to establish an any appropriate effluent limit and a related compliance schedule, if any, based on the approved Site Specific Standard and the Permittee will be required tomeet the new limit. .
- Upon completion of a rulemaking to revise the current water quality standards for Class 3 and 4 waters the Permittee shall be required to comply with effluent limits, if any, that reflect the revised water quality standards. MPCA will propose an amendment to this permit to establish an any appropriate effluent limit and a related compliance schedule, if any, for the applicable constiuents based on revised water quality standard.

U. S. Steel requests tthat the permit include language that allows the WS009 basin concentration limits (interim and final) to be changed without requiring a permit modification.

U. S. Steel requests that permit language be added that allows modifications to the linear regression of trout reach parameters monitored at SD003without a major permit modification.

7. **Issue: Permit requirements are based on arbitrary and capricious presumptions.**

   Reference: Draft Fact Sheet, Page 11

   U. S. Steel Position:
   Permit requirements must be based on real data and hard facts, rather than presumptions, otherwise they are arbitrary and capricious. Under the Site Geology and Hydrology section on page 11, it cannot be 'presumed' that "After more than 40 years of operation, essentially all groundwater ....is likely to be tailings-impacted." Without backup data, basing permit requirements on such a presumption is the very definition of arbitrary and capricious.

   Requested Change:
   U. S. Steel requests that all permit requirements, compliance points and related compliance parameters relative to groundwater seepage be removed until factual conclusions on groundwater flow and impact can be investigated.

8. **Issue: Permit requirements are based off of inappropriate and questionable data sources.**

   Reference: Draft Fact Sheet, Page 11

   U. S. Steel Position:
   Under the 'Site Geology and Hydrology' section on page 12, air photos are used to determine that there are other areas of shallow seepage. Air photos are unreliable due to the vast area of wetlands, beaver activity and ever-changing geological and hydrological conditions. Without backup data, basing permit requirements on unverified aerial photos is the very definition of arbitrary and capricious, and summary conclusions based on inspection of these photos should be removed and replaced with factual conclusions.

   Requested Change:
   U. S. Steel requests that all permit requirements, compliance points and related compliance parameters relative to groundwater seepage be removed until factual conclusions on groundwater flow and impact be investigated.

9. **Wild Rice Rulemaking - Re-Opener Language**

   Issue: The requirement for U. S. Steel to request modification of the Permit within ninety days of a rulemaking applying the wild rice beneficial use designation to any waters downstream of tailings basin discharges is inappropriate.

   Reference: Draft Permit: Section 2.6, page 27

U. S. Steel Position:
The ninety-day timeframe is inappropriate and the MPCA has the authority to modify the permit under the listed scenario. 90 days is insufficient for investigation and associated sampling needed to develop the site-specific sulfate limit in keeping with the current version of the draft wild rice sulfate rule and associated draft implementation guidance. In addition, the modified Permit would need to include a compliance schedule in order to give enough time for U. S. Steel to develop a compliance strategy to meet a new limit, though the length of time needed is unknown without knowledge of the final limit. Finally, pursuant to 7001.0170 C. it is within MPCA's authority to re-open and modify the Permit if "the agency or the federal government promulgates a new or amended pollution standard, limitation, or effluent guideline that is applicable to the permitted facility or activity."

According to the most recent MPCA language regarding the new sulfate standard, It was made very clear that MPCA would be required to gather data and evaluate it using the new formula to determine if sulfate limits would be required. Only new discharges would be required to submit their own data.

The MPCA should instead abide by Minnesota Law regarding implementation of a revised water quality standard to protect wild rice and designation of waters subjext to the standard. The legislature in 2015 gave specific direction to the MPCA on the topic, stating that upon the MPCA's completion of rule amendments to refine to wild rice water quality standard," the agency may reopen permits issued or reissued after the effective date of this section as needed to include numeric permit limits based on the wild rice water quality standard." Laws of Minnesota 2015, 1st Spec. Sess. chapter 4, article 4, section 136. In addition, pursuant to 7001.0170 C. it is within MPCA's authority to re-open and modify the Permit if "the agency or the federal government promulgates a new or amended pollution standard, limitation, or effluent guideline that is applicable to the permitted facility or activity ." No provisions of Minnesota statutes or rules provide the MPCA authority to require that a permittee request a modification to an NPDES permit upon revision of a water quality standard or a change in the use designation of a water.

Requested Change:
U. S. Steel requests that language be inserted that is consistent with the re-opener language in Paragraph 1.48 of Chapter 13 of the Draft Permit regarding MPCA initiated permit modification and remove the requirement for U. S. Steel to request a permit modification within 90 days of a final rulemaking without appeal. U. S. Steel also requests that 'waters downstream' be clarified to include a specific distance that would apply to wild rice limits.

Ground Water Wells and Requirements

10. Issue: Proposed groundwater monitoring points GW003, GW004, GW006, GW007, GW008 are not required, overly burdensome, excessive, arbitrary and capricious.

Reference: Draft Permit, Pages 8, 10, 11, 16, 40

U. S. Steel Position:

Minnesota Rules 7060.0800 establishes the standard for compliance related sample collection. It provides, "In making tests or analyses of the underground waters of the state, or of sewage, industrial wastes, or other wastes, to determine compliance with the standards, samples shall be collected in such manner and place and of such type, number, and frequency as may be considered satisfactory by the agency from the viewpoint of *adequately reflecting the condition of the underground water and the effects of the pollutants upon the specified water uses*." Proposed groundwater monitoring points GW003, GW004, GW006, GW007, GW008 bear no relation to the effects of any pollutants from the tailings basin on specified water uses.

Groundwater monitoring points GW003, GW004, GW006, GW007, GW008, are strictly monitoring points in the proposed permit. These wells were installed to evaluate a former rectified issue regarding the potential release of amine. These monitoring ponts should be removed similar to what was done for GW001, GW002 and GW005 when the intended purpose for the installation was rectified / achieved. In addition, these wells are not located at the property line and therefore are not required for compliance. Rather, GW009, GW011, GW012, GW013 and GW014, all located at various points along the U. S. Steel Minntac property boundary are sufficient to demonstrate compliance with applicable groundwater standards. Historical data shows no reasonable potential to exceed any property boundary groundwater standard, therefore there is no regulatory requirement to establish monitoring points. These five proposed monitoring points are excessive, redundant, arbitrary and capricious.

Each of the subject groundwater monitoring wells are located either thousands of feet away from the property boundary, or are located upgradient of another groundwater monitoring well that is at the property boundary. Since none of these monitoring locations are compliance points, continued monitoring at these locations in not appropriate and would use valuable time and manpower that could be better spent in pursuit of other compliance requirements. Additional monitoring required at these locations would result in additional data, but the data does not relate to an indication of compliance at the compliance points, or inform upon site conditions. Therefore, it would be data collection merely for the sake of data collection.

Requested Change:
U. S. Steel requests that monitoring points GW003, GW004, GW006, GW007 and GW008 be removed in their entirety.

11. **Issue: If MPCA does not act on the above issue and remove GW006, GW007, GW008, then the proposed groundwater monitoring locations GW006, GW007 and GW008 are arbitrary, not appropriate, redundant, and impractical.**

Reference: Draft Permit, Pages 8, 10, 11, 16, 40;
Minn. R. 7001.1060 Subp.1

U. S. Steel Position:

None of the three groundwater monitoring wells are anywhere near a groundwater compliance point (property line). Therefore, there is no basis for regulation or requirement for data monitoring. Additional monitoring required at these locations would result in additional data, but the data does not relate to an indication of compliance at the compliance points, or inform upon site conditions. Therefore, it would be data collection merely for the sake of data collection

Groundwater monitoring points located on the west side of the tailings basin (GW006, GW007, and GW008) are representative of the same discharge and it is unnecessary to include all in the permit. Minn. R. 7001.1060 Subp. 1 specifies that if the effluent from two outfalls is substantially identical, then MPCA shall allow sampling from only one of the outfalls to represent the discharge from both outfalls. Because groundwater monitoring wells GW006, GW007, and GW008 are all substantively identical, MPCA should remove two of these monitoring points.

Requested Change:
U. S. Steel requests the removal of monitoring requirements from at least two of groundwater monitoring wells GW006, GW007, or GW008.

12. **Issue: Proposed frequency of groundwater compliance monitoring at points GW009 and GW010 are excessive and burdensome.**

Reference: Draft Permit, Page 10, 11, 16

Draft Fact Sheet, Pages

U. S. Steel Position:

Although GW009 and GW010 are located near the property line and are appropriate compliance monitoring points, historical data show no reasonal potential to exceed current limits and that the wells are representative of background (non-impacted) ground water. MPCA acknowledges there is no compliance issues at these sites because there are no compliance limits associated with these wells (i.e., all parameters are monitor only). Additionally, there is over 20 years worth of quarterly DMR data demonstrating that these monitoring locations are at or very near background quality conditions.

Requested Change:

U. S. Steel requests that GW009 and GW010 monitoring be reduced to once per year, which should be entirely sufficient to assess the quality of the groundwater in those locations based on the historical data already compiled.

13. Issue: Proposed groundwater compliance monitoring point GW014 is arbitrary, caprious and unnecessary.

Reference: Draft Permit, Page 10, 12, 17

Draft Fact Sheet, Page 18

U. S. Steel Position:

U. S. Steel does acknowledge that the location of GW014 is suitable for a compliance point because of its location near the property line. Historical data shows that all parameters are comparable to background concentrations and there is no reasonable potential to exceed current ground water standards, however MPCA has still imposed compliance limits for chlorides, TDS, and sulfate.

More than two years of quarterly monitoring from May 2013 to October 2016 (n=12) indicates that groundwater is at or near background levels at this location. Specifically, there is no RPE for sulfates (14 mg/L average with a range from 5 to 32 mg/L), chlorides (3 mg/L average with a range from 2 to 5 mg/L), and for TDS (389 mg/L average with a range from 353 to 430 mg/L). At least two years of data is consistent with MPCA's approach of conducting an RPE analysis after the collection of 2 year's of data, pursuant to page 31 of the Draft Fact Sheet. As such, continued monitoring at this point is redundant, and would use valuable time and manpower that could be better spent in pursuit of other compliance requirements.

Requested Change:

U. S. Steel requests that all GW014 requirements be removed as the data demonstrate no RPE. If GW014 requirements are retained, at a minimum, limits should be removed based on the demonstrated no RPE and all parameters should be monitor only.

14. Issue: Proposed chloride monitoring and limits for GW012 and GW013 are arbitray, capricious and unnecessary.

Reference: Draft Permit, Page 10, 11, 16

U. S. Steel Position:

Data for GW012 from July 2012 to October 2016 (n=14) and GW013 from May 2013 to October 2016 (n=12) shows no RPE for chloride at either of these locations. GW012 chloride averages 92 mg/L and ranges from 54 to 106 mg/L and GW013 chloride averages 34 mg/L and ranges from 26 to 48 mg/L. At least two years of data is consistent with MPCA's approach of conducting an RPE analysis after the collection of 2 year's of data, pursuant to page 31 of the Draft Fact Sheet. As such, continued chloride monitoring at these locations is redundant, and would use valuable time and manpower that could be better spent in pursuit of other compliance requirements.

Requested Change:

U. S. Steel requests that the monitoring requirements for chlorides be eliminated, or at a minimum chloride limits for GW012 and GW013 be removed and replaced with monitor only requirements at a reduced frequency of once per year.

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15. Issue: Proposed monitoring for GW012 and GW013 are arbitray, capricious and unnecessary.

Reference: Draft Permit, Page 10, 11, 16

Draft Fact Sheet, Pages 18

U. S. Steel Position:

There are several parameters that are monitor only, with no reasonal potential to exceed groundwater standards. The requirement to sample and monitor is arbitray, overly burdensome and capricious.

Requested Change:

U. S. Steel requests that all parameters that are monitor only be reduced to a frequency of once per year.

16. Issue: The final compliance date for the proposed limits at GW012 and GW013 are not realistic, arbitrary and capricious.

Reference: Draft Permit, Pages 16, 17, 21

Draft Fact Sheet, Page 18

U. S. Steel Position:

U. S. Steel is currently investigating a Permeable Reactive Barrier (PRB) technology to address ground water compliance issues at GW012 and GW013 as per the amended ground water sulfate reduction plan (GWSRP) that was submitted and approved pursuant to Amendment No. 1 to the Multi-Media Pollutant Reduction Schedule of Compliance executed by U. S. Steel and MPCA in 2011 (2011 SOC). The MPCA approved the amended GWSRP on Febraury 25, 2014 and is therefore well aware that the schedule to meet compliance at GW012 and GW013 will take longer than five years. This is due to the investigative nature of the innovative technology, pilot testing, full scale treatment design, permitting and installation. Once installation occurs the travel time for the treated groundwater to move from the PRB location to the property boundary compliance location is additional necessary time.

Requested Change:

U. S. Steel requests that the permit be amended so that the requirements of Amendment No. 1 to the 2011 SOC to establish compliance with the sulfate groundwater standard as soon as possible are adopted in the permit as the Compliance Schedule to address sulfate concentrations at GW012 and GW013. Such Compliance Schedule should acknowledge MPCA's approval of the Amended GWSRP that was required under Amendment 1. Upon issuance of the reissued permit that incorporates the requirments of Amendment 1, the termination language, part 27 of the 2011 SOC, as amended, should be amended to provide that any requirement of that agreement is terminated when the requirement is

incorporated into another compliance document, including the reissuance of NPDES/SDS Permit MN0057207. The 2011 SOC, as amended, should also be amended to terminate the requirements contained in Amendment 1 due to the incorporations of its requirements into the permit. Finally, the permit provision defining when the final limit takes effect for GW012 and GW013 should reflect the terms of the Amended GWSRP. The Amended GWSRP was originally developed based off of information at that time and will be updated upon installation of the PRB pilot test and MPCA approval of the sampling plan.

17. Issue: The Proposed groundwater compliance monitoring point GW011 does not contain a realistic installation schedule and should be abandoned if sampling results show no influence (similar to background). Also, the shallow well (GW011-S) is not representative of groundwater, but rather surface water.

Reference: Draft Permit, Pages 8, 10, 11, 16, 40;
EPA Permit Writers' Manual at Section 8.1.2

U. S. Steel Position:

Installation of GW011 at the proposed location will impact wetlands and may require permission or land acquisition from the U.S. Forest Service. Infrastructure, such as roads and safe access will also be required as the site is regulated by the Mine Safety Health Association (MSHA) and the proposed installation schedule does not account for these facts.

The proposed Shallow portion of the nested cluster would be representative of surface water of the Sand River, which is monitored for compliance at SW005 (inlet to Little Sandy Lake). For this reason, the shallow well is redundant, arbitrary and capricious.

Since there is currently no data to conduct any reasonable potential for exceedance analysis for the groundwater in the proposed location of GW011, the permit should allow for a reasonal potential for exceedance analysis once there are 12 samples. If the data show no potential to exceed, the wells will be sealed and abandoned.

Requested Change:
U. S. Steel requests that draft permit Chapter 9, Section 2.2, be changed as follows:
"GW011: The Permittee shall install one downgradient monitoring well cluster (GW011-I and D) near the property boundry by the Admiral Lake outlet, within the bedrock trench underlying the Sand River no later than 12 months after receipt of all permits, agreements and permissions."

U. S. Steel requests that all references of the shallow (GW011-S) be removed from the permit.

U. S. Steel requests that language be added to Chapter 9, Section 2 that allows the GW011 nested wells to be sealed and abandoned once monitoring data shows no reasonable potential to exceed groundwater standards.

Waste Stream

18. Issue: Compliance point WS009 (Basin Water) is inappropriate, arbitrary and capricious.

Reference: Draft Permit, Pages 10, 16, 21, 43

Draft Fact Sheet, Pages 18, 36, 38, 39, 40

U. S. Steel Position:

U. S. Steel is pursuing several mitigation options at specific points outside the tailings basin perimeter dike that would achieve compliance regardless of what constituent concentrations are in the tailings basin clear pool. In fact, the implementation of the Dark River SCRS would result in increasing WS009 concentrations. Furthermore the tailings basin is not a "waters of the State" where state water quality standards apply. Minnesota Rules 7050.0130 subpart 2 states that "disposal systems or treatment works operated under permit or certificate of compliance of the agency are not "waters of the state."" The MPCA has authority to regulate basin discharges to waters of the state but lacks authority to establish a compliance point within the tailings basin.

Compliance with groundwater standards for sulfate is measured at the property boundary. Property boundary groundwater compliance issues have been identified at two specific locations, GW012 and GW013, both of which are being addressed through the GWSRP that should be incorporated, as noted above, into the Compliance Schedule for compliance at GW012 and GW013. Requiring sulfate limits to be met at the compliance points AND upgradient noncompliance points is inappropriate, redundant, and impractical.

The permit fact sheet properly states on page 18 that the MPCA's focus is on addressing the concern that the tailings basin is causing or contributing to exceedance of groundwater standards at U. S. Steel property boundary. Final compliance limits are established in the permit at the permit boundary for wells GW012, GW013, and GW014 which are located along the property boundary and therefore compliance limits are established at these wells as appropriate. As described in more detail below, collected

samples in the tailings basin for the purpose of compliance with water quality standards related to groundwater use does not reflect the condition of the underground water and does not it reflect the effect of the pollutants upon the specified water uses.

In addition to a lack of regulatory authority to establish a compliance point within the tailings basin, the MPCA cannot support establishing a compliance limit in the tailings basin that relates to compliance with the numeric water quality standard applicable at the U. S. Steel property boundary. It is overly simplistic for the MPCA to base permit conditions on a statement that it is "axiomatic" that prevention of a pollutant release to the environment is easier and less costly in the long run than post-release cleanup measures. MPCA's authority does not come from axioms and the facts regarding the tailings basin cast doubt in the applicability of the axiom here given the complexity of sulfate reduction and the complexity of groundwater modeling.

The MPCA does not have a basis to conclude that meeting any specific concentration in the tailings basin is a relevenat measure of the legally required compliance at the property boundary. The MPCA acknowledges that it does not have a basis for a compliance limit in the permit, stating in the permit fact sheet that the "goal" of the investigation into the sources and flowpaths of contaminants from the tailings basin is "*to determine* a basin sulfate concentration that would lead to compliance with all applicable surface water and groundwater quality standards during operation and closure."

The MPCA must acknowledge that the investigation will show that concentrations in the Tailings Basin will vary considerably due to a variety of factors, including evaporation and precipitation rates that vary from year to year, and that the MPCA already has information showing that it is unable to establish a compliance limit in the tailing basin that relates to property boundary compliance. The MPCA acknowledges in the permit fact sheet that the charactoristics of the groundwater flow preclude establishing a compliance limit in the taillings basin as a reasonable measure of compliance at the property line, stating that

- "within the aquifer, which at this facility extends laterally for several miles, water can move in any direction depending on the hydraulic head (water table) conditions, which vary spatially and over time."
- Flow through porous media is also subject to lateral dispersion, which is the mixing and spreading of the pollutant perpendicular to the path of fluid flow.
- the area over which impacted groundwater may discharge(H) to surface water features can be thousands of feet in length, covering hundreds or thousands of acres, particularly when discharging(H) to wetlands.

And importantly, the amended GWSRP approved by the MPCA describes hydraulic conductivity testing at MW012 that concluded that groundwater velocity equated to approximately 50 feet per year.

That all leads to the unavoidable conclusion that the MPCA cannot technically justify creating an enforceable compliance limit in the Tailings Basin that is hundreds, if not thousands, of feet away from the legal compliance point. The tailings basin is a 13-square mile feature with dynamic and ever-changing characteristics. The measurements of suflate concentrations within the tailings basin will vary based on location of the measurments within the basin and any number of naturally occurring events including precipitation and evaporation rates. The interim limits measured at the tailings basin create unreasonable and irrelevant standards at an internal waste stream that is legally measured at the point of compliance at the property line.

The interim and final sulfate limits proposed for WS009 are duplicative, arbitrary and not based in fact. Requiring an interim limit of 800 within 5 years of permit issuance will not achieve compliance with the groundwater standards at the property boundary. In fact, the stated 800 mg/L was based on projected clear pool concentrations 5 years after installation of dry controls on four Agglomerator lines. To arbitrarily require this limit when MPCA knows the technology is not installed, and will not be, is to flagrantly ignore the facts. In addition, the final sulfate limit of 357 mg/L should not be considered to be valid since it was based on strictly conservative groundwater sulfate modeling that MPCA acknowledged was incomplete. Subsequent research by MN DNR has clearly demonstrated that sulfate is not a conservative constituent during subsurface transport and can be reduced biologically, which was not included in the model from which the 357 mg/L resulted. Although MPCA appears to allow for a revised number to be submitted the compliance schedule does not allow for the time for additional modeling to be conducted. It also does not reflect the fact that having duplicative upstream compliance limits on non-compliance points is arbitrary and capricious.

Requested Change:

Remove WS009 in its entirty, including all associated compliance limits and monitoring requirements. If it is not removed, then parameters should be monitor only at a reduced frequency of once per year.

19. Issue: Sulfate limits at WS009 (Basin Water) are not required, overly burdensome, arbitrary and capricious.

Reference: Draft Permit, Pages 10, 16, 21

Draft Fact Sheet, Pages 18, 36, 38, 39, 40

U. S. Steel Position:

U. S. Steel believes the WS009 sulfate limits are inappropriate for the following reasons:

- There is no legal basis for duplicate compliance points internal to a wastewater treatment system and downstream at the point of compliance; Compliance for sulfate, specific conductance and hardness are measured at the property line (GW012, GW013) and surface water stations (SW005).

- The interim limit of 800 mg/L sulfate is based on a 2012 report that is no longer representative of current conditions and near future conditions, given the required implementation of the Dark River SCRS);
- The final limit of 357 mg/L sulfate is based on a preliminary model that assumes this concentration would be needed at the tailings basin in order for groundwater at the property boundaries to meet the groundwater standard of 250 mg/L.
- MPCA admits the preliminary nature of the model used to develop the final sulfate limit and is also requiring (as part of the Compliance Schedule) investigations into the fate and transport of tailings basin pollutants (fact sheet pages 35-36). Until the investigations are complete, appropriate limits cannot be determined and setting of any limits is premature and arbitrary. Furthermore, these speculative limits could be subject to anti-backsliding and would potentially impose unnecessarily strict limits on U. S. Steel depending on the final results of the investigations.

Requested Change:

U. S. Steel requests that WS009 is removed in its entirety. If it is not removed, then all parameters should be monitor only.

<u>SD001</u>

20. Issue: SD001 (Seepage outfall 020) – Footnote 3 (Final Limits) should be 12 months after permit effective date

Reference: Draft Permit, Pages 8, 10, 12, 13, 17, 18, 21

U. S. Steel Position:

Permit may not be issued by January 2018

Requested Change:

U. S. Steel requests that Footnote 3 state that final limits reflect permit issuance date rather than January 2018.

21. **Issue: SD001 (Seepage outfall 020) - Footnotes 1 (interim limits) and 3 (final limits) for Bicarbonates, Hardness and Total Dissolved Solids are contradicting.**

Reference: Draft Permit, Pages 8, 10, 12, 13, 17, 18, 21

U. S. Steel Position:

Final limits are to start Jan 2018 per footnote 3. Footnote 1 states that RPE to be calculated after 1 year of data to determine if an interim limit is needed. If an RPE exists, then according to footnote 1, the interim limit is effective the next monitoring period after calculation. These conditions contradict and makes it unclear for the permittee to know what requirement to comply with. Interim limits are based on an inappropriate data set and would result in immediate non-compliance which is unacceptable.

The same rationale/argument against the need for interim sulfate and specific conductance limits for SD001 can be applied to the possible application of interim limits for these parameters is also inappropriate. However, in the case of these parameters there are additional factors involved make interim limits even more unnecessary. One year of monitoring data is required prior to evaluation of the need for interim limits. Given the required timing of the Dark River SCRS, development of interim limits for such a limited timeframe is an ineffective use of U. S. Steel and MPCA resources.

Requested Change:

U. S. Steel requests monitoring only until seep collection installed Once seep collection is installed this monitoring location should be removed from the permit.

22. **Issue: Final limits for SD001 occur after the requirements for installation of the Dark River Seep Collection and Return System.**

Reference: Draft Permit, Pages 8, 10, 12, 13, 17, 18, 21

U. S. Steel Position:

Final limits occur after the SCRS installation date.Once the Dark River SCRS is installed, there will be no discharge from SD001. Outfall SD001 should be eliminated and all requirements pertaining to SD001 should stop.

Requested Change:

U. S. Steel requests that language be included in the permit that removes all requirements associated with SD001 upon completion of the Dark River SCRS including, but not limited to: monitoring requirements, interim and final limits, reporting, submittals, etc.

23. Issue: The Draft Permit requirement for mercury monitoring of SD001 is unnecessary.

Reference: Draft Permit, Pages 8, 10, 12, 13, 17, 18, 21
Draft Fact Sheet, Pages

U. S. Steel Position:
Based on 3 mercury results (one from the 2009 permit renewal application and two subsequent results from monitoring performed in 2014), no RPE exists for mercury at SD001 (max result of 1.2 ng/L, resulting in a PEQ of 3.6 ng/L (CV=0.6, n=3) that is less than the limiting criteria of 6.9 ng/L). As such, mercury monitoring requirements should be eliminated.

Requested Change:
Removal of all mercury monitoring requirements.

24. Issue: The Draft Permit requires SD001 monitoring for both total and dissolved mercury as well as a total suspended solids (TSS) sample specific to mercury.

Reference: Draft Permit, Pages 8, 10, 12, 13, 17, 18, 21

U. S. Steel Position:

MPCA does not provide a basis for required dissolved mercury monitoring nor the requirement for concurrent TSS monitoring. Furthermore, quarterly grab TSS sampling is already required for SD001 and so additional monitoring is redundant. Concurrance of TSS and mercury monitoring can be achieved with inclusion of a footnote language instead of requiring a separate sample.

Requested Change:
If the MPCA does not remove mercury monitoring in its entirety based on the previously described no RPE, U. S. Steel requests for monitoring of total mercury only, removing the requirements of a TSS mercury grab and the dissolved mercury sampling requirement.

25. **Issue: U. S. Steel is questioning the Reasonable Potential-to-Exceed (RPE) analysis performed to develop interim limits and final limits for sulfate and specific conductance at SD001. U. S. Steel is also questioning the application of final limits for bicarbonates, hardness, and TDS at this time.**

Citation: Draft Permit, Pages 12, 13, 17, 18

U. S. Steel Position:
U. S. Steel is questioning the RPE analysis methods and results for determination of the interim and final limits for SD001. The basis of inputs (e.g. background concentrations, and sulfate standard) for the RPE calculations is unknown and the development of interim and final limits is unclear. Furthermore, the application of final limits for bicarbonates, hardness, and TDS is premature given the permit requirement to gather additional data in support of a formal RPE evaluation.

Requested Change:
Provide more details on the RPE calculations and development of interim and final limits.
Remove interim limits for sulfate and specific conductance.
Remove final limits for bicarbonates, hardness, and TDS pending the RPE evaluation after one year of data collection.

26. **Issue: Application of water quality standard to protect the Trout Reach of the Dark River are arbitrary and capricious.**

Reference: Draft Permit, Page 14, 19

Draft Fact Sheet, Pages 33, 34

U. S. Steel Position:

The Dark River Trout reach is over 10 milesdownstream from Minntac discharges, and receives additional tributary inputs from sources beyond U. S. Steel's control. It is possible that measured exceedances of applicable water quality standards or permit limits proposed for the Dark River Trout reach could be from sources other than Minntac

discharges. To place compliance limits on a facility at a point 10 miles downstream which receives additional inputs is arbitray and capricious.

Minnesota Rule 7001.1080 provides direction to the commissioner regarding monitoring and reporting requirements, stating that the commissioner "shall establish appropriate monitoring and reporting of monitoring requirements to ensure compliance with permit limitations." Mn Rule 7001.0150 regarding terms and conditions of NPDES permits states that "Monitoring and testing requirements must specify the type, interval, and frequency of monitoring and testing activities that are sufficient to yield representative data to determine whether there is compliance with the terms and conditions of the permit or compliance with Minnesota and federal pollution control statutes and rules." The Dark River permit limits are arbitrary and capricious because the MPCA cannot establish that limits in the Dark River Trout Reach are related to proper compliance requirements due to the significant distance from the facility and the contributions from other sources to the watershed. In addition, the MPCA has alternative monitoring and compliance points "sufficient to yield representative data to determine whether there is compliance with the terms and conditions of the permit or compliance with Minnesota and federal pollution control statutes and rules."

Requested Change:

U. S. Steel requests that all limits that pertain to the Dark River Trout reach be removed from the permit (SW003). If the agency refuses to remove the associated limits, the compliance should be measured at the trout reach at proposed location SW004 (Dark River CR65).

27. **Issue: Use of CR668 monitoring location as surrogate for compliance with water quality standards at CR65 is unreasonable and not practical**.

Reference: Draft Permit, Page 26, section 1.27

Draft Fact Sheet 33, 34

U. S. Steel Position:

MPCA developed a mathematical relationship between the water quality in the Dark River at Cty Rd 668 and that at Cty Rd 65, representative of water quality entering the Dark River Trout Reach. Chapter 1, Section 1.27 (page 26 of the draft permit) requires 12 consecutive monthly samples be collected from each of the sampling locations following initial operation of the Dark River SCRS. If the mathematical relationship changes by more than 5% based on the 12 month sampling period, an application for permit modification must be submitted. No guidance has been provided on which of the

components of the mathematical relationship would trigger permit modification. Further, considering the variation in the limited data set ($R^2 = 0.78$)_it is very likely that there will be a greater than 5% change to one or more of the components of the mathematical relationship following SCRS implementation.

Requested Change:

U. S. Steel requests that Chapter 1, Section 1.27 (page 26 of the draft permit) be eliminated. U. S. Steel further requests that if compliance monitoring of the Dark River Trout Reach is deemed necessary following implementation of the west side SCRS, that monthly sulfate monitoring be conducted at CR 65 (SW004) for one year. If after 12 months of monitoring there is no exceedance of the Class 1B sulfate standard, monitoring at this location will be terminated.

28. **Issue:** U. S. Steel is questioning the analysis that estimates concentrations at the start of the trout reach based on SD001 data.

Reference: Draft Permit, pages 26
Draft Fact Sheet, pages 33, 34

U. S. Steel Position:
Several flow values are used in this evaluation but the basis and appropriateness of the flow rate of 2.63 cfs used for "the flow exiting the Minntac tailings basin westward" is unknown (e.g., does this value include the SD001 flow of 0.21 cfs?). Also, there appear to be mathematical errors in development of at least one dilution ratio (0.43) and the dilution ratios are applied inconsistently in Table 5.

MPCA has applied a ratio of 0.43 to most parameters (the exceptions are non-detect values and manganese) in Table 5. The 0.43 factor appears to be based on the "flow exiting the Minntac basin westward" (2.63 cfs) and the 7Q10 (1.95 cfs) at the beginning of the trout reach. However, this value includes a calculation error. Instead of using the ratio from westward flow/ (westward flow + 7Q10), the value is calculated from 7Q10/ (westward flow+7Q10). Additionally, this ratio is appropriate given the objective of the analysis. If assessing the possible influence of SD001 on the trout reach of the Dark River under 7Q10 conditions, then a dilution ratio based on the ratio of SD001 flow (0.21 cfs) and the calculated 7Q10 (1.95 cfs) at the beginning of the trout reach should be used: 0.21/ (0.21+1.95) = 0.1. With application of the 0.1 dilution ratio, the likely concentrations[1] (based on SD001 values) for hardness, specific conductance and TDS are all below the applicable criteria in the trout reach. In fact, if the max SD001 sulfate

[1] The analysis makes the same assumptions that MPCA used in their analysis: conservative fate of the SD001 parameters and no background concentrations.

value (1320 mg/L) is used with the 0.1 dilution ratio, the estimated value (132 mg/L) at the trout reach is less than the applicable criteria of 250 mg/L.

It is unclear from the Fact Sheet language which permit requirements result from this evaluation. Regardless, given that SD001 discharges directly to the non-trout reach of the Dark River, it is more appropriate to evaluate SD001 with respect to the standards applicable at the discharge location.

Requested Change:
U. S. Steel requests that MPCA provide more details on the basis of the calculations and exactly which permit requirements result from the analysis. Additionally, U. S. requests that MPCA redo the analysis with the appropriate flow ratios.

29. **Issue: The SW003 sulfate limitation is inappropriate and unbased. Furthermore the requirements in Chapter 1, 1.27 are arbitrary, capricious, inappropriate and burdensome.**

Reference: Draft Permit 14, 19, 26
Draft Fact Sheet, Pages 33, 34

U. S. Steel Position:
The Fact Sheet describes a relationship between concentrations of "key" parameters in Dark River prior the trout reach (at CR668 or SW003) and within the trout reach (at CR65) and indicates that concentrations at CR65 are about ½ those of CR668. To support this, a linear regression of 11 paired sulfate results is presented. Based on this relationship and the 250 mg/L sulfate standard applicable only to the trout reach segment of the Dark River, MPCA has developed final sulfate limits for SW003 of 525 mg/L. In addition draft Permit requires 1/mo monitoring for 12 months after the Dark River SCRS is operational to observe and determine if there is a change in the relationship between locations. The monitoring will consist of samples from the Dark River prior the trout reach (at CR668 or SW003) and within the trout reach (at CR65) for bicarbonates, chloride, flow, hardness, manganese, pH, dissolved potassium, total sodium, TDS, specific conductance, sulfate, and temperature. If after one year of data is collected, the relationship changes more than 5%, U. S. Steel must request a permit modification to address the new relationship.

The above requirements (final sulfate limits, required monitoring, and 5% threshold) are inappropriate for several reasons.

- The relationship is based on limited data for one parameter (sulfate) and is not robust or fully developed.
- Examination of the actual paired data shows concentration ratios (trout reach to non-trout reach) ranging from 0.32 to 0.57. The % RPD between these ratios is

53%. This level of variability and uncertainty is unacceptable when used to develop permit limits.

- Inclusion of additional measured paired data from 2014 and 2015 (representing the same operating condition) can significantly impact the relationship. For example, inclusion of 3 additional pairs of data changes the slope by 2.5% and the intercept by over 30%.
- The relationship does not account for non-linear bias observed with different concentrations. For the relationship based on n=11 results, the ratio changes 12% (from 0.46 to 0.52) when comparing the predictions based on SW003 results of 1200 mg/L and 200 mg/L.
- It would be more appropriate to directly monitor the Dark River at the start of the trout reach rather than rely on a limited mathematical relationship to assess the potential for the trout reach to be at or applicable applicable standards. However, if a mathematical relationship is the MPCA approach, it should be based on wasteload allocation for SD001 discharges to the Dark River and allowing for the appropriate dilution factors between the discharge location and the start of the trout reach.
- No basis in provided in the fact sheet that supports the applicability of the sulfate relationship to other parameters.
- While the relationship is based on sulfate, the fact sheet indicates that this relationship (of about ½ reduced concentrations between locations) is applicable to other key parameters.
- The key parameters are not specifically identified; however, the Permit requires monitoring of all WS003 parameters in association with this relationship (Permit p.26).
- The requirement for a permit modification if the relationship changes more than 5% is unclear, arbitrary, and overly burdensome.
- It is unclear what MPCA means when referring to a 5% change. 5% change in the intercept, slope, or predicted value? If predicted value, at what concentration (recall that the relationship does not account for non-linear bias)?
- MPCA does not explain the basis for the 5% threshold
- As demonstrated above, the addition of 3 paired results under the same operating conditions can greatly influence the relationship. Since data from the same operating condition can change the relationship more by more than 30% (as change in intercept), a 5% change should not be considered indicative of a change in the overall relationship. The threshold is simply too conservative given the limited robustness of the relationship presented.

Requested Change:
U. S. Steel requests the WS003 limitation for sulfate (525 mg/L) be removed and replaced with monitor only. Additionally the monitoring and associated requirements in Chapter 1, 1.27 of the Permit should be eliminated. If the Chapter 1, 1.27 requirements are not removed, clarification on implementation (e.g. what aspect of the relationship, which parameters) of the requirement is requested.

Surface Water Requirements

30. Issue: Monitoring (and associated limitations) for all Surface Water Stations (SW001, SW003, SW005, SW006, SW007, and SW008) is inappropriate and should be eliminated from the Draft Permit

Reference: Draft Permit, Pages 10, 13, 14, 19, 20

U. S. Steel Position:
MPCA is requiring U. S. Steel to monitor Surface Water Stations SW001, SW003, SW005, SW006, SW007, and SW008 for compliance in addition to requiring compliance at monitoring points that would be more representative of Tailings Basin discharges (SD001, GW009, GW012, GW013, GW014). U. S. Steel believes this is inappropriate for the following reasons:

- There is evidence, based on the results of a biological study that was published in 2011[2] and statements made in the Draft Fact Sheet regarding the preliminary results of a 2015 study that included the Sand River, in addition to a review of the MPCA 303(d) list[3] and status of TMDL development, that these streams are fully supporting and meeting their designated uses;[4]
- The Draft Permit already imposes monitoring requirements/limits on the discharge (SD001) from the Tailings Basin and therefore should not additionally impose monitoring requirements/limits on the "waters of the State";
- U. S. Steel is not the sole contributor to the surface waters (e.g., stormwater runoff outside of the U. S. Steel property boundaries);
- It is unknown when the quality of the surface water bodies would be impacted by the implementation of the remediation meaures, such as the implementation of the Dark River SCRS. Imposition of final limits for SW stations suggests an assumed reversal (return to "background") of surface water conditions in near-time for which MPCA has not provided a basis; and,
- Pursuant to 40 CFR 130, our understanding is that it is the State's responsibility to evaluate if water quality standards are being met and implement a continuing planning process, such as a Clean Water Act (CWA) 303(d) list/TMDL approach, for achieving those standards. Imposition of final surface water limits to U. S. Steel is

[2] The MPCA September 2011 Little Fork River Watershed Monitoring and Assessment Report.
[3] The surface waters in the vicinity of the Tailings Basin are not identified on the CWA 303(d) list as being impaired for chlorides, hardness, sulfate, conductivity, bicarbonate, or total dissolved solids (TDS).
[4] This is not suprising. Other states, such as Illinois, has stated publicly that no harmful environmental effects are occurring as a result of modern mines in the State of Illinois. Studies that specifically targeted the effects of coal mines (including elevated sulfate concentrations) on aquatic life have shown healthy macroinvertebrate communities existing downstream of mine discharges (Soucek, David. "Impacts of Coalmine Discharges on Illinois Unionid Mussels". June 28, 2014.).

contrary to the 303(d)/TMDL approach which would assign discharge (not surface water) limits and requirements to a facility.

In addition, it is believed that the majority of the Tailings Basin surface water discharges will be eliminated with the recent installation of the Tailings Basin East Side Seep Collection Return System (SCRS) and the near future installation of the Dark River SCRS. As such, additional monitoring beyond the Tailings Basin monitoring requirements would be redundant and unnecessary.

Minnesota Rule 7001.1080 provides guidance to the commissioner stating that the commisioner "shall establish appropriate monitoring and reporting of monitoring requirements to ensure compliance with permit limitations" and Minnesota Rule 7001.0150 states that "monitoring and testing requirements must specify the type, interval, and frequency of monitoring and testing activities that are sufficient to yield representative data to determine whether there is compliance with the terms and conditions of the permit or compliance with Minnesota and federal pollution control statutes and rules." The monitoring and compliance limits are inconsistent with those rules and arbitrary and capricious. The MPCA has more "appropriate" and less costly alternatives to gather "representative data" to determine whether there is compliance with the terms and conditions of the permit or compliance with Minnesota and federal pollution control statutes and rules.

Requested Change:
U. S. Steel requests that compliance monitoring points (and any associated limits) SW001, SW003, SW005, SW006, SW007, and SW008 be removed.

31. Issue: Proposed monitoring point SW007 (Admiral Lake) is arbitrary and capricious, not appropriate, and impractical.

Reference: Draft Permit, Pages 9, 14, 15, 20, 21;
Minn R. 7001.1060;
Minn. R. 7001.1080 Subp. 5;
EPA Permit Writers' Manual, Section 8.1.2

U. S. Steel Position:

SW005 (Little Sandy Lake Inlet) and SW007 (Admiral Lake) are both monitoring points in same receiving stream, and therefore SW007 (Admiral Lake) is redundant and not necessary.

Insufficient information exists regarding the groundwater flow patterns and groundwater-surface interactions along the Sand River prior to the Twin Lakes to know at what point the river has ceased receiving tailings impacted contributions. Because of this fact and also for same reason as listed for the selection of Timber Creek compliance point SW006

(see Page 15 of draft fact sheet), SW005 (Little Sandy Lake Inlet) is a better compliance point because 'it would allow for assessment of impacts from possible groundwater and surface water contamination that could occur along almost the full length of the stream'. SW005 is also easily accessible, has channelized flow and existing infrastructure that allows for flow measurements.

If SW007 (Admiral Lake) was used, the permit would have to include a compliance schedule that allows for development of site access roads as well as infrastructure improvements that would facilitate flow monitoring. The compliance schedule would also need to include the time to acquire the necessary permits. The use of SW007 would not only require a lengthy compliance schedule, but also require significant cost/capital expenditures as well.

Minn. R. 7001.1080 Subp. 5 states that "the commissioner shall establish appropriate monitoring and reporting of monitoring requirements to ensure compliance with permit limitations." Proposed monitoring at SW007 (Admiral Lake) is arbitrary and capricious, not appropriate, and impractical for the following reasons:

1. SW007 and SW005 compliance monitoring points are substantially identical and characterize the same discharge. If the effluent from two outfalls is substantially identical, MPCA shall allow the discharger to sample from one of them instead of both. *See* Minn R. 7001.1060. Because the effluent at SW007 and SW005 is substantially identical, U. S. Steel has no obligation, nor is there a regulatory reason, to sample from both of these
locations.

2. SW007 is not safely accessible to U. S. Steel and/or MPCA. Monitoring and compliance locations are required, both by USEPA by MSHA, to have safe access for both the permittee and the
permitting Agency. *See* EPA Permit Writers' Manual at Section 8.1.2.

3. No time is included in the compliance schedule to establish a monitoring point at this location. Time is needed to construct roads to and infrastructure at the monitoring point and to obtain additional permits, including wetland mitigation and potentially Work in Public Waters and a Permit to Mine amendment.

4. The inclusion of a monitoring point at SW007 would require impacts to wetlands to establish and gain safe access. Before wetlands are impacted, avoidance measures must be considered, including sampling at an alternate location already required by the permit. No wetland impacts are expected to establish a monitoring station at SW005.

5. There is no defined channel or means to obtain flow measurement at SW007. A compliance schedule would be needed to design and install infrastructure cabable of flow measurement, possibly including wetland and/or Work in Public Waters permitting, and also potentially a Permit to Mine amendment.

Requested Change:
U. S. Steel requests that compliance monitoring point SW007 be removed in its entirety. If MPCA declines to remove SW007, then U. S. Steel requests time to establish a monitoring point at this location. The schedule must include time allowance for all required permits, agreements and permissions, infrastructure improvements for safe access as well as flow measurement, internal capital approval, engineering design, etc. If SW007 is left in the permit, then U. S. Steel requests that SW005 be removed from the permit in its entirety due to the fact that it is substantially similar to SW007 and in the same receiving water.

32. Issue: Proposed monitoring point SW001 (Station 701) is arbitrary and capricious.

Reference: Draft Permit, Pages 9, 14, 15, 20, 21;
Minn R. 7001.1060;
EPA Permit Writers' Manual, Section 8.1.2

U. S. Steel Position:

Minn. R. 7001.1080 Subp. 5 states "the commissioner shall establish appropriate monitoring and reporting of monitoring requirements to ensure compliance with permit limitations." Proposed monitoring at SW001 (Station 701) is arbitrary and capricious for the following reasons:

1. SW001, SW005 and SW007 compliance monitoring points are substantially identical and characterize the same discharge. If the effluent from two outfalls is substantially identical, MPCA shall allow the discharger to sample from one of them instead of both. *See* Minn R. 7001.1060. Because the effluent at SW001, SW005 and SW007 is substantially identical, U. S. Steel has no regulatory obligation to sample from all of these locations.

There is no regulatory reason to monitor or impose limits at SW001 (Sandy River Station 701). SW001 (Sandy River Station 701) is redundant because of proposed compliance points SW005 (Little Sandy Lake Inlet) and SW007 (Admiral Lake) are both upstream in same water body.

As stated in the draft fact sheet, SW001 (Sandy River Station 701) sampling is required so 'that the gross pollutant loading to the Sand River can be monitored and compared to a significant period of record to assess the ongoing impact of the tailings basin…' Although this information may be of interest to the MPCA, there is no regulatory requirement, all compliance is measured upstream at SW005 (Little Sandy Lake Inlet) and SW007 (Admiral Lake).

MPCA also states that sampling at SW001 (Sandy River Station 701) is required to 'determine whether limits are needed to protect surface water along this portion of the Sand River.' There is already enough historical data (i.e. several decades) that shows there is no compliance issues at this location. Further, U. S. Steel has no control over tributary inputs to the Sand River between the Minntac tailings basin and SW001. It is possible that a future water quality standard exceedances at the SW001 location could result from tributary inputs to the Sand River completely unrelated to the Minntac operation. Since compliance monitoring will take place at the compliance points much closer to the facility, this additional monitoring requirement is extremely time consuming, costly and would result in an unnecessary data set.

There is no regulatory reason to monitor at SW001 (Sand River at highway 53). SW001 is redundant because of proposed compliance points SW005 (Inlet Little Sandy) and SW007 (Admiral Lake) are both upstream in same water body. As stated in the draft fact sheet, SW001 sampling is required so 'that the gross pollutant loading to the Sand river can be monitored and compared to a significant period of record to assess the ongoing impact of the tailings basin…' Although this information may be of interest to the MPCA, there is no regulatory requirement, all compliance is measured upstream at SW005 (Inlet Little Sandy) and SW007 (Admiral Lake).

MPCA also states that sampling at SW001 is required to 'determine whether limits are needed to protect surface water along this portion of the Sand River.' There is already enough historical data that shows there is no compliance issues at this location.

The sampling requirements are beyond those that are needed to ensure that monitoring if "sufficient to yield representative data to determine whether there is compliance with the terms and conditions of the permit or compliance with Minnesota and federal pollution control statutes and rule."

Requested Change:
U. S. Steel requests that compliance monitoring point SW001 be removed in its entirety. If SW001 is left in the permit, then U. S. Steel requests that SW005 and SW007 be removed from the permit in its entirety due to the fact that they are substantialy similar to SW001 and in the same receiving water.

33. Issue: Proposed monitoring point SW006 (Timber Creek) is arbitrary and capricious.

Reference: Draft Permit, Pages 9, 15, 21;
Minn. R. 7001.1080 Subp. 5;
Minn R. 7001.1060

U. S. Steel Position:
Minn. R. 7001.1080 Subp. 5 states "the commissioner shall establish appropriate monitoring and reporting of monitoring requirements to ensure compliance with permit limitations." Proposed monitoring at SW006 (Timber Creek) is arbitrary, not appropriate, and/or impractical for the following reasons:

1. SW006, SD001, SW008 and SW003 compliance monitoring points are substantially identical and characterize the same discharge. If the effluent from two outfalls is substantially identical, MPCA shall allow the discharger to sample from one of them instead of both. *See* Minn R. 7001.1060. Because the effluent at SW006 and SW003 is substantially identical, U. S. Steel has no regulatory basis to sample from both of these locations.

2. SW006 likely does not account for deep seepage and therefore does not accurately characterize
Minntac's effluent. Insufficient information exists regarding the groundwater flow patterns and groundwater-surface interactions along the streams immediately adjacent to the Minntac tailings basin west perimeter dike to know at what point the river has ceased receiving tailings impacted contributions. Because of this fact and also for same reason as listed on page 15 of draft fact sheet, SW003 (Dark River CR668) is a more appropriate compliance point because 'it would allow for assessment of impacts from possible groundwater and surface water contamination that could occur along almost the full length of the stream'. SW003 is also easily and safely accessible, has channelized flow and existing infrastructure that allows for flow measurements.

3. SW006 is not safely accessible to U. S. Steel and/or MPCA. Monitoring and compliance locations should be safe and accessible to both the permittee and the permitting Agency. *See* EPA Permit Writers' Manual at Section 8.1.2.

4. No time is included in the compliance schedule to establish a monitoring point at this location. Time is needed to construct roads and infrastructure at the monitoring point and to obtain additional permits, including for the impact to wetlands.

5. The inclusion of a monitoring point at SW006 would require impacts to wetlands to establish and gain safe access. Before wetlands are impacted, avoidance measures must be considered, including sampling at an alternate location already required by the permit.

7. The proposed limits at SW006 are established per standards that do not have any existing or historical use.

8. There is no channelized flow in Timber Creek, making it impossible for Minntac to collect accurate flow data without making substantial changes to Timber Creek.

9. Once a Seepage Collection and Return System (SCRS) is installed on the west side of

the tailings basin, there will be no surface water impact from the Minntac tailings basin at SW006.
The time required for U. S. Steel to complete permitting and construct the west side SCRS is likely similar to the time required to complete permitting and establish a monitoring point at SW006; therefore, it is unnecessary to include a compliance point at this location for this interim period.

10. SW006 is being established to monitor for compliance with Class 3C (industrial consumption) and Class 4A (agricultural) standards. However, the Class 3C and Class 4A beneficial uses do not currently exist and will not exist in the forseeable future at any point along Timber Creek as this is on U. S. Steel property and subject to a Permit to Mine by the DNR. Therefore, monitoring to assess compliance in support of non-existant beneficial uses is arbitrary, inappropriate and unnecessary.

Requested Change:
U. S. Steel requests that compliance monitoring point SW006 be removed in its entirety. If MCPA declines to remove SW006, then U. S. Steel requests time to establish a monitoring point at this location. The schedule must include time allowance for all required permits, agreements and permissions, infrastructure improvements for safe access as well as flow measurement, internal capital approval, engineering design, etc. U. S. Steel requests 12 months from receipt of all permits for data collection to begin. Likewise, if SW006 is left in the permit, then U. S. Steel requests that SW003 and SW008 be removed from the permit in its entirety due to the fact that they are substantialy similar to SW006 and in the same receiving water.

34. Issue: Proposed monitoring point SW008 (Dark River near Basin) is arbitrary and capricious

Reference: Draft Permit, Pages 9, 15, 21, 42
Minn. R. 7001.1080 Subp. 5;
Minn R. 7001.1060;
EPA Permit Writers' Manual at Section 8.1.2.

U. S. Steel Position:
Minn. R. 7001.1080 Subp. 5 states "the commissioner shall establish appropriate monitoring and reporting of monitoring requirements to ensure compliance with permit limitations." Proposed monitoring at SW008 (Dark River near Basin) is arbitrary, not appropriate, and/or impractical for the following reasons:

1. SW008, SW003, SW006 and SD001 compliance monitoring points are substantially identical and characterize the same discharge. If the effluent from two outfalls is substantially identical, MPCA shall allow the discharger to sample from one of them instead of both. *See* Minn R. 7001.1060. Because the effluent at SW008, SW003, and SD001 is substantially identical, U. S. Steel has no regulatory obligation to sample from both of these locations.

2. Once a Seepage Collection and Return System (SCRS) is installed on the west side of the tailings basin, there will be no surface water impact from the Minntac tailings basin at SW008.
The time required for U. S. Steel to complete permitting and construct the west side SCRS is likely similar to the time required to complete permitting and establish a monitoring point at SW008; therefore, it is unnecessary to include a compliance point at this location for this interim period.

3. SW008 likely does not account for all deep seepage and therefore does not accuractly characterize
Minntac's effluent. Insufficient information exists regarding the groundwater flow patterns and groundwater-surface interactions along the streams immediately adjacent to the Minntac tailings basin west perimeter dike to know at what point the river has ceased receiving tailings impacted contributions. Because of this fact and also for same reason as listed on page 15 of draft fact sheet, SW003 (Dark River CR668) is a better compliance point because 'it would allow for assessment of impacts from possible groundwater and surface water contamination that could occur along almost the full length of the stream'. SW003 is also easily and safely accessible, has channelized flow and existing infrastructure that allows for flow measurements.

4. SW008 is not safely accessible to U. S. Steel and/or MPCA. Monitoring and compliance locations should be safe and accessible to both the permittee and the permitting Agency. *See* EPA Permit Writers' Manual at Section 8.1.2.

5. No time is included in the compliance schedule to establish a monitoring point at this location. Although the draft permit indicates that 'Station SW008 shall be taken in the Dark River in the vicinity of the abandonded road…', no such road exists. Time is needed to construct roads and infrastructure at the monitoring point and to obtain additional permits, including for the impact to wetlands.

6. The inclusion of a monitoring point at SW008 would require impacts to wetlands to establish and gain safe access. Before wetlands are impacted, avoidance measures must be considered, including sampling at an alternate location already required by the permit.

8. The proposed limits at SW008 are established per standards that do not have any existing or historical use.

9. There is no channelized flow in Dark River near this location, making it impossible for Minntac to collect accurate flow data without making substantial changes to Dark River at this location.

10. SW006 is being established to monitor for compliance with Class 3C and Class 4A standards. However, the Class 3C and Class 4A beneficial uses do not currently exist and will not exist in the forseeable future at any point along Timber Creek as it is located on

U. S. Steel property and subject to a Permit to Mine from the DNR. Therefore, monitoring to assess compliance in support of non-existant beneficial uses is arbitrary, inappropriate and unnecessary.

Requested Change:
U. S. Steel requests that compliance monitoring point SW008 be removed in its entirety. If MCPA declines to remove SW008, then U. S. Steel requests time to establish a monitoring point at this location. The schedule must include time allowance for all required permits, agreements and permissions, infrastructure improvements for safe access as well as flow measurement, internal capital approval, engineering design, etc. U. S. Steel requests 12 months from receipt of permits for data collection to begin. Likewise, if SW008 is left in the permit, then U. S. Steel requests that SW003 and SW006 be removed from the permit in its entirety due to the fact that they are substantialy similar to SW008 and in the same receiving water.

35. Issue: The requirement to monitor for sodium and potassium is unnecessary, arbitrary and capricious.

Reference: Draft Permit, Pages 13, 14, 15, 18, 19, 20, 42

Draft Fact Sheet, Page 32

U. S. Steel Position:

U. S. Steel is already complying with the standard that sodium needs to be less than 60% of the total cations based on historical sampling results and the nature of the Minntac recirculating process water which passes through the tailings basin. From two sampling events at SD001 during 2014 for total and dissolved cations (calcium, magnesium, potassium and sodium), the percentage of sodium with respect to total cations ranged from 12.5% to 12.6%. Similar percentages were measured from sampling of the Dark River at County Road 668 during 2011 - 2014. Analysis of thirteen samples resulted in sodium accounting for 10.1% - 13.6% of the total cations measured. Furthermore, magnesium and calcium dominate the cation composition so monitoring of potassium is also unnecessary. For the 2014 SD001 data described above, the corresponding potassium percentages ranged from 3.6% to 3.7%.

Requested Change:

U.S. Steel requests that all monitoring for dissolved potassium and total sodium be removed. At a minimum the dissolved potassium monitoring requirements should be removed.

36. Issue: Flow measurements at all surface water stations are arbitray and capricious.

Reference: Draft Permit, Pages 12, 13, 14, 15, 17, 18, 19, 20

Draft Fact Sheet, Pages 17

U. S. Steel Position:

The water quality standards, and therefore the limits included as permit conditions, are concentration based. Therefore compliance can be determined simply by analyzing the grab samples required by the permit. Although flow might be interesting information, and may potentially inform where contaminant mass may be entering the system, there is no regulatory basis for requiring the flow monitoring and does not specifically address compliance with applicable standards at the points of compliance.

Requested Change:

U. S. Steel requests that all flow measurement requirements associated with the surface water stations be removed from the permit.

37. Issue: The Class 4B narrative standard for sulfate should not be included as a numeric limit in the permit.

Reference: Draft Permit, Pages 18, 19, 20

U. S. Steel Position:

MPCA has imposed a sulfate effluent limit of 1,000 mg/L at all of the proposed surface water monitoring stations based on interpretation of the following narrative statements found in Minn R. 7050.0224, subp. 3:

> "The quality of Class 4B waters of the state shall be such as to permit their use by livestock and wildlife without inhibition or injurious effects," and
>
> "Additional selective limits may be imposed for any specific waters of the state as needed."

MPCA did not follow legal procedure to impose numeric limits in the permit. In order to establish a numeric limit based on narrative criteria in the permit, the permit writer must follow the procedure for establishing limits based on BPJ. These factors include:

The quality of Class 4B waters are outlined in Minn. Rules, part 7050.0224, subpart 3 to permit the water bodies use "by livestock and wildlife without inhibition or injurious effects." Based on water quality monitoring conducted by U. S. Steel, lands adjacent to Timber Creek and the upper Dark River are not currently used for agricultural livestock purposes and will not be used for such purposes in the foreseeable future based on the current land ownership and use.

However, these lands have conditions conducive to the support of wildlife typical to northeastern Minnesota. Stands of mix spruce/fir, birch and black spruce are present in the watersheds near the tailings basin, with various areas containing abundant aspen and pine stands throughout the watershed. These diverse upland and lowland habitats provide likely habitat for a variety of species that have been known to occur in northeastern Minnesota. Canada geese, pelicans, cormorants and other waterfowl are common in and around the Minntac tailings basin. Beaver activity is also prevalent in the area. Wolves, moose, black bear, bald eagles, ravens, and deer are frequent visitors to the Minntac tailings basin and adjacent lands.

Due to the presence of wildlife and the supporting habitat conditions discussed above, Timber Creek and the upper Dark River support the wildlife that is present in the area and suggests that the various wildlife species common to this area are acclimated to this environment. When applying the narrative water quality standards, consideration must be made that the only use in the Timber Creek and Dark River watershed is for acclimated wildlife. Wildlife is acclimated to this source and able to seek out other nearby water sources as necessary. Sulfate levels in Dark River have been relatively high as compared to background over the past two decades and there have been no detrimental effects observed on the resident wildlife population.

Alternatively, MPCA must complete the rulemaking process for establishing a numeric sulfate standard to be included in the Class 4B water quality standards. For example, Illinois followed the applicable rulemaking process for development and implementation of a suflate standard for waters that are withdrawn or accessed for the purposes of lifestock watering.

EPA's NPDES Permit Writers Manual states that Water Quality Based Effluent limits in permits involve site-specific evaluation of the discharge and its effect on the receiving water."[5] For NPDES permit purposes, 40 CFR Section 122.44 (d)(vi)(B) provides guidance for the state to follow when it has not, as here, established a concentration based water quality criterion. EPA NPDES permitting requlations provide that in such a case the MPCA should "establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under section 304(a) of the CWA, supplemented where

[5] EPA NPDES Permit Writers Manual Chapter 6, Section 6.2.1.

necessary by other relevant information."40 CFR Section 122.44 (d)(vi)(B). Under Minnesota law the MPCA has two choices to implement the NPDES requirements or related SDS requirements for converting a narrative standard into a concentration based water quality standard. First, if the concentration based water quality criterion is to be adopted as a standard of general applicability and future effect it must be adopted as a rule. Second, the MPCA can establish a concentration based critierion on a case-by-case basis. Since MPCA has not initiated or completed a rulemaking process adopte the 1,000 mg/L concentration limit as a limit of general applicability or future effect the MPCA cannot impose the limit in the permit absent information showing that it is an appropriate site-specific standard for this facility.

Requested Change:

U. S. Steel requests the numeric sulfate effluent limit for Class 4B waters be removed from the permit.

Alternatively, U. S. Steel requests, in lieu of a sulfate effluent limit of 1,000 mg/L, the following permit condition be included in the permit:

> "The quality of Class 4B waters of the state shall be such as to permit their use by livestock and wildlife without inhibition or injurious effects."

38. Issue: It is inappropriate to apply Class 3C and 4A water quality standards to Timber Creek and portions of Dark River where no use exists (SD001, SW006 and SW008).

Reference: Draft Permit, Pages 9, 13, 15, 19, 21;
Draft Fact Sheet, Page 22
Previously submitted UAA and SSS applications
Minn. R. 7050.0430;
40 CFR § 131.10(g)(3);
40 CFR § 131.10(g)(2&5)

U. S. Steel Position:
MPCA's NPDES/SDS Permit Program Fact Sheet, Permit Reissuance, MN0057207 (Draft Fact Sheet) provides the following definitions for Class 3 waters, industrial consumption: "Industrital consumption includes all waters of the state that are or may be used as a source of supply for industrial process or cooling water…" Similarly, the following definition is provided for Class 4 waters, agriculture: "Agriculture includes all waters of the state that are or may be used for any agricultural purposes, including stock watering and irrigation…" Class 3C (industrial consumption) and Class 4A (agricultural irrigation) designated

beneficial uses currently assigned to the upper Dark River and Timber Creek have not existed, do not exist and are not reasonably expected to exist in the foreseeable future. Further, these waters are not specifically listed in Minnesota Rules for the 3C and 4A beneficial use classifications, but rather are classified as such by "default," since they are not specifically listed and therefore are classified as per Minn. R. 7050.0430.
In addition, property ownership by U. S. Steel prevents access to the waterbodies in order to withdraw from it and use it for industrial purposes (40 CFR § 131.10(g)(3)), there is insufficient flow in Timber Creek and upper Dark River during all periods of the year to facilitate industrial uses (40 CFR § 131.10(g)(2&5)), and no reliable or cost effective means to treat the water to the Class 3C and 4A water quality standards in Timber Creek and upper Dark River has been identified. For the foregoing reasons, U. S. Steel filed a UAA for the Upper Dark River and Timber Creek in December 2014 to petition MPCA to remove the associated 3C and 4A uses from these waterbodies.

In addition to the UAA, USS also submitted a SSS request that covers the Class 3C and 4A water quality standards as well.

Requested Change:
U. S. Steel requests that all Class 3C and 4A water quality standards be removed for compliance monitoring points on the upper Dark River and Timber Creek (SD001, SW006, and SW008); or, alternatively, provide language in the permit to modify/remove these limits and/or the surface water monitoring stations if a UAA is approved by MPCA without the need for a major permit modification. U. S. Steel requests the following parameters be removed:

Water Use Classification	Water Quality Parameter	Water Quality Standard
3C	Hardness	500 mg/L
4A	Total Dissolved Solids	700 mg/L
4A	Spec. Conductance	1000 umho/cm
4A	Alkalinity	250 mg/L CaCO3

If the agency does not remove the requested standards, then U. S. Steel requests that the Class 3C and 4A limits be modified in accordance with the Site Specific Standard Request that USS submitted in October 2015. U. S. Steel requests the following parameters be modified:

Water ClassificationClass	Water Quality Parameter	Water Quality Standard	Requested Change
3C	Chlorides	250 mg/L	Narrative Standard: 'The water quality shall be such as to permit their use for industrial cooling and materials transport without a high degree of treatment being necessary to avoid severe fouling, corrosion, scaling, or other unsatisfactory conditions. Waters that can support 2B uses will be
3C	Hardness	500 mg/L	
3C	pH	6.0 – 9.0	

			judged as meeting this narrative standard'
4A	Bicarbonate	5 meq/L	Adjusted sodium absorbtion ratio - Adj. RNa = 10
4A	Sodium	60% of cations	
4A	Spec. Conductance	1000 umho/cm	2,000 umho/cm
4A	Total dissolved salts	700 mg/L	Remove

39. Issue: It is inappropriate to apply Class 3C and 4A water quality standards to Admiral Lake and portions of the Sand River where no use exists (SW007).

Reference: Draft Permit, Pages 8, 10, 15, 20
Minn. R. 7050.0430;
40 CFR § 131.10(g)(3);
40 CFR § 131.10(g)(2&5)

U. S. Steel Position:
MPCA's Draft Fact Sheet provides the following definitions for Class 3 waters, industrial consumption: "Industrital consumption includes all waters of the state that are or may be used as a source of supply for industrial process or cooling water…" Similarly, the following definition is provided for Class 4 waters, agriculture: "Agriculture includes all waters of the state that are or may be used for any agricultural purposes, including stock watering and irrigation…" Class 3C (industrial consumption) and Class 4A (agricultural irrigation) designated beneficial uses currently assigned to the Sand River upstream of the Twin Lakes have not existed, do not exist and are not reasonably expected to exist in the foreseeable future. Further, these waters are not specifically listed in Minnesota Rules for the 3C and 4A beneficial use classifications, but rather are classified as such by "default," since they are not specifically listed and therefore are classified as per Minn. R. 7050.0430. In addition, property ownership prevents access to the waterbodies in order to withdraw from it and use it for industrial purposes (40 CFR § 131.10(g)(3)), there is insufficient flow in the Sand River upstream of the Twin Lakes during all periods of the year to facilitate industrial uses (40 CFR § 131.10(g)(2&5)), and no reliable or cost effective means to treat the water to the Class 3C and 4A water quality standards in Sand River upstream of Twin Lakes including Admiral Lake has been identified. For the foregoing reasons, U. S. Steel filed a Site Specific Standard Application in October 2015 to petition MPCA to revise the standards associated with 3C and 4A beneficial uses from these waterbodies.

Requested Change:
U. S. Steel requests that all Class 3C and 4A water quality standards be removed for compliance monitoring points on the Sand River and Admiral Lake (SW007); or, alternatively, language is provided in the permit to modify

these limits if a UAA is approved by MPCA without opening the permit to a major modification. U. S. Steel requests the following parameters be removed:

Water Use Classification	Water Quality Parameter	Water Quality Standard
3C	Hardness	500 mg/L
4A	Total Dissolved Solids	700 mg/L
4A	Spec. Conductance	1000 umho/cm
4A	Alkalinity	250 mg/L CaCO3

U. S. Steel requests that the Class 3C and 4A limits be modified in accordance with the Site Specific Standard Request that USS submitted in 2015. U. S. Steel requests the following parameters be modified:

Water ClassificationClass	Water Quality Parameter	Water Quality Standard	Requested Change
3C	Chlorides	250 mg/L	Narrative Standard: 'The water quality shall be such as to permit their use for industrial cooling and materials transport without a high degree of treatment being necessary to avoid severe fouling, corrosion, scaling, or other unsatisfactory conditions. Waters that can support 2B uses will be judged as meeting this narrative standard'
3C	Hardness	500 mg/L	
3C	pH	6.0 – 9.0	
4A	Bicarbonate	5 meq/L	Adjusted sodium absorbtion ratio - Adj. RNa = 10
4A	Sodium	60% of cations	
4A	Spec. Conductance	1000 umho/cm	2,000 umho/cm
4A	Total dissolved salts	700 mg/L	Remove

40. **Issue: The WET requirement for SD001 is unnecessary and excessive. Additionally, the requirements for U. S. Steel to conduct WET testing on surface water station SW005, and the next active downstream monitoring location if there is no discharge from SD001, is inappropriate.**

Reference: Draft Permit, Pages 33, 34, 35
Draft Fact Sheet, Pages 23, 24
EPA Permit Writer's Manual Section 6.5.3

U. S. Steel Position:

Pursuant to the July 2000 EPA Methods Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing Document, Whole Effluent Toxicity (WET) is defined as "the aggregate toxic effect of an effluent (i.e., discharge) measured directly by an aquatic toxicity test." Therefore the direct sampling of a surface waterbody utilizing the WET test is inappropriate. In addition, toxicity, if measured from a WET result of the surface water station, could be due to another source, and/or could be due to natural causes such as fungus or other natural pathogens not associated with the discharges to the surface water. With respect to performing WET testing on downstream discharges if SD001 is not discharging, U. S. Steel feels this is inappropriate since WET testing results from another location would not be representative of SD001 discharges, nor could it be compared to subsequent tests from SD001. In addition, as discussed above, SD001 may be eliminated with the implementation of the Dark River SCRS.

According to the EPA Permit Writer's Manual Section 6.5.3, comprehensive WET Testing frequency is only required when the discharge has the reasonable potential to exceed water quality standards. WET testing completed on samples from SD001 (September 30, 2014) resulted in no acute or chronic toxicity; therefore, no reasonable potential to exceed standards exists.

Requested Change:

Remove the SD001 WET requirements or at a minium reduce the frequency to once per year throughout the permit term.

Remove the SW005 WET testing requirements and remove the requirement that WET testing needs to be performed on the next active downstream monitoring station if there is no discharge from SD001. As discussed above, U. S. Steel anticipates the WET testing requirements will be removed if SD001 is eliminated.

41. Issue: Interim effluent limits are not required and are not appropriate where a technology is not present

Reference: Draft Permit, Pages 11, 12, 13, 14, 15, 21
Minn. R. 7052.0260
EPA Permit Writer's Manual

U. S. Steel Position:

Discharges should not be included in NPDES permit and subject to NPDES rules.

For GLI parameters ("pollutants of concern," as designated in the GLI rules), interim limits are required if a permit is issued with a compliance schedule that lasts beyond the term of the permit (Minn. R. 7052.0260). For other compliance schedules, interim "requirements" and compliance dates are required if the schedule is longer than one year, but the rules do not state that interim "limits" are required (40 CFR 122.47(a)(3))

MPCA has issued a statement indicating that if the waterbody is impaired, then the compliance schedule must include interim limits, to ensure that the discharge does not contribute further to the impairment.

Minnesota Rules 7001.0140 subpart 2 provides that the agency shall issue, reissue, revoke and reissue, or modify a permit if the agency determines *that the proposed permittee or permittees will*, with respect to the facility or activity to be permitted, comply or will *undertake a schedule of compliance to achieve compliance* with all applicable state and federal pollution control statutes and rules administered by the agency, and conditions of the permit and that all applicable requirements of Minnesota Statutes, chapter 116D." The MPCA cannot determine that undertaking compliance schedules to achieve intermim limits will be an undertaking "to achieve compliance" when no technology exists to control discharge, and compliance would be out of U. S. Steel's control in many cases. Corrective actions would be unknown if a violation of interim limits occurred.

Requested Change:

U. S. Steel requests all interim limits contained in the permit as well as conditions related to calculation of interim limits after 1 year of sampling be removed and replaced with interim progress reports during the course of the compliance schedule.

Chapter 1 – Compliance Schedules

42. **Issue: Proposed compliance schedule is arbitray and capricious.**

Reference: Draft Permit, pages 22 - 27

U. S. Steel Position:
The draft permit contains a wide variety of compliance points, limits and monitoring requirements that are outside the bounds of a proper compliance schedule. For example, given the ongoing activities and the pending tasks to gather information on local

hydrogeology, it is not appropriate for the MPCA to include in the permit a compliance schedule related to deep seepage. Similarly the MPCA cannot yet define the sulfate concentrations necessary to comply with water quality standards applicable at the U.S. Steel property boundary

Minnesota rules provide significant guidance on the appropriate use of a compliance schedule or schedule of compliance, all of which show that a compliance schedule requires definition of "compliance" that MPCA has not yet produced. Signficant portions of the compliance schedules are not connected with a compliance target defined by MPCA rules but are rather information gathering activities of compliance points based on estimates without supporting calculations.

Under Minnesota Rules 7000.0100 "Schedule of compliance" means "a schedule of remedial measures including an enforceable sequence of actions or operations *leading to compliance with an effluent limitation, other limitation, prohibition, or standard.*" Minnesota Rules 7001.0100 subpart 2 provides that "if the preliminary determination is to issue a permit, the commissioner shall prepare a draft permit, including a proposed schedule of compliance *if a schedule is necessary to meet all applicable standards and limitations imposed by statute or rule.*" Minnesota Rules 7001.0140 subpart 2 provides that the agency shall issue, reissue, revoke and reissue, or modify a permit if the agency determines that the proposed permittee or permittees will, with respect to the facility or activity to be permitted, comply or will undertake a schedule of compliance *to achieve compliance* with all applicable state and federal pollution control statutes and rules administered by the agency, and conditions of the permit and that all applicable requirements of Minnesota Statutes, chapter 116D." Minnesota Rules 7001.0150 subpart 2.A. says that the special conditions of a permit must include "A schedule of compliance that *leads to compliance* with the appropriate Minnesota or federal statute or rule." U. S. Steel understands the need to develop an understanding of the fate and transport of sulfate and other parameters associated with the tailings basin and continues to work with state agencies on these issues. MPCA cannot, however, yet define what actions will "lead to compliance" or what specific actions are "necessary to meet all applicable standards and limitations."

Significant work is already ongoing pursuant to the 2014 Permit to Mine amendment administered by the DNR that is sufficient to satisfy the MPCA's information gathering needs regarding deep seepage. As that work proceeds the MPCA will be able to develop a record supporting a compliance goal upon which a compliance schedule can be based. In addition, the MPCA cannot support a compliance schedule directed towards reaching targets of sulfate concentrations in the tailings basin until it has information showing that those concentrations have been calculated and show that they are supported by a conclusion that they are necessary to achieve compliance with a specific state standard.

Requested Change:
U. S. Steel requests that the MPCA review and revise compliance schedules in the draft permit to more properly reflect the purpose of compliance schedules in Minesota rules.

43. Issue: Proposed Compliance Schedule related to Deep Seepage – Investigation Work Plan is arbitrary, over-reaching, overly burdensome, and not necessary

Reference: Draft Permit, Pages 22 - 27

U. S. Steel Position:

U. S. Steel has been working with the MN DNR over the past 3 years to advance the understanding of the transport and fate of sulfate associated with the Minntac tailings basin through the DNR's MWRAP research program. In addtition, as per Special Condition No. 6 of the January 22, 2014 Permit to Mine Amendment issued by DNR, U. S. Steel is required to develop a plan such that tailings basin operating and closure conditions can be predicted. The Minntac Tailings Basin Closure Water Quality & Quantity Work Plan (Plan) was completed and submitted to DNR in June 2015. Work on the Plan continues under the supervision of the DNR and will incorporate the MWRAP findings. The Plan will provide the same information that is required by the proposed Deep Seepage – Investigation Work Plan. Even though a considerable amount of time and effort has already been expended to advance the understanding of tailings basin constituent transport and fate, it is widely recognized that completion of the Plan and development of the tools needed to accurately predict closure conditions, and the impact of changing conditions on downstream water quality, will require significantly more effort in terms of time, resources and manpower.

The requirement of a separate investigation work plan which duplicates a permit condition from another regulatory agency is redundant and a waste of limited resources. For the reasons described above, the timeframe layed out by the Compliance Schedule for completion of the investigation work plan is completely unreasonable. Since U. S. Steel has no control over natural processes within the receiving waters beyond the tailings basin perimeter dike, it is not possible to predict aggregate acute and chronic toxic effects to aquatic organisms at downstream monitoring stations. Due to the disconnected nature of the tailings basin clear pool from seepage to the west of the perimeter dike, it will take extensive investigative research to develop a predictive tool that can be used to accurately forecast downstream compliance limits within Timber Creek and the Upper Dark Rvier based on clear pool sulfate concentrations. Given the complexities of the Minntac tailings basin, the requirement that a conceptual model be developed that will predict mass of

constituents emanating from the tailings basin and travel times to within plus or minus 10% within the proposed timeframes is not feasible.

Requested Change:

U. S. Steel requests that the Deep Seepage – Investigation Work Plan be removed from the Compliance Schedule, in lieu of work already required by Special Condition 6 of the 2014 Permit to Mine Amendment administered by the MN DNR.

44. Issue: Required sampling and flow measurements for the calculation of mass flux that 'could be used to determine where contaminant mass may be entering the river system' is not appropriate and is unnecessary

Reference: Draft Fact Sheet , Page 17

U. S. Steel Position:

The water quality standards, and therefore the limits included as permit conditions, are concentration based. Constituent mass is not indicative of complance with a concentration standard and therefore is not appropriate and unnecessary. Although calculation of mass flux might be interesting information, and may potentially inform where contaminant mass may be entering the system, there is no regulatory basis for requiring the calculation of mass flux and does not specifically address compliance with applicable standards at the points of compliance.

Requested Change:

U. S. Steel requests that the requirements for a system mass balance that accounts for the transport or transformation of parameters of concern and travel times be removed from the permit. Alternatively, allow U. S. Steel to determine site investigation needs during execution of the compliance schedule.

45. Issue: Chapter 1, Background Section 1.1.a discusses interim and final limits on the tailings basin pool water

Reference: Draft Permit, Page 22

U. S. Steel Position:

As previously stated, U. S. Steel disagrees with compliance limits being placed on the tailings basin clear pool. A compliance schedule should be utilized for a documented non-compliance, not for the agency to arbitrarily add conditions however they see fit. Since the tailings basin is not a water of the state, and compliance limits are placed on groundwater wells at the property boundary, this section is unnecessary.

Requested change:

U. S. Steel requests that section 1.1.a be deleted.

46. Issue: Chapter 1, Background Section 1.3 requires the permittee to specify by month 37 final compliance dates for all pollutants

Reference: Draft Permit, Page 22

U. S. Steel Position:
It is difficult to even understand what this section is discussing as it does not list compliance locations or parameters that are subject to the requirement. Although it is a background section it lacks required specificity for a permittee or the general public to even understand what is being requested, and therefore it serves no purpose.

Requested change:
U. S. Steel requests that section 1.3 be deleted.

47. Issue: Chapter 1, Background Section 1.5 requires installation of Dark River Seep Collection and Return no later than December 31, 2017

Reference: Draft Permit, Page 22

U. S. Steel Position:
MPCA is well aware that several permits are required by multiple regulatory agencies prior to U. S. Steel having all of the necessary authorizations to construct the Dark River Seep Collection and Return project. U. S. Steel has no control over when permits are ultimately issued as it is a function of both agency resources and requirements, and public input. The permit condition as written ignores that and seems to implicate that the

decision to construct is solely U. S. Steel's. U. S. Steel will not construct without having all regulatory authorizations received as it is unlawful to do otherwise.

Requested change:
U. S. Steel requests the following changes to section 1.5: "...and for all such seepage along the west and northwest dam boundary, no later than 8 consecutive construction season months, during one or more construction season(s), after receipt of all necessary regulatory approvals." Also, the required installation date should be from permit effective date, not a specific date as stated in the permit.

48. Issue: Chapter 1, 1.6-1.11 of the permit requires a deep seepage investigation work plan

Reference: Draft Permit, Page 22, 23

U. S. Steel Position:
As previously stated, although this section is a compliance schedule, MPCA does not indicate what parameters or compliance locations are being discussed as compliance issues. Therefore, the permit conditions from 1.6-1.11 are difficult to comment on as MPCA has not clearly stated what compliance points are being discussed. The conditions talks about "parameters of concern", but nowhere does this section list compliance locations and parameters for which the facility needs a compliance schedule. Although MPCA may have parameters for which they feel they have concerns, a compliance schedule is used for a facility to resolve non-compliance issues, not conduct a research project for an entire facility on the whim of an agency.

The plan is required to be submitted within 30 days of permit issuance, which is an extremely short window of time for the magnitude of information required to be in the plan. In addition, Section 2.1 requires that U. S. Steel meet with the MPCA three months prior to a plan submittal to present a draft plan. The permit is currently written that if U. S. Steel can not accurately predict the issuance date of the permit in order to meet at least two months prior to that, a trap has been set and we will be considered non-compliant. The schedule is also wholly inappropriate as the permit requires installation of the Dark River Seep Collection and return system which would not be operating prior to the site investigation. This schedule would result in necessitating the work be redone to more accurately capture site conditions after startup of the seep collection system.

Requested change:

Unless or until MPCA can clearly delineate the regulatory purpose behind the request for an Investigation Work Plan, including specific compliance locations and parameters for which non-compliance exists, Sections 1.6-1.11 should be deleted.
If MPCA chooses to clarify the locations and parameters for which non-compliance exists and the Plan would be required for, more time is needed to complete the requirements. Due to section 2.1, the plan should be due at a minimumof 6 months after issuance (section 1.6).

49. Issue: Chapter 1, section 1.12-1.14 requires a Basin Treatment Methods Study Plan

Reference: Draft Permit, Page 24

U. S. Steel Position:
As stated multiple times, U. S. Steel disagrees with the inclusion of compliance limits on the tailings basin clear pool. Requiring a basin treatment plan is not necessary as it does not indicate compliance at the compliance points, and clearly has no regulatory or technical basis other than MPCA thinks the basin concentration should be reduced. The MPCA states in section 1.12 "an alternative to the 357 mg/L interim limit may be established if additional site investigation and modeling demonstrates that the alternative concentration will achieve compliance will all applicable groundwater and surface water quality standards, and MPCA has reviewed and approved this alternative concentration." This statement is very unsettling for multiple reasons. The permit as written indicates that the 357 mg/L sulfate limit is a final limit, but is listed here as an interim. Does MPCA plan to change the limit yet again? Also, although the condition says "all applicable. . . . standards" the 357 mg/L is only for sulfate, and was related just to the groundwater sulfate standard at the property boundary at GW012. Additionally, natural background levels for iron and manganese are over the groundwater standards. Is MPCA indicating that U. S. Steel will be required to reduce levels of background constituents in groundwater? Clearly, little thought has been put into this section and since compliance limits are being applied to the actual compliance points, requiring study of treatment technologies for the basin is a waste of resources with no regulatory basis.

Requested change:
U. S. Steel is requesting to delete sections 1.12-1.14 as they do not relate to compliance at the compliance points.

50. Issue: Chapter 1, SDS Schedule for Deep Seepage – Final Compliance Plan, Final Plans and Specs and System Implementation or Construction (1.15-1.21)

Reference: Draft permit, Pages 25-26

U. S. Steel Position:
Again, the entire section does not list compliance issues but for the limits applied to the tailings basin clear pool. Although compliance points are located outside the basin this section does not reference those and instead focuses on the clear pool which does not indicate compliance at all compliance points. Since MPCA has again not indicated what compliance points and parameters are being evaluated, the inclusion of these conditions in a compliance schedule is arbitrary and sets a trap for the permittee being out of compliance with an unknown requirement as it has not been specified. Any discussion of closure is inappropriate as it is regulated under the DNR Permit to Mine, for which extensive work is being conducted, and is not appropriate for a five-year permit.

Requested change:
Unless or until MPCA can clearly delineate the compliance points required to be evaluated, these sections should be deleted.
If MPCA chooses to clarify the locations and parameters for which non-compliance exists and the Plan would be required for, more time is needed to complete the requirements. All references to closure should be deleted. Section 1.16a should be deleted as the tailings basin concentration fluctuates and is moot related to compliance points.

51. Issue: Appropriate time to complete required wetland and other permitting has not been incorporated into the compliance schedule

Reference: Draft Permit, Pages 22 - 51

U. S. Steel Position:

The draft permit requires implementation of several new monitoring locations, several of which are in undeveloped areas dominated by wetlands. Establishing safe access to these areas will require wetland permitting and mitigation, followed by construction of access roads. In addition, the results of site investigations or standards revisions may require the need for implementation of additional controls to achieve compliance at locations outside of the tailings basin perimeter dike. Permit language should be included to allow time for application and receipt of wetland permits and all required regulatory approvals/authorizations.

It is unreasonable for the MPCA to establish compliance deadlines without specifically accounting for delays that are are likely. In addition, the MPCA maintains full control over determining when a permit application to the MPCA is sufficiently complete and accurate. The MPCA cannot justify issuing a permit with conditions that impose compliance obligations on the permittee for meeting schedules that are solely controlled by the MPCA. U.S. Steel cannot agree to comply such permit conditions.

Requested Change:

U. S. Steel requests that language be included in the permit to allow time for wetland permitting and application for and receipt of all associated regulatory approvals/authorizations required for implementation of monitoring installations or control equipment in applicable areas outside of the tailings basin perimeter dike.

The permit should therefore be revised as follows:

Chapter 1. Compliance Schedule

2.4. If any of the submitted Plan(s) described herein propose actions requiring permits and/or approvals, the Permittee shall make reasonable efforts to submit complete and accurate applications in the shortest reasonable period of time and comply completely and accurately with any requests for additional information in the timeframes specified in the requests. If the permittee has not made reasonable efforts, delays in permit issuance due to incomplete or inaccurate applications will not excuse failure to meet permit deadlines. Delays in issuance of permits necessary to complete requirements of the permit that are beyond the control of the permittee shall excuse failure to meet permit deadlines that are impacted by delays in permit issuance. The permittee shall cooperate with the MPCA and other relevant government agencies to ensure that the government entity responsible for permit issuance has received all information necessary to act on permit applications.

52. Issue: Permit requirements to meet with MPCA before certain milestones is not realistic within the timeframes proposed in the permit.

Reference: Draft Permit, Page 22 - 51

U. S. Steel Position:

There is not enough time allocated to perform the studies and proposals as well as meet with the agency in the time frames as proposed in the permit.

Requested Change:

U. S. Steel requests that additional time be incorporated into the permit regarding meetings with the MCPCA

53. **Issue:** Separate requirements under the Dark River Seepage Collection and Return System (SCRS) are potentially in conflict

Reference: Draft Permit, Page 26, sections 1.22, 1.24 and 1.26

U. S. Steel Position:

The requirements contained in sections 1.22, 1.24 and 1.26 of the draft permit are potentially in conflict, depending upon the date of final permit reissuance, MPCA review and approval, and regulatory authorization related to wetlands. U. S. Steel agrees that an 8 consecutive construction month schedule for completion and start-up of the SCRS is feasible. However, it is possible that permit issuance, MPCA review and approval, and regulatory authorization for project-related wetlands may not occur early enough to for the SCRS to be constructed and operational by December 31, 2017.

Requested Change:

U. S. Steel requests that Chapter 1, Section 1.26, (page 26 of the draft permit) be deleted.

Chapter 2 – Special Requirements

54. **Issue:** Reference to "subheading 6" in Chapter 2, Section 1.2

Reference: Draft Permit, Page 28 – Chapter 2, Section 1.2

U. S. Steel Position:

It is unknown to what 'subheading 6' refers to.

Request:

U. S. Steel requests that MPCA provide clarification to what is meant by the term 'subheading 6' in the first sentence of Section 1.2: "If concentrations of any secondary parameters identified in **subheading 6** in the proposed source water…"

Chapter 4 – Industrial Process Wastewater

55. Issue: Requirement to include an updated 5-year Operating Plan for the tailings basin for application of future permit reissuance is excessive, arbitrary and beyond the authority of the MPCA

Reference: Draft Permit, page 31, Chapter 4, section 5.3

U. S. Steel Position:

Yearly operating plans for the tailings basin are submitted to the MN DNR as part of the Annual Report requirements of the Permit to Mine. Requiring a five-year projection of future tailings basin operations is redundant and beyond the MPCA's regulatory authority.

Request:

U. S. Steel requests that Chapter 4, Section 5.3 c. be eliminated from the draft permit.

Chapter 5 – Metallic Mining

56. Issue: The Dike Seepage Survey and Survey Report is unduly burdensome and unnecessary.

Reference: Draft Permit, page 32, Chapter 5, Section 5.1, Page 32

U. S. Steel Position:
U. S. Steel is required by the Minnesota Department of Natural Resources (DNR) to complete an annual Tailings Basin Dike Seepage Survey and Report under the Dam Safety program. Requirements to complete a second survey which contains the same information would be unduly burdensome and unnecessary.

Requested Change:
U. S. Steel requests Chapter 5, Section 5.1 (page 32) be removed from the Draft Permit. A copy of the required DNR survey can be made available to MPCA upon request.

Chapter 6 – Mercury Minimization Plan

57. Issue: Mercury Minimization Plan requirement is inappropriate, unduly burdensome, and unnecessary.

Reference: Draft Permit, Page 32, Chapter 6,

U. S. Steel Position:
The requirement that Minntac complete and submit a Mercury Minimization plan is redundant and should be removed from this draft. As a result of the Mercury TMDL process, in September 2016 MPCA finalized the Mercury Air Emission Reduction and Reporting Requirements rule. This rule is applicable to taconite facilities, including Minntac, and requires that facilities complete and submit a plan to reduce mercury emissions. To require another plan to reduce mercury is redundant.

Requested Change:
U. S. Steel requests that Chapter 6 (page 32) be removed from the Draft Permit. A copy of the required plan for the Mercury Air Emission Reduction and Reporting Requirements rule can be made available to the applicable MPCA group upon request.

Chapter 8 – Industrial Stormwater

58. Issue: Stormwater Pollution Prevention Plan inspection requirements are unduly burdensome.

Reference: Draft Permit, Page 37, Chapter 8, Section 5.1

U. S. Steel Position:
Minntac already maintains a Stormwater Pollution Prevention Plan (SWPPP) and bimonthly (every other month) inspection schedule which sufficiently protects surface and groundwater quality from stormwater pollution.

Requested Change:
U. S. Steel requests that Chapter 8, Section 5.1 be revised to: "The Permittee must develop and implement an inspection schedule that includes a minimum of one bimonthly (every other month) facility inspection during non-frozen conditions (March through October)."

Chapter 10 – Surface Discharge Stations

59. Issue: Dark River Seepage Collection and Return System should be required to collect and return collected surface seepage only.

Reference: Draft Permit, Page 41, Chapter 10, Section 3.4

U. S. Steel Position:

The Dark River Seepage Collection and Return System is designed to collect all surface and shallow groundwater seepage that formerly reported to SD001. In addition, return flow from the Dark River SCRS will be discharged to a swale that carries fine tailings decant flow back to the clear pool reservoirs located on the north and east side of the tailings basin.

Request:

U. S. Steel requests that Chapter 10, Section 3.4 (page 41 of draft permit) be revised to read: "Upon Completion of construction of the Dark River Seepage Collection and Return System and commencement of its operation, all ~~water~~ '**surface and shallow groundwater seepage**' formerly reporting to SD001 will be captured and pumped back into the tailings basin ~~clear pool~~, effectively eliminating the discharge through the currently permitted outfall."

Chapter 11 – Surface Water Stations

60. Issue: The Final Limits for Class 3 and Class 4A Parameters is unclear and poorly written.

Reference: Draft Permit, Page 42, Chapter 11, Section 2

U. S. Steel Position:

A monitoring schedule is outlined defining when violations of permit conditions related to final limits for Class 3 and Class 4 constituents may occur at suface water monitoring stations. However, the scheme to determine compliance is convoluted and there is no definitive indication of when the final period of compliance applies.

Request:

U. S. Steel requests that a more clear explanation be provided of what constitutes compliance with respect to the Class 3 and Class 4A water quality standards and the applicable surface water monitoring stations.

61. **Issue: Sampling required at mid-stream, mid-depth may not be practical or feasible from a safety perspective, and reporting of location, date, time and results for each sample on a supplemental DMR form is overly burdensome, unnecessary, arbitrary and capricious.**

Reference: Draft Permit, Page 42, Chapter 11, Section 4.8

U. S. Steel Position:

Chapter 11, Section 4.8 specifies that: "Samples shall be taken at mid-stream, mid-depth. Record location, date, time and results for each sample on the supplemental Discharge Monitoring Report form." Collecting samples from mid-stream, mid-depth is not feasible at all monitoring locations and at all times, especially with respect to certain required sampling procedures. Certain procedures require that samples be collected directly into the bottle without intermediate transfer, which would be impossible at some monitoring locations.

Recording the location, date, time and results for each sample on a supplemental DMR serves no useful purpose and is a waste of limited resources. All backup monitoring information kept on file and is readily available upon request.

Request:

U. S. Steel requests that Chapter 11, Section 4.8 be revised to: "Samples shall be taken at mid-stream, mid-depth as much as possible considering the sampling technique required and the safety of the sampling personnel." U. S. Steel further requests that the requirement to record the location, date, time and results of each sample on a supplemental DMR be eliminated.

Chapter 13 – Total Facility Requirements

62. **Issue: The requirement to submit DMR sample values and/or Operational Spreadsheets or DMR supplemental form is overly burdensome, unnecessary, arbitrary and capricious.**

Reference: Draft Permit, Page 45, Chapter 13, section 1.21 and 1.22

U. S. Steel Position:

There is no regulatory basis for the requirement to complete anything other than a monthly discharge monitoring report. Language contained within Chapter 13, Sections 1.21 and 1.22 indicate that additional forms may include DMR Sample Values and/or Operational Spreadsheets or Supplemental Forms, similar to language found in the MPCA Wastewater Permit User's Manual. However, requiring completion of additional reporting forms is overly burdensome and is a waste of limited resources. Additionally, electronic reporting is not facilitated by submittal of Sample Values or Operational Spreadsheets. All final DMR data must be rechecked following automatic download of supplemental data to ensure accurate transfer, which requires additional time.

Requested Change:

U. S. Steel requests that all reference to DMR Sample Values and/or Operational Spreadsheets or DMR Supplemental Forms be eliminated from the draft permit.

63. **Issue: The requirements in Chapter 13, section 1.35 are overly burdensome, arbitrary and capricious.**

Reference: Draft Permit, Page 48

U. S. Steel Position:

Chapter 13, Section 1.34 and 1.35 discuss requirements related to "releases," but the terms is not defined. The requirement in Section 1.35 that samples be collected at least, but not limited to, two time per week for as long as the release continues is overly burdensome and no legal basis is provided.

Requested Change:

U. S. Steel requests that the requirement "Samples shall be collected…" from 'releases' be qualified as it relates specifically to wastewater releases.

64. **Issue: Facility closure requirements in Chapter 13, section 1.51 are over reaching and redundant.**

Reference: Draft Permit, Page 50

U. S. Steel Position:

Facility closure requirements are a DNR responsibility, not requirements of a NPDES or SDS permit. The fact that MPCA includes closure requirements is an overreach of authority and is redundant to DNR's permit to mine. There is no legal requirement to notify MPCA within 180 days of significant reduction or cessation of operations. Nor does MPCA have regulatory authority to approve a closure plan or financial assurance.

Requested Change:

U. S. Steel requests section 1.51 on page 50 of the Draft Permit be removed in its entirety.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

DEC 2 1 2016

REPLY TO THE ATTENTION OF
WN-15J

Ann Foss
Metallic Mining Sector Director
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194

Re: U.S. Environmental Protection Agency Review of the Draft NPDES/SDS Permit for U.S. Steel Corp. – Minntac Tailings Basin Area, Permit No. MN0057207

Dear Ms. Foss:

The U.S. Environmental Protection Agency has reviewed the Minnesota Pollution Control Agency's (MPCA) draft National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit and related documents which was public noticed on November 15, 2016. EPA is providing the following comments on the draft permit.

We are concerned that this draft permit as written does not address, under MPCA's approved National Pollutant Discharge Elimination System (NPDES) program and in accordance with the Clean Water Act (CWA), all discharges to surface waters from this tailings basin. MPCA acknowledges in the fact sheet that discharges from this 8,700 acre tailings basin are causing exceedances of surface water quality standards. Based on this and facts supporting this conclusion, the CWA requires all such discharges to surface waters from the tailings basin be authorized by an NPDES permit. The original NPDES permit, which was issued in 1987, did not contemplate the full extent of the discharges to surface waters from this facility. In the years between expiration of that permit and today the nature and water quality impacts of the discharges to surface waters have continued and are better understood.

As a result, there is a need for an NPDES permit that includes extensive and specific actions, and definitive timeframes for these actions that will result in attaining water quality standards in the receiving waters. MPCA's proposed approach would establish compliance schedules that do not set a date by which compliance with surface water quality standards will be achieved nor do they fully describe the steps necessary to achieve compliance with these standards. In addition, we are concerned that some of the statements in MPCA's draft fact sheet regarding EPA's interpretation of the scope of the NPDES program are incorrect and should be corrected prior to MPCA finalizing this draft permit.

In this case the tailings basin is a point source which, according to MPCA's own documentation is discharging pollutants to nearby surface waters in the Sand and Dark River watersheds via direct, unmonitored surface seeps and subsurface pathways, as well as to the Dark River via the monitoring point identified as SD001. The permittee, by its own documentation acknowledges

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that approximately 3,000 gallons per minute, or 4.3 million gallons per day are discharged from the tailings basin via subsurface seepage to the Sand and Dark River watersheds[1]. MPCA appears willing only to regulate the portion of the discharge to the Dark River that passes through Monitoring Station SD001 as a discharge requiring NPDES permit coverage.

The tailings basin is a point source that discharges pollutants to surface waters in the Sand and Dark River watersheds, which, as explained above is consistent with EPA's past interpretation that the CWA applies to discharges of pollutants from a point source to waters of the United States, including those made via ground water that has a "direct hydrologic connection" to surface water.[2] EPA's longstanding position is that a discharge from a point source to jurisdictional surface waters that moves through groundwater with a direct hydrological connection comes under the purview of the CWA's permitting requirements. *E.g.,* Amendments to the Water Quality Standards Regulations that Pertain to Standards on Indian Reservations, 56 Fed. Reg. 64,876, 64,982 (Dec. 12, 1991) ("[T]he affected ground waters are not considered 'waters of the United States' but discharges to them are regulated because such discharges are effectively discharges to the directly connected surface waters.").

The CWA's language prohibiting "any addition of any pollutant to navigable waters from any point source" does not limit liability only to discharges of pollutants *directly* to navigable waters. *See Rapanos v. United States*, 547 U.S. 715 at 743 (2006) (plurality op.) (emphasis in original). Courts have interpreted the CWA as covering not only discharges of pollutants directly to navigable waters, but also discharges of pollutants that travel from a point source to navigable waters over the surface of the ground or through underground means. *E.g.*, *Sierra Club v. Abston Constr. Co.*, 620 F.2d 41, 44-45 (5th Cir. 1980). As one court noted, "it would hardly make sense for the CWA to encompass a polluter who discharges pollutants via a pipe running from the factory directly to the riverbank, but not a polluter who dumps the same pollutants into a man-made settling basin some distance short of the river and then allows the pollutants to seep into the river via the groundwater." *N. Cal. River Watch v. Mercer Fraser Co.*, No. 04-4620, 2005 WL 2122052, at *2 (N.D. Cal. Sept. 1, 2005).

The CWA defines point sources as follows:

> The term 'point source' means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture. *33 U.S.C 1362(14)*

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[1] Liesch Associates, Inc. Memorandum to U.S. Steel. RE: January 2010 Minntac Tailings Basin Seep Estimate. January 26, 2010. (enclosed)

[2] See, Proposed National Pollutant Discharge Elimination System Regulations for Concentrated Animal Feeding Operations, 66 *Fed. Reg.* 2960, 3015 (Jan. 12, 2001); NPDES General Permits for Storm Water Discharges from Construction Activities, 63 *Fed. Reg.* 7,858, 7,881 (Feb. 17. 1998).

The need for an NPDES permit is highly dependent on the facts surrounding each situation. 66 *Fed. Reg.* at 3015; 63 *Fed. Reg.* at 7881. As EPA has explained:

> The determination of whether a particular discharge to surface waters via ground water which has a direct hydrologic connection is a discharge which is prohibited without an NPDES permit is a factual inquiry, like all point source determinations. The time and distance by which a point source discharge is connected to surface waters via hydrologically connected [ground] waters will be affected by many site specific factors, such as geology, flow, and slope. . . 66 *Fed. Reg.* at 3017.

The facts in this situation include the following and support a finding that the tailings basin point source is discharging pollutants to the nearby surface waters:

- The tailings basin is a container that holds tailings and wastewater
- The tailings basin is discharging pollutants to the surrounding surface waters through direct surface discharges and seeps and via subsurface flow which has a direct hydrologic connection as evidenced by:
  - Elevated pollutant concentrations in the receiving waters which are also present in the tailings basin waters
  - No other sources, or minimal other sources, contributing those pollutants to the same receiving waters,
  - Pre basin construction surface water quality data that demonstrate that the pollutants were not elevated in the receiving waters prior to basin construction, and
  - U.S. Steel's estimate that approximately 3,000 gallons of wastewater per minute are being discharged from the tailings basin to surface waters.

Receiving Waters – MPCA, by its own documentation acknowledges that pollutants are being discharged from the basin into the Sand River watershed. MPCA has even drafted compliance limits that apply in the Sand River watershed (although these limits do not have any effective date). However, the Sand River is not listed among the surface waters authorized to receive discharges under the draft NPDES permit. Failing to include the Sand River as a receiving water to which U.S. Steel is authorized to discharge under the NPDES permit would constitute a discharge of pollutants to surface waters in the absence of NPDES permit coverage, a violation of the Clean Water Act.

Timber Creek runs along the western side of the tailings basin and flows into the Dark River. There is evidence of ponding along the west side of the Basin, viewable from aerial imagery, indicating that pollutants are seeping from the basin directly into adjacent surface waters on the west side of the basin. It is likely that these pollutants are flowing into Timber Creek and reach the Dark River. Timber Creek is also not listed among the receiving waters to which U.S. Steel would be authorized to discharge to under this NPDES permit.

There is evidence, based on aerial imagery that the tailings basin is creating ponding in wetlands immediately adjacent to the basin on both the east and west sides. However, the permit would not authorize these discharges, as wetlands are not among the surface waters to which the permittee would be authorized to discharge and, if confirmed, would constitute a discharge of pollutants to surface waters in the absence of NPDES permit coverage, a violation of the Clean Water Act.

Compliance Schedule – MPCA has included some compliance limits in the draft permit that apply at certain surface water monitoring stations. However, these limits are not effective until the "Final Period". There is no definition of the "Final Period" in the draft permit. However, since MPCA has determined that the limits effective in the "Final Period" are necessary and there is no date at which they would be effective, the permit does not contain limits as stringent as necessary to ensure compliance with the applicable water quality requirements, as required by 40 C.F.R. § 122.4(d).

While the draft permit contains "compliance schedules" in three different Sections of Chapter 1, none of the schedules comport with 40 C.F.R. § 122.47, as they do not contain dates by which the permittee must attain compliance with final effluent limits, and do not contain enforceable milestones that ensure that the permittee is attaining compliance as soon as possible. An enforceable compliance schedule (or schedules) that contains a final compliance date is particularly important in light of the possibility that this NPDES permit is once again administratively continued for a long period of time. MPCA would be able to modify the schedule upon permit reissuance if new information becomes available that justifies a modification to the schedule.

Further, the draft permit includes schedules that require submittals of plans and schedules that then would become part of the permit. It appears that these submittals would constitute permit modifications that do not follow the procedures for modifying permits, including issuing public notice, in 40 C.F.R. § 124.

Limits and Monitoring Requirements –

Sandy and Little Sandy Lakes (a.k.a. the "Twin Lakes"), on the east side and downstream of the tailings basin, have been known to produce wild rice historically, as documented by the Minnesota Department of Natural Resources (MNDNR)[3] and in more recent years in a diminished capacity as documented by the 1854 Treaty Authority in their 2016 report.[4] The Sand River and Twin Lakes are downstream waters receiving discharges from the tailings basin and it appears that wild rice production is an existing use in these water bodies as defined by 40 C.F.R. § 131.3(e). Therefore, MPCA needs to include the Sand River in the draft NDPES permit including water quality based limits that will meet all applicable water quality standards [including the state's wild rice standard based on the documented wild rice stands in the Sand River and Twin Lakes, or explain why this standard does not apply].

Dark River at (SD001) - MPCA calculated WQBELs, shown in the fact sheet, for sulfate at 1221 mg/L daily maximum and monthly average of 1080 mg/L. The Draft Permit incorrectly expresses the monthly average limit as 1221 mg/L and does not contain the necessary daily maximum limit. Similarly, for specific conductance the fact sheet says that the daily maximum limit should be 1197 mg/L and the average monthly limit should be 1072 mg/L, but MPCA has only included an incorrect monthly average limit at 2430 mg/L. In addition, the fact sheet indicates that MPCA's calculation of the average monthly limit is based on 2x per month

[3] Minnesota DNR. Memo from Gerald McHugh, Wild Rice Coordinator, December 7, 1987 (enclosed)
[4] 1854 Treaty Authority. Sandy Lake and Little Sandy Lake Monitoring (2010-2016). Vegetation Surveys starting on Page 16. (enclosed)

monitoring, but the permit only requires 1x per month monitoring. No justification for the discrepancy is included in the Fact Sheet.

Class 1B Reach of the Dark River (AUID 09030005-525) – the fact sheet states that discharges from the tailings basin are contributing to an exceedance of water quality standards (sulfate) that applies in the section of the Dark River downstream of the tailings basin that is designated as a Class 1B water. MPCA is proposing to implement a limit based on the criteria that apply in the Class 1B reach at a compliance monitoring station upstream, rather than at a compliance point in the Class 1B segment. MPCA appears to be applying a rationale that the concentration of sulfate at the upstream location ("SW003") can be approximately double the criteria that must be met in the downstream Class 1B segment of the River, based in part on available dilution. It is unclear how MPCA can authorize a discharge, to a surface water that is not meeting criteria, and limit sulfate to more than double the concentration necessary to protect the criteria.

Reasonable Potential Analysis - MPCA has decided not to conduct a reasonable potential analysis for several parameters for which it has limited data pertaining to discharge characterization (despite the facility operating under an NPDES permit since 1987). MPCA should conduct the reasonable potential analysis with the information that it has, and in addition should add monitoring requirements to the draft permit, for all of the surface water and discharge monitoring stations, monthly monitoring for at least the following parameters that have been detected in the discharge: Selenium, Arsenic, Cobalt, Copper, Manganese, and Thallium.

Permit Modification – In a few paragraphs in the permit, MPCA requests that the company apply for permit modifications. As you are aware, the permit may be modified during its term for cause under 40 C.F.R. § 122.62. MPCA need not wait for the permittee to submit an application for permit modification, if, for example, MPCA promulgates and EPA approves new water quality standards that need to be applied in the permit, as this would be a cause for permit modification under 40 C.F.R. § 122.62(a)(2).

Federal Effluent Limitations Guidelines at 40 C.F.R § 440.10 - It is unclear how MPCA is implementing the zero discharge requirements at 40 C.F.R. § 440.12(c) which requires that the facility not discharge wastewater from mills… with the exception of "a volume of water equivalent to the difference between annual precipitation falling on the treatment facility and … the annual evaporation…". In this case the processing facility is located at the adjacent mining area which is covered under NPDES Permit No. MN0052493. In order to evaluate compliance with 40 C.F.R. § 440.12(c), discharges from the mining area permit and the tailings basin area permit would have to be considered. The permit would have to require monitoring and reporting of all of the discharges from the tailings basin rather than limiting the monitoring, reporting, and therefore the estimation of the volume of discharge, to just that which passes through the monitoring station at SD001.

Construction of Dark River Seep Collection and Return System - It is unclear why MPCA is requiring the permittee to build a Seep Collection and Return System on the west side of the basin. There is no basis for this requirement provided in the fact sheet, and to our knowledge there is limited information as to how the system is predicted to resolve outstanding water quality standards exceedances in the Dark River. In a letter from EPA to the St. Paul District Army Corps of Engineers dated September 16, 2015 regarding the pending CWA Section 404 application for the construction of the Dark River Seepage Collection and Return System (SCRS), we articulated concerns regarding the substantial changes in hydrology and loss of

function to wetlands within the project boundary as well as adjacent wetlands; specifically the effect the proposed discharges will have on water circulation, fluctuation, water chemistry[5] as well as secondary effects on aquatic ecosystems[6]. The wetlands and open water complexes within the project footprint, as both conduits and storage basins for mine tailings seep water, will be subjected to increased concentrations of mine tailings constituents (e.g. hardness, total dissolved solids, specific conductance, alkalinity and sulfate), thus resulting in lower quality wetlands with diminished functional capabilities. In the letter, EPA objected to the construction of the Dark River SCRS because of a lack of compliance with the 404(b)(1) Guidelines. As such, EPA recommended a comprehensive monitoring plan and additional compensatory mitigation be required to address our concerns regarding the determination of wetland impacts and compensatory mitigation requirements.

The comments provided in this letter transmit EPA's initial concerns with the draft permit. Please see the enclosure for additional comments that you should consider to improve the enforceability or clarity of the draft permit language. We look forward to working with you as we conduct a formal review of the permit consistent with Section II. of our Memorandum of Agreement. When the Proposed Permit is prepared, please forward a copy and any significant comments received during any public notice period to r5npdes@epa.gov. Please include the permit number, the facility name, and the words "Proposed Permit" in the message title. If you have any technical questions related to EPA's review, please contact Krista McKim at (312) 353-8270 or at mckim.krista@epa.gov.

Sincerely,

Kevin M. Pierard, Chief
NPDES Programs Branch

cc: Erik Smith, MPCA

Enclosures:

Enclosure A: Additional comments

Liesch Associates, Inc. Memorandum to U.S. Steel. RE: January 2010 Minntac Tailings Basin Seep Estimate. January 26, 2010.

Minnesota DNR. Memo from Gerald McHugh, Wild Rice Coordinator, December 7, 1987

1854 Treaty Authority. Sandy Lake and Little Sandy Lake Monitoring (2010-2016). (enclosed)

[5] 40 CFR § 230.11(b)
[6] 40 CFR § 230.11(h)

Enclosure A:
EPA's Additional Comments on the Draft
NPDES/SDS Permit No. MN0057207

Monitoring Station Location information
We recommend that you provide latitude-longitude coordinates in the monitoring station identification descriptions to improve the precision of this information in the permit and fact sheet

Throughout the draft permit MPCA interchanges different names for monitoring stations. For example, "CR668" is sometimes used to refer to SW003 or D-1. To improve the clarity of the permit, we suggest MPCA revise the permit to refer to monitoring stations by the same name throughout the permit.

Internal outfall monitoring stations WS002, WS003, WS004, WS005, WS006 and WS007 were all removed from this permit when compared to the previous draft. Please provide an explanation as to why monitoring at these locations is no longer needed or desired.

Please provide an explanation as to why the limit for oil and grease and monitoring for dissolved oxygen at SD001 have been removed from this draft permit when compared to the previously issued permit.

Please provide an explanation as to why dissolved oxygen monitoring requirements were removed from the surface water monitoring stations in the draft permit

Please explain why the monitoring station SW004, which was proposed in the pre-public notice draft of the permit that EPA reviewed in 2014 to be located in the Class 1B reach of the Dark River has been removed completely from this draft of the permit.

Please explain why monitoring for sulfate was removed for monitoring station SW005 during the final period.

Compliance Schedule at Chapter 1.1.1:
MPCA has included a schedule in the draft permit to require the permittee to reduce the concentration of sulfate in the basin pool water ultimately to 357 mg/L "within ten years of permit issuance, or the shortest reasonable period of time…". If MPCA intends for this schedule to end after ten years, the language should be revised to be clear that ten years is the maximum amount of time allotted to the permittee in this schedule. Also, neither this schedule nor any other included in the draft permit comports with 40 C.F.R. § 122.47.

Compliance Schedule starting at Chapter 1.1.6:
Aside from this schedule also failing to meet the requirements of 40 C.F.R § 122.47 because it lacks enforceable milestones, and a final compliance date, the schedule also appears to remove from MPCA the ability to approve any of the plans and schedules that the permittee would submit under the schedule. We recommend that the language be changed to provide the

permittee with explicit plan requirements, specifications, quality assurance and milestones for any plan to allow the permittee to move forward in implementation of the plan once it is developed in accordance to those requirements. Such plans should be provided to MPCA 30 days prior to implementation. The permit should contain explicit, enforceable milestones that require the permittee to make progress toward and ultimately achieve compliance with water quality standards.

Compliance Schedule starting at Chapter 1.1.22

While this schedule does require the permittee to construct and operate the Seep Collection and Return system by a date certain, and the text refers to monitoring requirements at SW003, there is no link to any "Final Period" or date at which the sulfate limit that is effective in the final period would come into effect. Therefore, this schedule also fails to comport to 40 C.F.R. § 122.47. Further, the schedule indicates that the permittee or MPCA would be evaluating the "mathematical relationship" of results from samples taken at "CR668" and "CR65" for 12 months. The text does not explain what the mathematical relationship should be compared to or evaluated against. There are no monitoring requirements in the permit at "CR65" (a.k.a. SW004), so it is unclear how the permittee is supposed to compare new data taken from the crossing of CR65 at the Dark River to data taken at SW003 (a.k.a. "CR668"). It is also not clear what MPCA is requiring the permittee to request in terms of a permit modification in this paragraph. As stated earlier, MPCA can modify the permit for cause under 40 C.F.R § 122.62, and would not necessarily need the permittee to apply for a permit modification if one of the causes listed in 40 C.F.R. § 122.62(a) are present.

Whole Effluent Toxicity Testing

Whole Effluent Toxicity (WET) testing is required by the draft permit in the Sand River watershed at SW005, which is over a mile from the basin. WET testing should be conducted on the effluent, and therefore on a sample taken from a monitoring station closer to the basin so that the sample can be as representative of the effluent as possible.

Liesch Associates, Inc. ▪ 13400 15th Avenue North ▪ Minneapolis, MN 55441
Phone: (763) 489-3100 ▪ Toll Free: (800) 338-7914 ▪ Fax: (763) 489-3101

MEMORANDUM

TO: Tom Moe, U. S. Steel
FROM: Mike Johnson/Mat Knutson, Liesch Associates
DATE: January 26, 2010
RE: January 2010 Minntac Tailings Basin Seep Estimate

The following memo has been prepared to document the methods used to develop an estimated seepage rate from the Minntac Tailings Basin. The information in this memo is based upon information shared during a January 22, 2010 conference call between U. S. Steel (USS), Hatch, CRA, Barr, and Liesch.

The seep rate through the dikes was calculated by both Liesch and Barr using similar but slightly different methods.

Liesch utilized chloride as a tie element and downstream flow information to back-calculate an estimated seep flow rate. Chloride concentrations were measured at Seep 030 and Seep 020. During a corresponding period, chloride concentrations and flow rates were measured downstream at location 701 on the Sandy River and location D-1 on the Dark River. Data used for the calculation was collected in 2003, 2007, and 2009 (the 2009 data was incorporated following the Jan 22, 2010 conference call). It was assumed all chloride observed at the downstream locations originated from the tailings basin. Based on this information, an average seepage flow rate of 2,896 gpm was estimated.

Barr conducted a slightly more complex yet similar analysis utilizing sulfur as the tie element. See attached Barr memorandum for greater detail on the methodology used by Barr. The Barr estimated seep flow rate was 3,049 gpm.

CRA was requested by USS to estimate the loss of water from the tailings basin into the groundwater through the bottom of the tailings basin. CRA reported that their estimate from the clear pool area (cell 1 and cell 2) ranged from 6 to 154 gpm with a mean of 43 gpm. This estimate was based on 25, 000 linear feet of wetted perimeter on the east side of Cell 1 and the north/east

EPA-R5-2020-000706_0000039

side of Cell 2. See attached CRA memorandum for greater detail on the methodology used by CRA. It was acknowledged on the conference call that the CRA value did not represent all the water potentially leaving the tailings basin bottom. Due to the fairly small estimated rate (compared to the estimated seep flow rates), the mean average was effectively doubled and rounded up to 100 gpm to represent a reasonable estimate of total tailings basin loss to the groundwater.

It was agreed during the conference call that the Liesch and Barr methods would be averaged with the rounded-up CRA groundwater seep estimate then added to that result. **This results in a total estimated seep flow rate from the tailings basin of 3,070 gpm.** USS has indicated that this value should be used in future modeling of the tailings basin for treatment system sizing.

W:\ww\94154\Estimated seep rate memo.doc

Table A18.2. Wild rice resources in the Sand-Pike River.

DEC 1987
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REGION II
D.N.R.
WATERS

DEPARTMENT: Natural Resources - Enforcement

DATE : December 7,1987

TO : Amy Loiselle

FROM : Gerald McHugh, Wild Rice Coordinator

SUBJECT : Water Discharge Minntac Tailings Pond

The Wild Rice Beds involved in the discharge down the Sandy River are Sandy and Little Sandy Lakes which in a good year will have about 200 acres of rice. These lakes are about a mile down stream from discharge and seepage sites. There is also a 40 to 50 acre bed further down the river that is a wide spot in the Sandy River.

These beds produce a good quality rice and generally follow the trend of the region as far as quainty of rice in any given year. I found as many of the old areial surveys as I could in the files in St. Paul. They go back as far as 1966.

Year	Twin Lakes	Statewide
1966	Fair	Fair to Good
1968	Fair	Fair
1970	Good	Good
1972	Good	Good
1973	Fair	Good
1977	Poor	Good
1978	Poor	Poor
1980	Fair	Good

Table A18.2. Wild rice resources in the Sand-Pike River.

1981	Poor	Good
1982	Poor	Poor
1984	Poor	Good
1985	Poor	Poor
1986	Poor	Poor
1987	Poor	Good

The bed on the river was not included in the areial survey but was in the surveys I did since 1984. There was good rice in in 1984, 1985 and 1987. The rice was poor in 1986.

These above mentioned rice beds are important not only for the rice that is harvested but also as waterfowl hunting areas which are in relatively short supply in the area. The waterfowl hunting potential is especially good for the Sandy Lakes. A good rice crop on these lakes will attract water fowl which are on the nearby tailings pond. The tailings pond are not hunted and hold several thousand waterfowl in the fall.

The discharge presents two hazards to the above mentioned wild rice beds. First and foremost is the chemical composition of the discharge water. The Sulphate ion concentration of the water in a series of tests exceeded 200 ppm. and up to over 300 ppm. Wild rice is relatively intolerant of sulphates and no large beds are found in waters with concentrations of over 10 to 20 ppm. sulphate ion cond. Secondly the increased volume of water will exacerbate a already serious problem of high water in the Sandy Lakes.

Table A18.2. Wild rice resources in the Sand-Pike River.

The Division of Enforcement is charged with management of Wild rice in the public waters of the State of Minnesota. Therefore it is our recommendation that the Division of Enforcement, vigorously oppose the granting of a permit to discharge tailings water into the Sand River.

Gerald McHugh

Gerald McHugh

Wild Rice Coordinator

Sandy Lake and Little Sandy Lake Monitoring (2010-2016)

Prepared by:
Darren J. Vogt
Environmental Director

Technical Report 16-06
December 2016

1854 Treaty Authority
4428 Haines Road
Duluth, MN 55811
218-722-8907
www.1854treatyauthority.org

Sandy Lake and Little Sandy Lake Monitoring (2010-2016)

Introduction

Under an agreement between the Bois Forte Band of Chippewa and the United States Steel Corporation-Minnesota Ore Operations, a monitoring program was completed in 2010-2014 at Sandy Lake and Little Sandy Lake. The United States Steel Corporation provided funding support for monitoring activities during these years. The 1854 Treaty Authority, in support of the Bois Forte Band and at their request, completed the monitoring work. Although the agreement was not extended into 2015-2016, the 1854 Treaty Authority continued the program.

Sandy Lake and Little Sandy Lake, also known locally as the Twin Lakes, historically have produced good stands of wild rice. Wild rice harvesters utilized the lakes when suitable crops were present. A lake survey in 1966 indicated moderately dense to dense stands covering both lakes. Rice production generally declined through the 1970s and 1980s, with little or no rice found in the lakes during a 1987 survey. Rice production has since remained poor. The lakes are located downstream of the tailings basin at the U.S. Steel Minntac iron ore operation. Construction of the tailings basin began in 1966. The resulting changes to water quantity and/or water quality in the system may have impacted wild rice in the Twin Lakes. Construction of a seepage collection system completed in late 2010 and other possible actions at the tailings basin may change the conditions in the Twin Lakes. With that in mind, monitoring activities were completed in 2010-2016 to document conditions in the lakes.

Monitoring activities completed in 2010-2016 have included:

- water depth recording
- inlet and outlet field surveys
- water sampling
- vegetation surveys
- aerial surveys

This report summarizes results from monitoring activities from all six years. Separate reports contain similar information from monitoring activities completed those years:

- *Sandy Lake and Little Sandy Lake Monitoring 2010,* Technical Report 10-07, December 2010
- *Sandy Lake and Little Sandy Lake Monitoring 2010-2011,* Technical Report 11-07, December 2011
- *Sandy Lake and Little Sandy Lake Monitoring 2010-2012,* Technical Report 12-05, December 2012
- *Sandy Lake and Little Sandy Lake Monitoring 2010-2013,* Technical Report 13-06, December 2013
- *Sandy Lake and Little Sandy Lake Monitoring 2010-2014,* Technical Report 14-07, December 2014
- *Sandy Lake and Little Sandy Lake Monitoring 2010-2015,* Technical Report 15-07, December 2015

General Information

Sandy Lake (MN Department of Natural Resources # 69-0730) and Little Sandy Lake (MN Department of Natural Resources # 69-0729) are located north of Virginia, Minnesota in Township 59N, Range 18W, Sections 2, 3, 10, 11. Sandy Lake has a surface area of 121 acres, and Little Sandy Lake has a surface area of 89 acres. Please see Figures 1-3 for maps and an aerial photograph of the lakes.

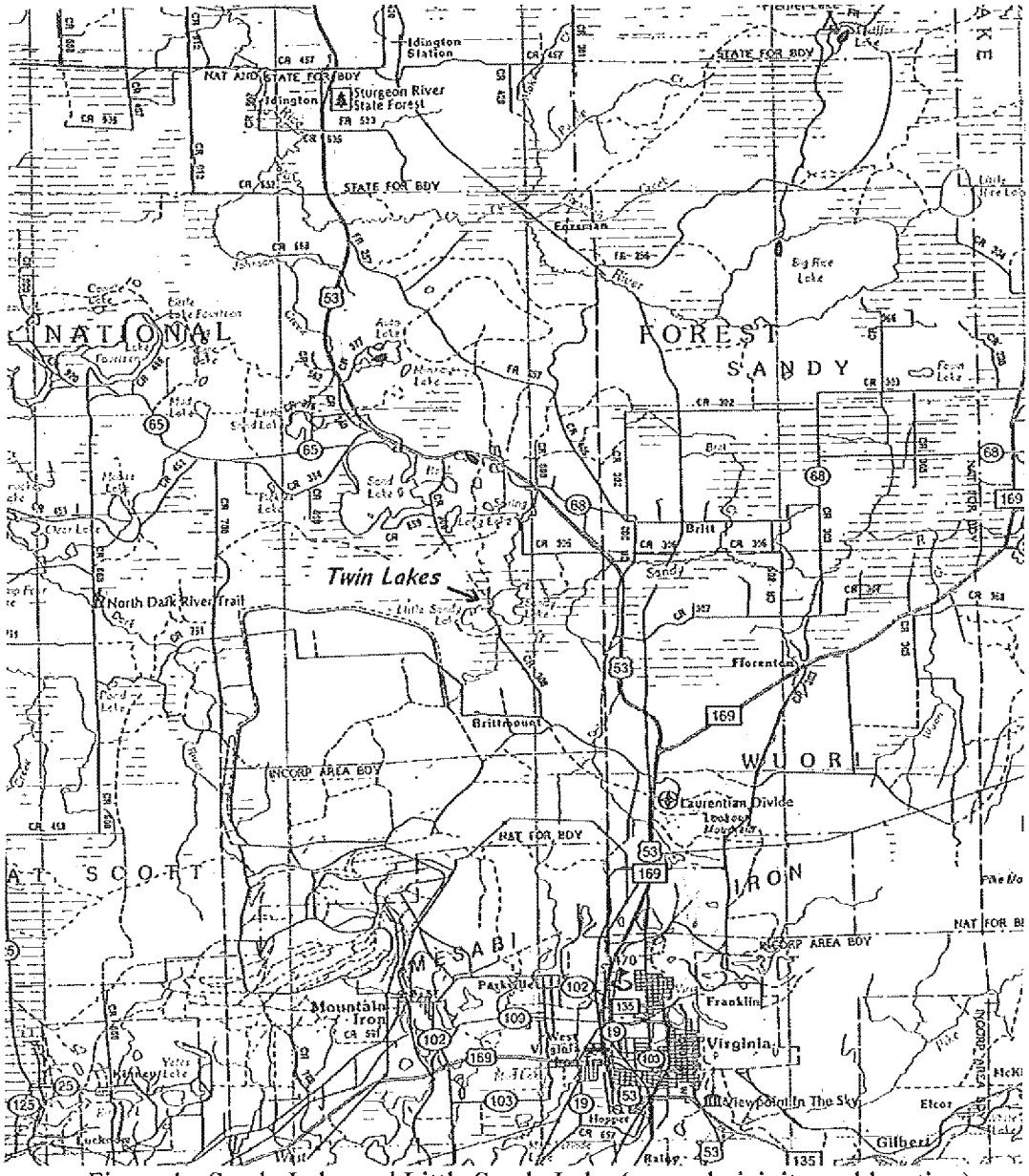

Figure 1: Sandy Lake and Little Sandy Lake (general vicinity and location)

Minnesota Atlas and Gazetteer, DeLorme, 1994

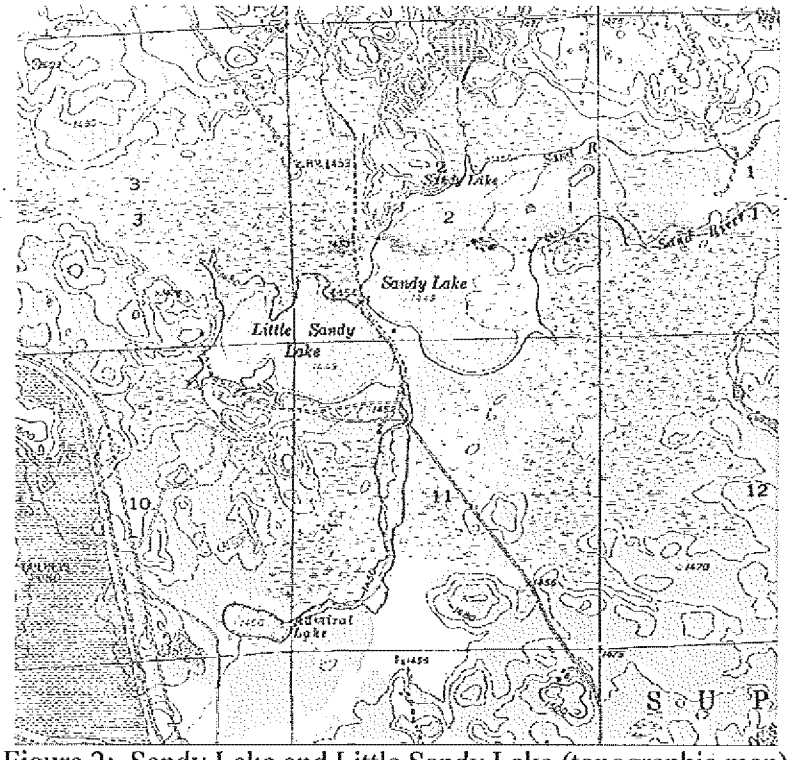

Figure 2: Sandy Lake and Little Sandy Lake (topographic map)
U.S. Geological Survey and Minnesota DNR

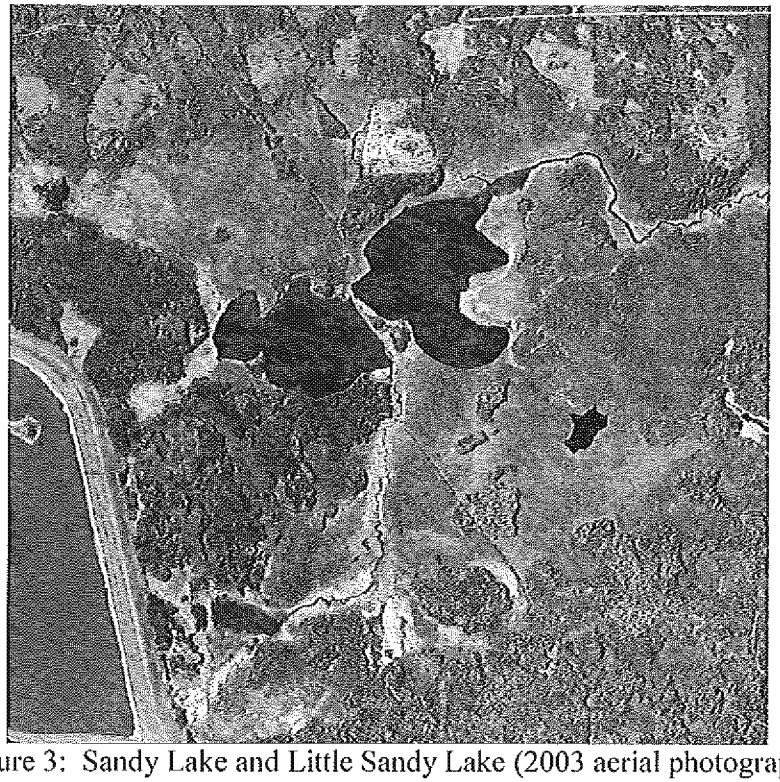

Figure 3: Sandy Lake and Little Sandy Lake (2003 aerial photograph)
U.S. Department of Agriculture, Farm Services Agency, Aerial Photography Field Office

Most of the land around the lakes is in federal ownership and managed by the U.S. Forest Service, Superior National Forest. Some parcels of private ownership are located on the northeast shoreline of Sandy Lake and surrounding the outlet. Please see Figure 4.

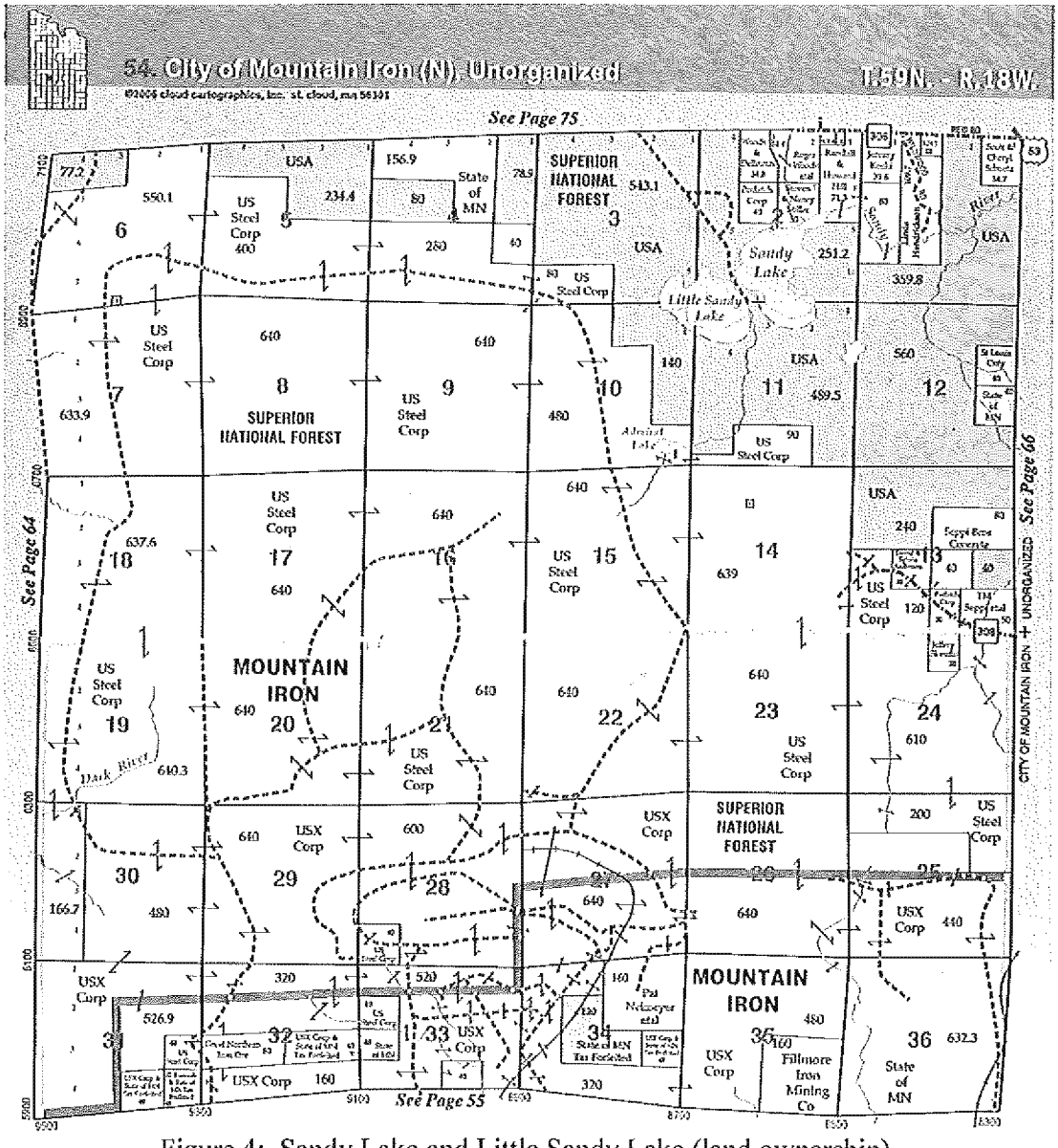

Figure 4: Sandy Lake and Little Sandy Lake (land ownership)
St. Louis County, MN, 2007 Land Atlas and Plat Book, Cloud Cartographics

Current access to the lakes is somewhat difficult. A narrow road extending from County Road 306 leads to the north side of the lakes, but crosses some private property. An informal truck trail provides a carry-down canoe access to the north shoreline of Sandy Lake. An alternative option is to utilize the existing road/trail to the bridge between the lakes. This trail was largely underwater in 2010-2016 and in a number of previous years,

and access requires chest waders. Please see Appendix 1 for photographs of access points in 2016.

Sandy Lake and Little Sandy Lake (Twin Lakes) are located immediately downstream of the tailings basin for U.S. Steel's Minntac iron ore operation. Please see Figure 5.

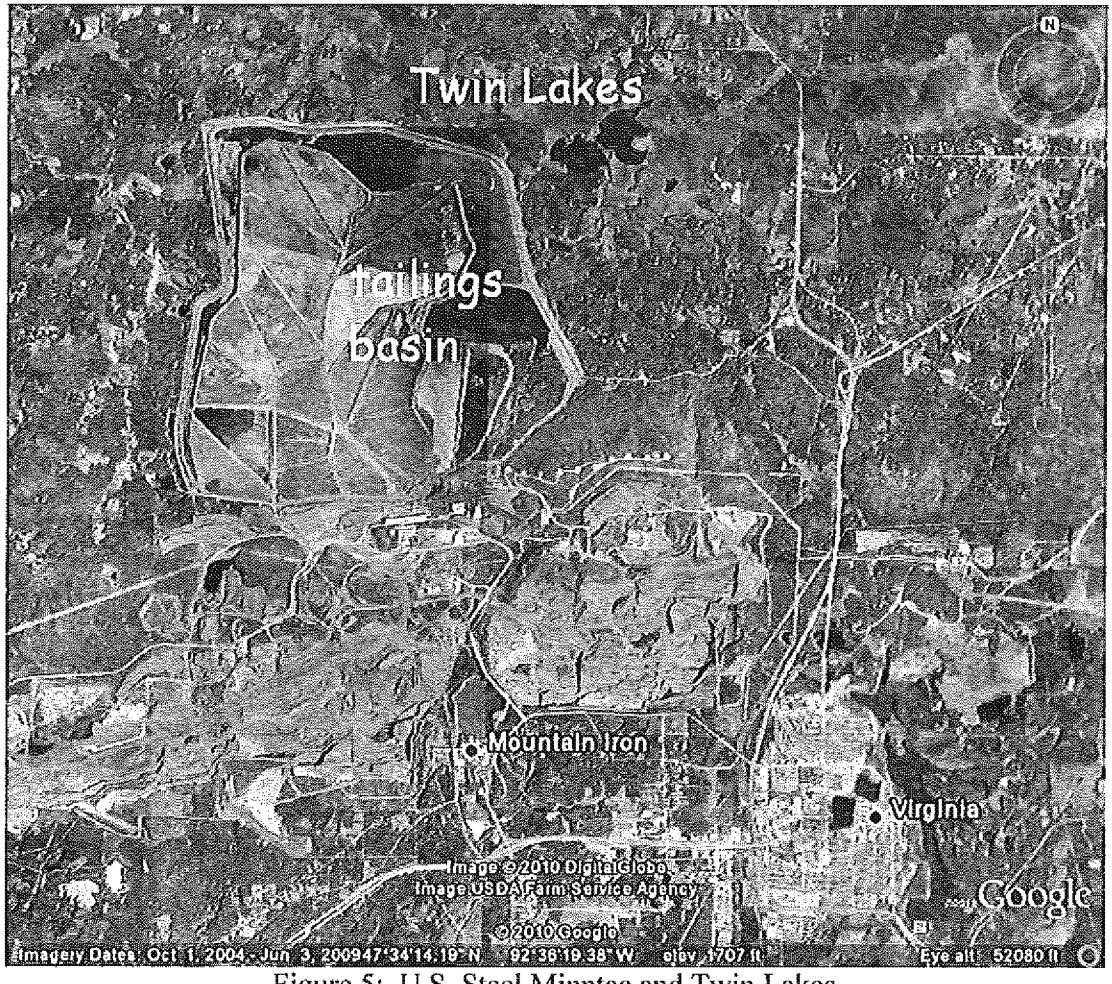

Figure 5: U.S. Steel Minntac and Twin Lakes

Water Depths

A trail and bridge bisects the connection between Sandy and Little Sandy lakes. A water depth gauge is attached to the northwest corner of the concrete bridge support. Data obtained from the Minnesota Department of Natural Resources indicates that the gauge was installed in 1991, with an elevation of 1447.1 feet above mean sea level (NGVD 29) at the zero reading on the gauge. A surveyed benchmark with an elevation of 1453.93 feet above mean sea level (NGVD 29), marked by a chiseled square in the concrete bridge support above the depth gauge, was established by the Minnesota Department of Transportation in 2008.

A local consulting firm (SEH) was retained under this monitoring project in 2010 to complete a survey to relate the depth gauge to elevation. Another benchmark was established in the same location on top of the concrete bridge support and marked by an "X" in the concrete. This benchmark has an elevation of 1454.86 feet above sea level (NAVD 88). The zero reading on the depth gauge is 1448.03 feet above mean sea level (NAVD 88). It should be noted that the two known surveyed benchmarks differ by 0.93 feet (1454.86 – 1453.93). This is due to use of the different vertical datum systems, National Geodetic Vertical Datum of 1929 (NGVD 29) versus North American Vertical Datum of 1988 (NAVD 88).

Utilizing the existing depth gauge on the bridge support, water depth readings were recorded approximately every two weeks May through early November each year in 2010-2016. The graph in Figure 6 outlines water elevations at the Twin Lakes in 2010-2016. The elevations reported are based on the benchmark established by SEH in 2010, since NAVD 88 is the current standard typically utilized. Across this time period, the highest water reading was 1452.52 feet above mean sea level (5/15/2014), and the lowest was 1450.36 feet above mean sea level (11/10/11), a difference of 2.16 feet.

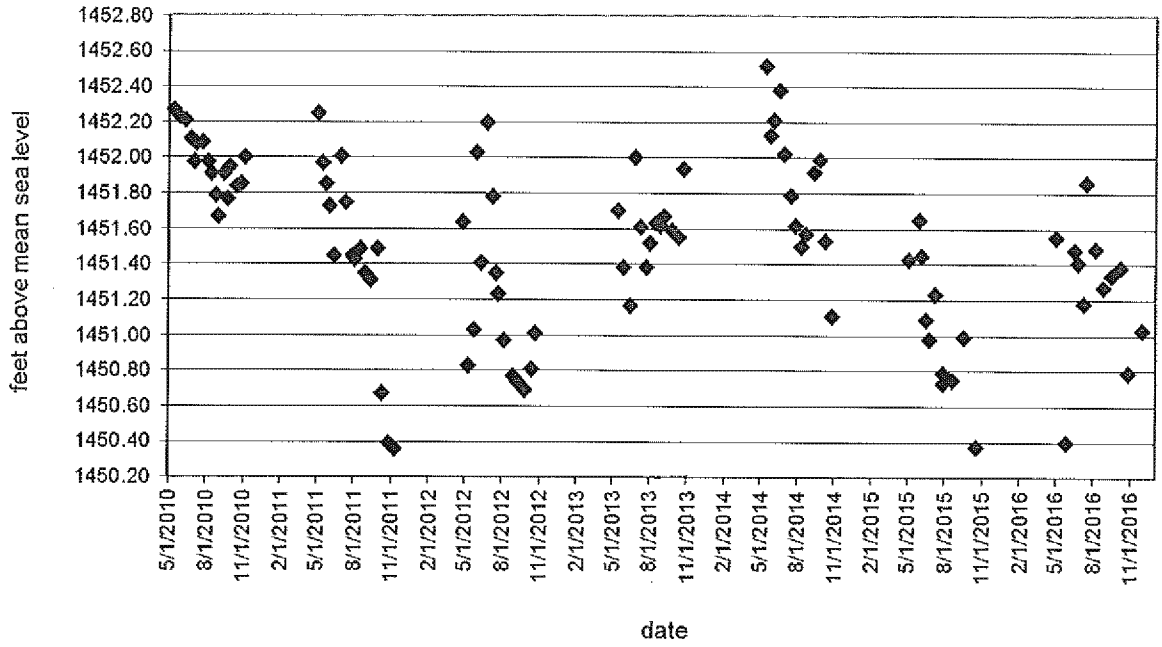

Figure 6: Water Elevation at the Twin Lakes in 2010-2015

A few readings are also available from visits completed in 2006-2008: 1451.71 (8/1/2006); 1451.48 (7/31/2007); 1451.83 (8/6/2008) feet above mean sea level based on the 2010 benchmark. Communication with the Minnesota Department of Natural Resources indicated that limited water level readings from the 1980s and 1990s may be

on file at local offices. Under a separate initiative managed by U.S. Steel, an automatic data logger was installed adjacent to the bridge to track changes in water depth in 2013-2016. This data is not included in this report.

Water depth has a major influence on the success of wild rice. Wild rice grows in a variety of water depths, but 1-3 feet is typically considered prime conditions. During the vegetation surveys conducted on September 1, 2010 and June 25-26, 2013 water depths were recorded at every survey point. In the 2010 survey, mean water depths were 3.83 feet (range of 1.50-4.50 feet) in Sandy Lake and 4.23 feet (range of 2.25-5.00 feet) in Little Sandy Lake. In the 2013 survey, mean water depths were 4.07 feet (range of 1.50-5.00 feet) in Sandy Lake and 4.55 feet (range of 2.75-5.75 feet) in Little Sandy Lake.

Water depths across the Twin Lakes were typically in the range of 4-5 feet in 2010, until a decline in September. Water depths in 2011 were similar to 2010 through the middle of July 2011, but then declined in the second half of summer and dropped considerably in October 2011. In 2012, storm events in May and June caused significant increases in water depth. Water levels then declined through September 2012, with increases noted again during October 2012. In 2013, water levels declined early in the season until an increase at the end of June. Water depths remained fairly stable from early July on until an increase was observed at the end of October. Water levels in 2014 were generally high, with the highest levels observed under this program since beginning in 2010. In 2015, water levels were generally lower than previous years since 2010. Water levels were low at the end of May 2016, but then increased to higher water by mid-July before declining through the end of the open water season.

Besides upstream releases from the tailings basin and outlet conditions (such as presence of beaver dams), precipitation also impacts water levels in the Twin Lakes. Available data from the Minnesota State Climatology Office was utilized in Table 1 to summarize monthly precipitation near the Twin Lakes from May to October in 2010-2016. The precipitation data reported is based on the nearest available information reported for each month. Average monthly precipitation in inches reported for Virginia, MN is 2.73 in May, 4.64 in June, 3.87 in July, 3.74 in August, 3.44 in September, and 2.45 in October (www.weather.com). Utilizing this available information, total precipitation near the Twin Lakes was as follows:

- 23.94 inches (3.07 inches above average) from May to October 2010
- 13.73 inches (7.14 inches below average) from May to October 2011
- 23.38 inches (2.51 inches above average) from May to October 2012
- 18.38 inches (2.49 inches below average) from May to October 2013
- 21.94 inches (1.07 inches above average) from May to October 2014
- 22.10 inches (1.23 inches above average) from May to October 2015
- 25.70 inches (4.83 inches above average) from May to October 2016

Table 1: Monthly Precipitation near the Twin Lakes in May to October (2010-2016)

Month	Township, Range, Section	Distance from Twin Lakes	Precipitation (inches)
May 2010	59N 17W section 18	2 miles	2.51
June 2010	59N 17W section 18	2 miles	4.06
July 2010	59N 17W section 18	2 miles	6.69
August 2010	59N 17W section 18	2 miles	3.52
September 2010	58N 18W section 33	10 miles	4.91
October 2010	58N 18W section 33	10 miles	2.25
May 2011	59N 17W section 18	2 miles	2.80
June 2011	59N 17W section 18	2 miles	3.38
July 2011	60N 17W section 32	3 miles	1.28
August 2011	59N 17W section 18	2 miles	2.61
September 2011	59N 17W section 18	2 miles	2.04
October 2011	59N 17W section 18	2 miles	1.62
May 2012	59N 17W section 4	4 miles	7.10
June 2012	59N 17W section 18	2 miles	5.11
July 2012	60N 17W section 32	3 miles	6.67
August 2012	59N 17W section 4	4 miles	1.47
September 2012	59N 17W section 4	4 miles	1.05
October 2012	58N 18W section 33	10 miles	1.98
May 2013	59N 17W section 4	4 miles	2.44
June 2013	59N 17W section 4	4 miles	5.84
July 2013	59N 17W section 4	4 miles	3.51
August 2013	59N 17W section 4	4 miles	2.02
September 2013	59N 17W section 4	4 miles	1.44
October 2013	58N 18W section 33	10 miles	3.13
May 2014	59N 17W section 4	4 miles	4.03
June 2014	59N 17W section 4	4 miles	7.45
July 2014	59N 17W section 4	4 miles	4.35
August 2014	59N 17W section 4	4 miles	2.51
September 2014	58N 17W section 5	6 miles	1.91
October 2014	58N 18W section 33	10 miles	1.69
May 2015	59N 17W section 4	4 miles	4.89
June 2015	59N 17W section 4	4 miles	4.71
July 2015	59N 17W section 4	4 miles	2.10
August 2015	59N 17W section 4	4 miles	4.67
September 2015	59N 17W section 4	4 miles	3.24
October 2015	59N 17W section 4	4 miles	2.49
May 2016	59N 17W section 4	4 miles	1.66
June 2016	59N 17W section 4	4 miles	7.69
July 2016	59N 17W section 4	4 miles	4.28
August 2016	59N 17W section 4	4 miles	5.73
September 2016	59N 17W section 4	4 miles	4.89
October 2016	59N 17W section 4	4 miles	1.45

Minnesota State Climatology Office, Minnesota Climatology Working Group

Inlet and Outlet Field Surveys
Beaver activity can alter water levels and flow in a system, and potentially negatively impact wild rice. To document beaver activity and other general features, field surveys were completed on the inlet and outlet (Sand River) of the Twin Lakes in 2010, and only on the outlet in 2011-2016. The Minntac tailings basin is the headwaters of the Twin Lakes, with a creek entering the southeast corner of Little Sandy Lake. The Sand River leaves the northeast corner of Sandy Lake. A field survey was conducted on July 14, 2016 down the outlet of the Twin Lakes to the U.S. Highway 53 crossing. Beaver activity was the focus of the survey. No fresh beaver activity was observed, with only inactive dams and lodges present in this portion of the outlet. All dams had been cleared and opened. One site with an inactive beaver dam has grown cattails across the river, restricting flow to two small openings. Other underwater berms remained, but none were holding or controlling water levels at the time of the survey. It should be noted that the survey in 2016 was conducted during higher water due to recent rains, so some existing berms or restrictions may not have been apparent.

In addition to water entering the system from the tailings basin, the beaver activity on the outlet may also be a factor in higher water levels in the Twin Lakes. It is likely that the water levels in 2010-2016 and in recent history are contributing to the negative impacts on wild rice. Besides addressing releases from the tailings basin, beaver management (trapping, dam removal) down the outlet should be a consideration in an attempt to reduce water levels in the Twin Lakes. U.S. Steel contracted with trappers to complete beaver and dam removal beginning in spring 2015, with similar plans for 2016. Ongoing beaver management and dam removal may be needed to maintain a clear outlet.

Water Sampling and Analysis
Four water sampling locations were established in 2010. Figure 7 shows the locations of the sampling points. The locations were set in a downstream gradient and identified as:

- Twin 1 - inlet at Little Sandy Lake
- Twin 2 - middle of Little Sandy Lake
- Twin 3 - middle of Sandy Lake
- Twin 4 - outlet at Sandy Lake

Water samples were collected monthly from May through October in 2010-2014, and bi-monthly (June, August, October) in 2015-2016. Analyses were completed by Pace Analytical (formerly Era Laboratories, Inc.) in Duluth, MN. Results from 2016 are included in Table 2, and annual results of the analyses from all years (2010-2016) are included in Appendix 2.

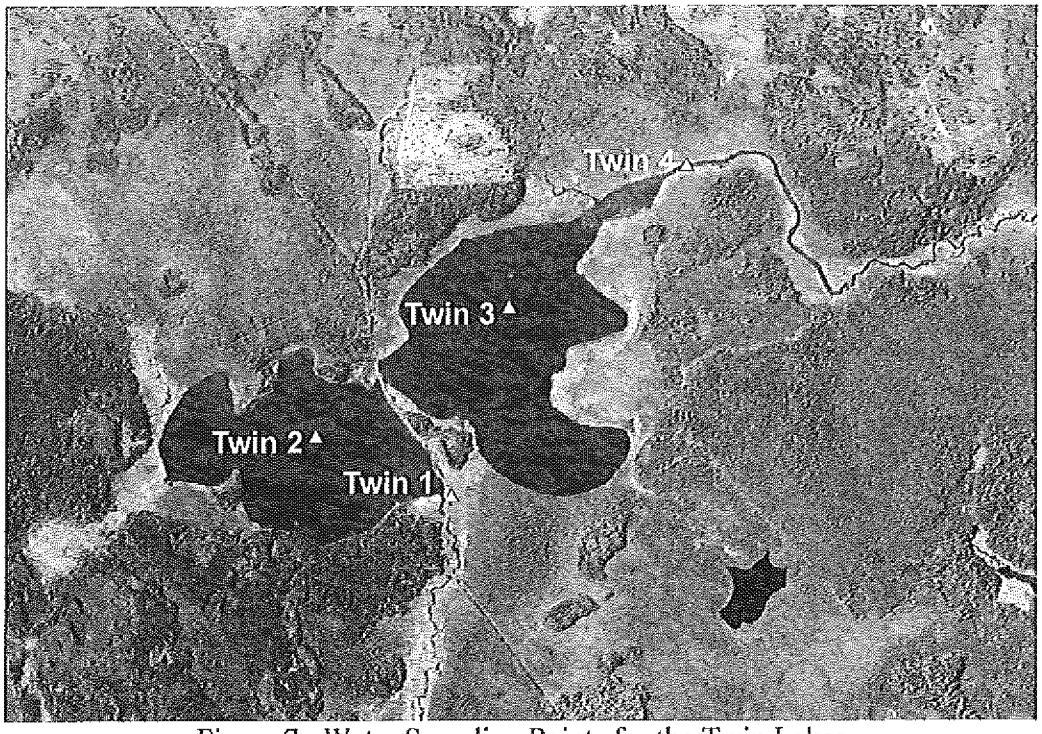

Figure 7: Water Sampling Points for the Twin Lakes

Table 2: Water Sample Analysis in the Twin Lakes (2016)

Twin 1	6/23/2016	8/24/2016	10/25/2016	units
alkalinity (as CaCO3)	114	234	200	mg/L
chloride	31.9	55.2	66.4	mg/L
color	150	200	150	Pt-Co
nitrogen, ammonia	ND	ND	ND	mg/L
nitrogen, nitrate + nitrite	ND	ND	ND	mg/L
nitrogen, total	1.0	0.85	ND	mg/L
nitrogen, total kjeldahl	1.0	0.84	ND	mg/L
pH - lab	7.3	7.3	7.6	SU
phosphorus, total	0.024	0.034	0.022	mg/L
solids, suspended volatile	ND	1.0	2.8	mg/L
solids, total dissolved	472	814	762	mg/L
solids, total suspended	1.2	1.2	5.0	mg/L
specific conductance	679	1070	1100	umhos/cm
sulfate	217	304	347	mg/L
turbidity	3.1	3.3	5.6	NTU

Twin 2	6/23/2016	8/24/2016	10/25/2016	units
alkalinity (as CaCO3)	122	194	194	mg/L
chloride	25.9	24.0	41.2	mg/L
color	40.0	300	150	Pt-Co
nitrogen, ammonia	ND	0.14	0.18	mg/L
nitrogen, nitrate + nitrite	ND	ND	0.020	mg/L
nitrogen, total	0.82	1.3	0.73	mg/L
nitrogen, total kjeldahl	0.82	1.3	0.71	mg/L
pH - lab	7.9	8.1	8.2	SU
phosphorus, total	0.014	0.023	0.010	mg/L
solids, suspended volatile	ND	2.0	ND	mg/L
solids, total dissolved	428	486	570	mg/L
solids, total suspended	1.8	2.4	1.0	mg/L
specific conductance	628	640	818	umhos/cm
sulfate	194	126	211	mg/L
turbidity	1.8	3.2	1.7	NTU

Twin 3	6/23/2016	8/24/2016	10/25/2016	units
alkalinity (as CaCO3)	93.2	145	158	mg/L
chloride	24.5	19.2	33.4	mg/L
color	90.0	375	100	Pt-Co
nitrogen, ammonia	ND	0.40	ND	mg/L
nitrogen, nitrate + nitrite	ND	ND	ND	mg/L
nitrogen, total	0.68	1.6	0.81	mg/L
nitrogen, total kjeldahl	0.67	1.5	0.80	mg/L
pH - lab	8.0	7.8	8.3	SU
phosphorus, total	0.011	0.027	0.012	mg/L
solids, suspended volatile	ND	1.2	ND	mg/L
solids, total dissolved	348	386	454	mg/L
solids, total suspended	1.0	1.0	ND	mg/L
specific conductance	525	481	663	umhos/cm
sulfate	158	82.7	148	mg/L
turbidity	1.1	3.7	1.9	NTU

Twin 4	6/23/2016	8/24/2016	10/25/2016	units
alkalinity (as CaCO3)	89.0	132	143	mg/L
chloride	22.7	17.5	30.4	mg/L
color	110	300	150	Pt-Co
nitrogen, ammonia	ND	0.34	0.18	mg/L
nitrogen, nitrate + nitrite	ND	ND	ND	mg/L
nitrogen, total	0.63	1.4	0.73	mg/L
nitrogen, total kjeldahl	0.63	1.4	0.72	mg/L
pH - lab	7.8	7.8	8.1	SU
phosphorus, total	0.014	0.029	0.015	mg/L
solids, suspended volatile	ND	1.0	1.0	mg/L
solids, total dissolved	314	360	410	mg/L
solids, total suspended	1.6	1.0	1.6	mg/L
specific conductance	477	435	616	umhos/cm
sulfate	138	70.9	132	mg/L
turbidity	2.1	6.8	2.8	NTU

In comparison with other lakes containing wild rice in the region, some parameters are of note in the Twin Lakes. Most notable are elevated levels of alkalinity, chloride, total dissolved solids, specific conductance, and sulfate. Sulfate levels ranged from 210 mg/L to 661 mg/L across all samples in 2010, before the installation of the seep collection system at the U.S. Steel Minntac tailings basin. After the system was in operation, sulfate ranged from 61.4 to 561 mg/L in 2011, from 38 to 275 mg/L in 2012, from 36 to 650 mg/L in 2013, from 44 to 419 mg/L in 2014, from 45.6 to 590 mg/L in 2015, and from 70.9 to 347 mg/L in 2016. Table 3 displays average sulfate concentrations at each sampling point in 2010-2016. A Minnesota water quality standard exists for sulfate of *"10 mg/L, applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels"* (Minnesota Rules, part 7050.0224, subp. 2).

Table 3: Average Sulfate Concentrations at Twin Lakes Sampling Points (ranges in parentheses)

	2010 average sulfate (mg/L)	2011 average sulfate (mg/L)	2012 average sulfate (mg/L)	2013 average sulfate (mg/L)	2014 average sulfate (mg/L)
Twin 1	483 (360-661)	357 (208-561)	207 (137-275)	355 (215-650)	301 (180-419)
Twin 2	353 (280-475)	164 (130-247)	144 (87-210)	195 (149-261)	172 (128-274)
Twin 3	280 (250-310)	118 (103-166)	97 (72.6-160)	129 (118-140)	114 (96-172)
Twin 4	234 (210-252)	84 (61.4-127)	66 (38-101)	89 (36-120)	70 (44-100)

	2015 average sulfate (mg/L)	2016 average sulfate (mg/L)
Twin 1	460 (386-590)	289 (217-347)
Twin 2	295 (253-360)	177 (126-211)
Twin 3	217 (171-270)	130 (82.7-158)
Twin 4	145 (45.6-220)	114 (70.9-138)

To help determine if the seep collection system was a factor in reducing sulfate levels in the Twin Lakes at the start of operation in late 2010, paired two-sample, one-tailed t-tests were performed (alpha = 0.05) comparing data from 2010 to 2011. Analyses were based on water quality results from six samples taken at each location (Twin 1, Twin 2, Twin 3, Twin 4) per year.

On average, sulfate levels measured in 2011 were significantly less than sulfate levels measured in 2010 at sample locations Twin 2 (164.3 mg/L < 352.5 mg/L, $p = 0.0011$, $t = 5.72$), Twin 3 (117.5 mg/L < 279.5 mg/L, $p = 0.0001$, $t = 10.09$) and Twin 4 (83.9 mg/L < 234.2mg/L, $p = 0.0001$, $t = 11.07$). The average sulfate level measured at Twin 1 in 2011 was lower than the level measured in 2010 (356.7 mg/L < 482.3 mg/L), but the difference was not significant ($p = 0.0780$, $t = 1.67$). These analyses suggest a decrease in sulfate concentration at each sample location after the first year of seep collection operation.

From 2010-2016, sulfate levels have trended down slightly in the Twin Lakes (Figure 8). After the seep collection system began operation, sulfate levels in 2011-2016 have varied and showed a trend upward (Figure 9).

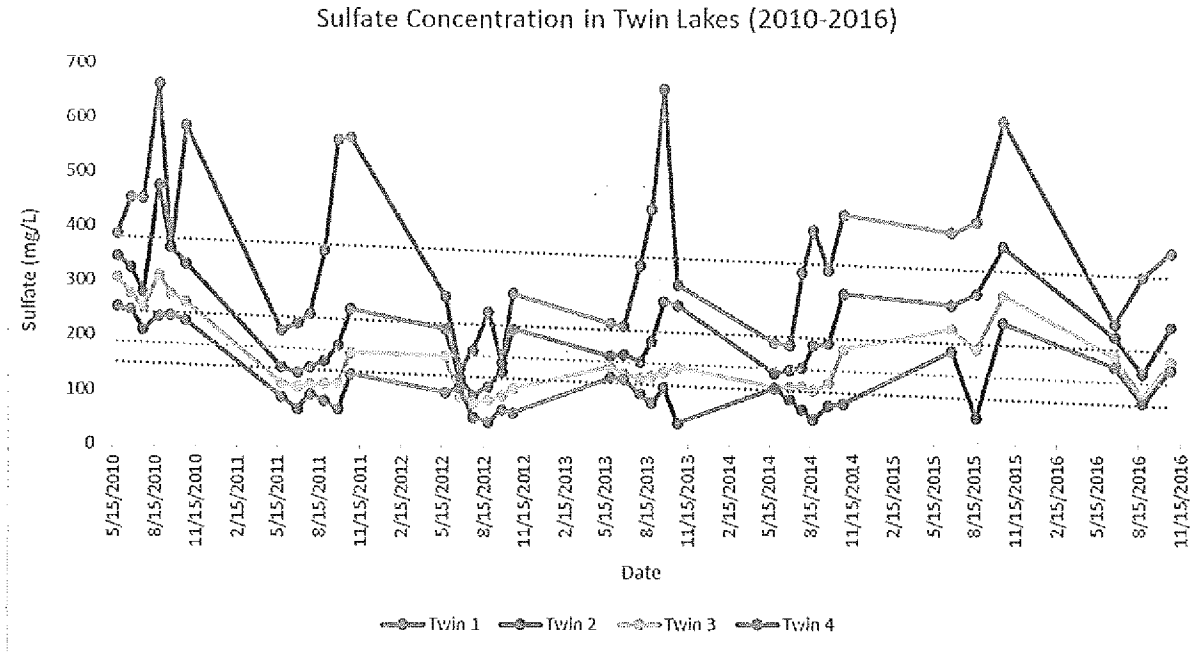

Figure 8: Sulfate Concentration in Twin Lakes (2010-2016)

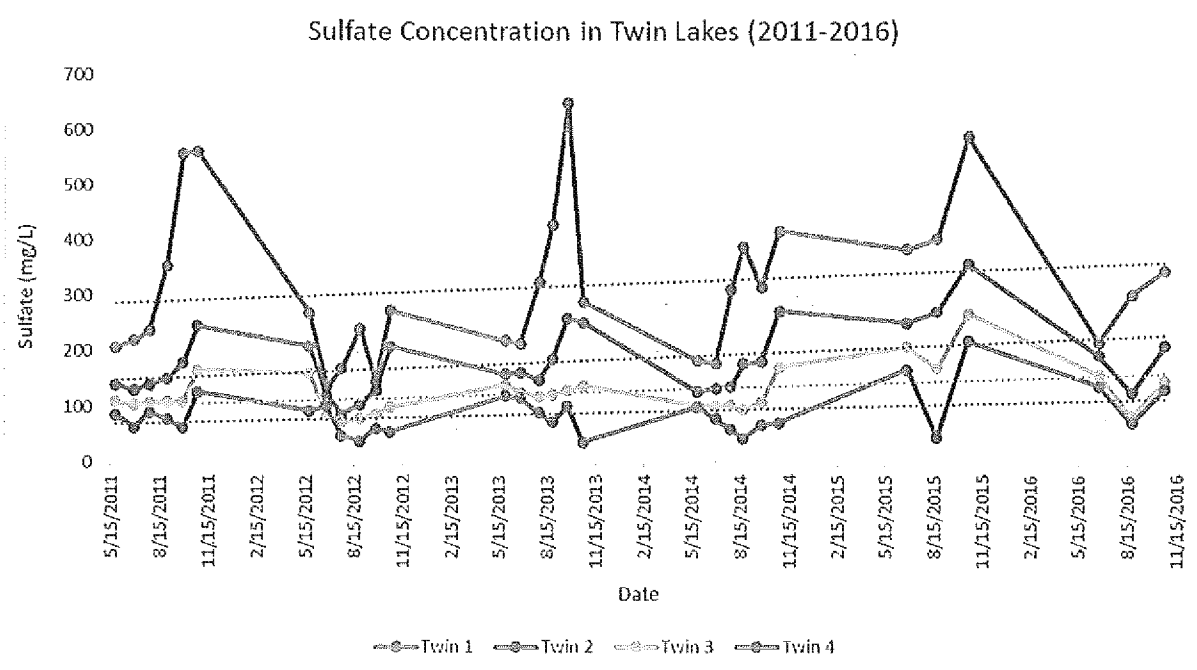

Figure 9: Sulfate Concentration in Twin Lakes (2011-2016)

In addition to monthly water sampling in the Twin Lakes, one sampling event occurred at three locations each October in 2010-2016 in the system downstream to Lake Vermilion. Sampling was completed in the Sand River (State Highway 169 crossing), Pike River (County Road 367), and the Pike River Flowage (State Highway 1 public access). Sampling locations are shown in Figure 10.

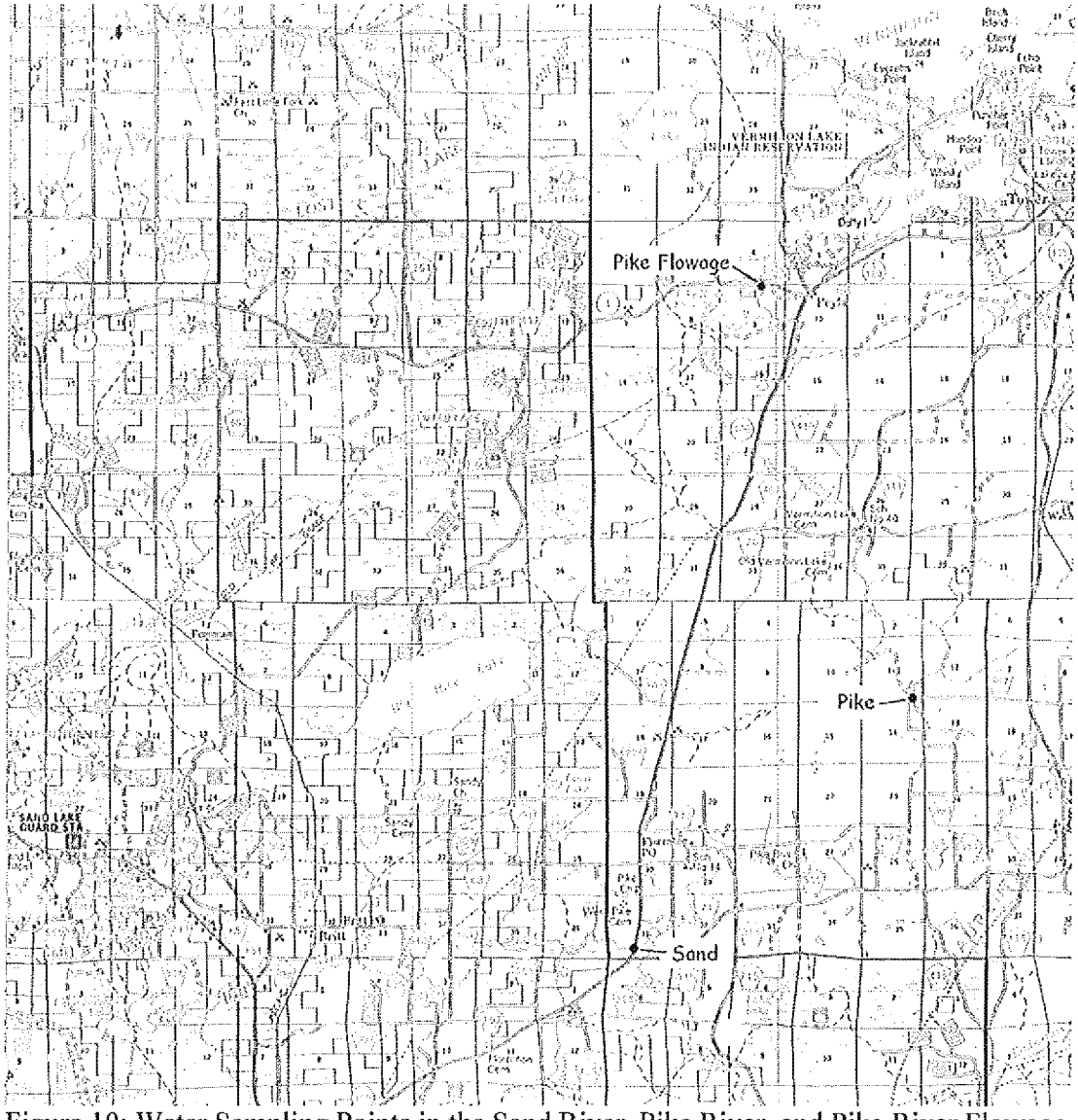

Figure 10: Water Sampling Points in the Sand River, Pike River, and Pike River Flowage
United States Department of Agriculture, U.S. Forest Service, Superior National Forest map, 2003

Table 4 displays analysis results in 2016, and Appendix 2 includes annual results of the analyses from all years (2010-2016) for the downstream sampling locations. Sample analysis indicated generally declining levels of several parameters including alkalinity, chloride, total dissolved solids, specific conductance, and sulfates moving downstream through the system. When sampling was conducted at all points on the same date, sulfate

concentrations from the inlet at Little Sandy Lake to the Pike River Flowage ranged from 584-27 mg/L on 10/25/2010, from 561-19 mg/L on 10/26/2011, from 275-15 mg/L on 10/22/2012, from 291-7.1 mg/L on 10/23/13, from 419-11 mg/L on 10/27/14, from 590-31.9 mg/L on 10/19/2015, and from 347-17.9 mg/L on 10/25/2016.

Table 4: Water Sample Analysis in the Sand River, Pike River, and Pike River Flowage (2016)

10/25/2016	Sand	Pike	Pike Flowage	units
alkalinity (as CaCO3)	84.9	70.4	62.1	mg/L
chloride	28.3	18.9	17.3	mg/L
color	200	150	200	Pt-Co
nitrogen, ammonia	0.10	ND	ND	mg/L
nitrogen, nitrate + nitrite	0.040	0.068	0.068	mg/L
nitrogen, total	0.91	0.71	0.91	mg/L
nitrogen, total kjeldahl	0.87	0.64	0.84	mg/L
pH - lab	7.4	7.6	7.6	SU
phosphorus, total	0.029	0.021	0.025	mg/L
solids, suspended volatile	1.6	2.4	ND	mg/L
solids, total dissolved	228	174	184	mg/L
solids, total suspended	2.6	5.2	1.4	mg/L
specific conductance	341	245	218	umhos/cm
sulfate	43.8	22.1	17.9	mg/L
turbidity	6.8	6.0	4.1	NTU

Vegetation Surveys

Known aquatic vegetation surveys were completed in 1966 and 1987 at the Twin Lakes by the Minnesota Division of Game and Fish, and Minnesota Department of Natural Resources respectively. The 1966 survey described Sandy Lake with dense wild rice over the entire lake, and Little Sandy Lake with moderately dense rice over the entire lake. The report also mentions that the wild rice is harvested at the lakes when the crop is adequate. Results from the 1987 survey indicated that the aquatic vegetation changed little since the 1966 survey, with one noticeable exception. Wild rice for all practical purposes was absent from both lakes. Two other changes occurred: the water levels were considerably higher in 1987 than in 1966 (approximately 2 feet), and the water clarity improved dramatically (from 1.3 feet to approximately 6 feet). The report also describes the rice crop at Twin Lakes in some years from 1966 to 1987: 1966-fair, 1968-fair, 1970-good, 1972-good, 1973-fair, 1977-poor, 1978-poor, 1980-fair, 1981-fair, 1982-poor, 1984-poor, 1985-poor, 1986-poor, 1987-poor.

With the decline in wild rice abundance, some management activities were undertaken to improve production at the Twin Lakes. Beaver management (trapping, dam blasting) was conducted on the system periodically in the 1980s through the mid-1990s by the Minnesota Department of Natural Resources. In addition, information indicates that some wild rice seeding was conducted in 1991 and 1992. However, limited success in restoring wild rice was noted. Staff from the Minnesota Department of Natural Resources report an area of sparse wild rice was found near the outlet in 1993, and

believe that was the last time anything that could be referred to as a "bed of wild rice" was on the lakes. Wild rice was found only in trace quantities within the lakes in 2000 and 2001 by the Bois Forte Department of Natural Resources (reported in Minntac Water Inventory Reduction EIS, September 2004). The 1854 Treaty Authority conducted a survey to document wild rice presence on the Twin Lakes on August 1, 2006. Some individual wild rice plants were found along portions of the shoreline of Sandy Lake, and along portions of the north shore of Little Sandy Lake. Please see Figure 11.

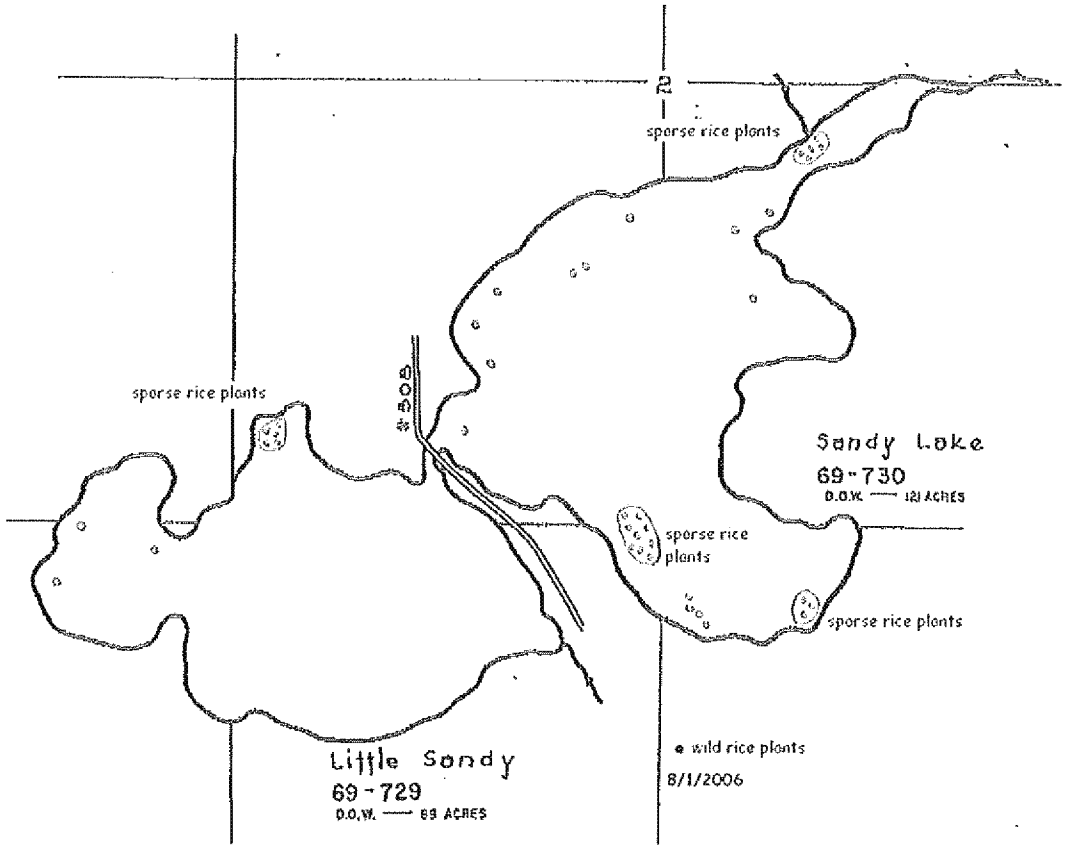

Figure 11: Wild Rice Locations in the Twin Lakes in 2006

Another field visit, but not a complete survey of both lakes, on July 31, 2007 found a few scattered wild rice plants along the west shoreline of Sandy Lake near the bridge. Please see Figure 12. No wild rice was evident viewing from the bridge on August 6, 2008.

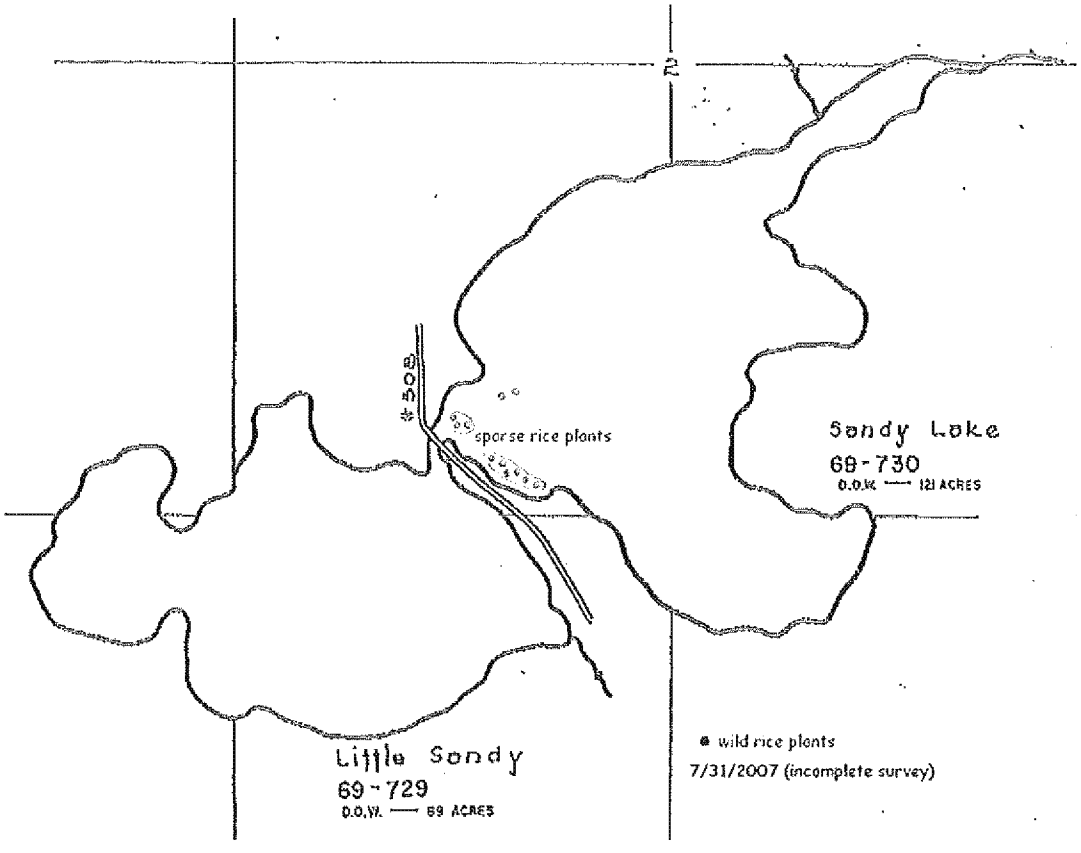

Figure 12: Wild Rice Locations in the Twin Lakes in 2007 (not complete survey of lakes)

To document conditions at the Twin Lakes, an aquatic vegetation survey was completed on both lakes on September 1, 2010. The survey was conducted by the Minnesota Department of Natural Resources Shallow Lakes Program, following their standard protocol for lake surveys. In general, the survey consisted of identifying aquatic vegetation (and recording other characteristics such as water depth, water clarity, and bottom type) at a grid of survey points across the lakes. Emergent and floating-leaf vegetation was identified by sight, and a sampling hook was used to gather submerged vegetation for identification. On the Twin Lakes, 49 survey points were established on Sandy Lake, and 44 points on Little Sandy Lake. The Minnesota Department of Natural Resources repeated the aquatic vegetation survey on June 25-26, 2013. Vegetation found and frequency observed at sampling points in the lakes during the 2010 and 2013 surveys are listed in Table 5. Final reports on both vegetation surveys have been completed by the Minnesota Department of Natural Resources.

Table 5: Vegetation in the Twin Lakes in 2010 and 2013

Sandy Lake (9/1/2010)		Sandy Lake (6/26/2013)	
vegetation species	frequency	vegetation species	frequency
Muskgrass *(Chara spp.)*	75.5%	**Northern Water Milfoil** *(Myriophyllum sibiricum)*	52.1%
Northern Water Milfoil *(Myriophyllum sibiricum)*	36.7%	**Sago Pondweed** *(Stuckenia pectinata)*	39.6%
Sago Pondweed *(Stuckenia pectinata)*	34.7%	**Muskgrass** *(Chara spp.)*	37.5%
Coontail *(Ceratophyllum demersum)*	10.2%	**Greater Bladderwort** *(Utricularia vulgaris)*	25.0%
no vegetation found	10.2%	**Common Yellow Waterlily** *(Nuphar variegata)*	18.8%
Emergent Burreed Group *(Sparganium EM spp.)*	6.1%	**White-stem Pondweed** *(Potamogeton praelongus)*	8.3%
White Waterlily *(Nymphaea odorata)*	6.1%	**Flat-stem Pondweed** *(Potamogeton zosteriformis)*	6.3%
Greater Bladderwort *(Utricularia vulgaris)*	4.1%	**White Waterlily** *(Nymphaea odorata)*	6.3%
Fries Pondweed *(Potamogeton friesii)*	4.1%	**Narrowleaf Cattail Group** *(Typha angustifolia or glauca)*	4.2%
Bushy Pondweed *(Najas flexilis)*	4.1%	**no vegetation found**	4.2%
Narrowleaf Cattail Group *(Typha angustifolia or glauca)*	2.0%	**Coontail** *(Ceratophyllum demersum)*	4.2%
Clasping-leaf Pondweed *(Potamogeton richardsonii)*	2.0%	**Robbins Pondweed** *(Potamogeton robbinsii)*	2.1%
White-stem Pondweed *(Potamogeton praelongus)*	2.0%	**Curly-leaf Pondweed** *(Potamogeton crispus)*	2.1%
Watermoss Group *(Drepanocladus or Fontinalis spp.)*	2.0%	**Water Shield** *(Brasenia schreberi)*	2.1%
Little Sandy Lake (9/1/2010)		**Little Sandy Lake (6/25/2013)**	
vegetation species	frequency	vegetation species	frequency
Northern Water Milfoil *(Myriophyllum sibiricum)*	84.1%	**Northern Water Milfoil** *(Myriophyllum sibiricum)*	79.5%
Muskgrass *(Chara spp.)*	81.8%	**Sago Pondweed** *(Stuckenia pectinata)*	56.8%
Sago Pondweed *(Stuckenia pectinata)*	27.3%	**Greater Bladderwort** *(Utricularia vulgaris)*	31.8%
Fries Pondweed *(Potamogeton friesii)*	13.6%	**Coontail** *(Ceratophyllum demersum)*	20.5%
Coontail *(Ceratophyllum demersum)*	9.1%	**Common Yellow Waterlily** *(Nuphar variegata)*	15.9%
Greater Bladderwort *(Utricularia vulgaris)*	6.8%	**Muskgrass** *(Chara spp.)*	15.9%
Emergent Burreed Group *(Sparganium EM spp.)*	6.8%	**Narrowleaf Cattail Group** *(Typha angustifolia or glauca)*	4.5%
Narrowleaf Cattail Group *(Typha angustifolia or glauca)*	4.5%	**Floatingleaf Burreed Group** *(Sparganium FL spp.)*	4.5%
Common Yellow Waterlily *(Nuphar variegata)*	2.3%	**Spikerush Group** ***(Eleocharis spp.)*** *(Eleocharis spp.)*	4.5%
		no vegetation found	2.3%

Present but not observed at any sample points: Wild Rice *(Zizania palustris)*, Pickerelweed *(Pontederia cordata)*, Arrowhead Group *(Sagittaria spp.)*, Bulrush Group *(Scirpus spp.)*

During the vegetation survey on September 1, 2010, specific locations containing wild rice were recorded. Two areas on Sandy Lake contained wild rice plants. Wild rice plants (<25) were located on the northeast arm toward the outlet. Additional wild rice plants (<50) were located on the southwest end of the lake. No wild rice was found in Little Sandy Lake in 2010. Please see Figure 13 for wild rice locations in 2010.

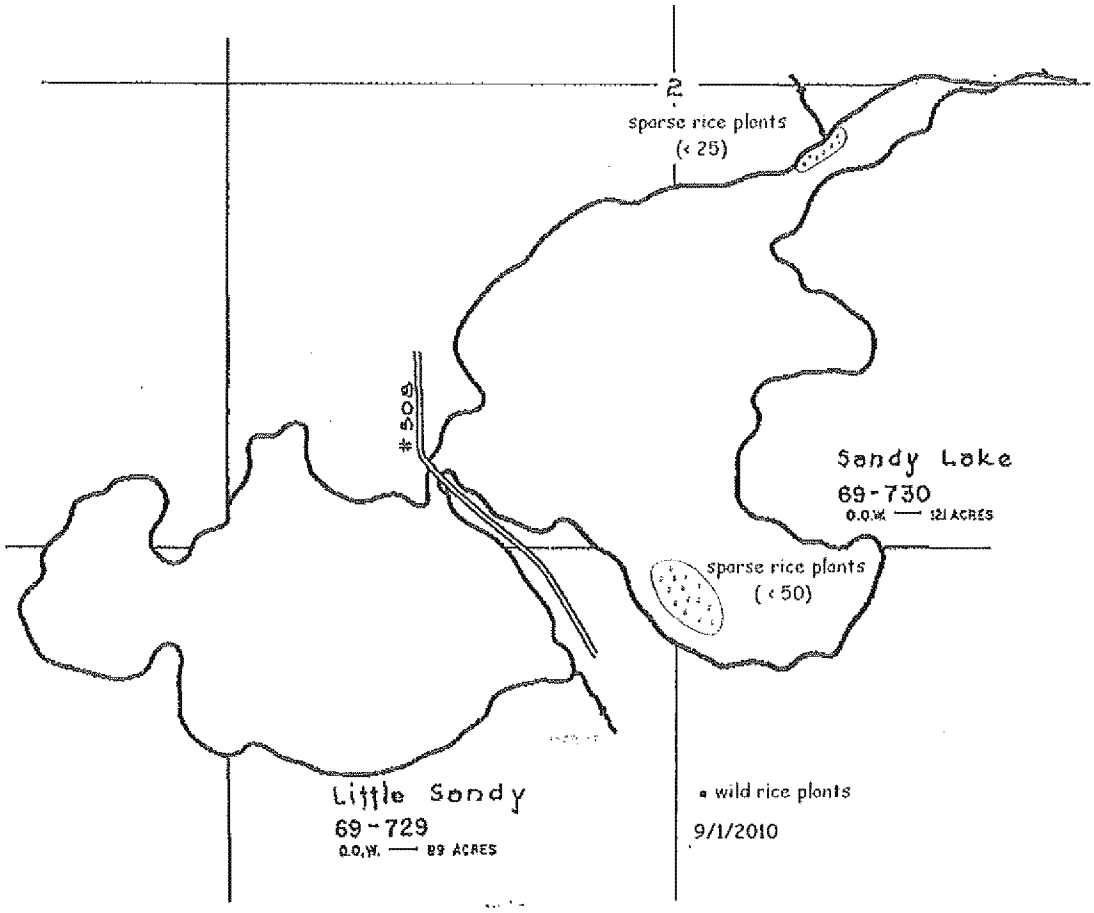

Figure 13: Wild Rice Locations in the Twin Lakes in 2010

A survey was conducted on August 29, 2011 to document wild rice presence on the lakes. Wild rice plants (<50) were located on the northeast arm of Sandy Lake toward the outlet. Additional wild rice plants (<40) were located on the southwest end of the lake. No wild rice was found in Little Sandy Lake in 2011. Please see Figure 14 for wild rice locations in 2011.

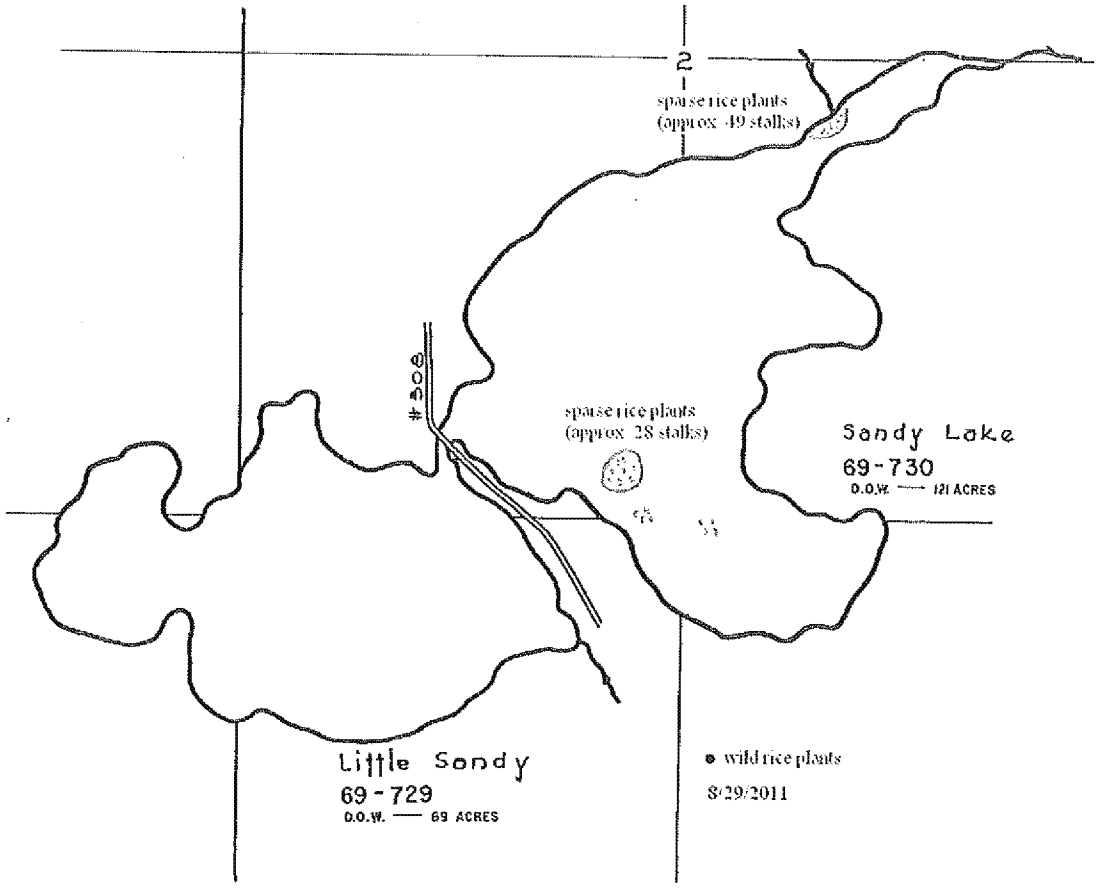

Figure 14: Wild Rice Locations in the Twin Lakes in 2011

In 2012, the survey to document wild rice presence on the lakes was conducted on August 27th. As in 2010 and 2011, wild rice plants (<50) were located on the northeast arm of Sandy Lake toward the outlet. Additional wild rice plants were located along portions of the eastern shore and southern end of the lake. For the first time documented since 2006 (although not surveyed in 2007-2009), wild rice was found in Little Sandy Lake in 2012 with two stalks growing along shore in the northwest bay of the lake. Please see Figure 15 for wild rice locations in 2012.

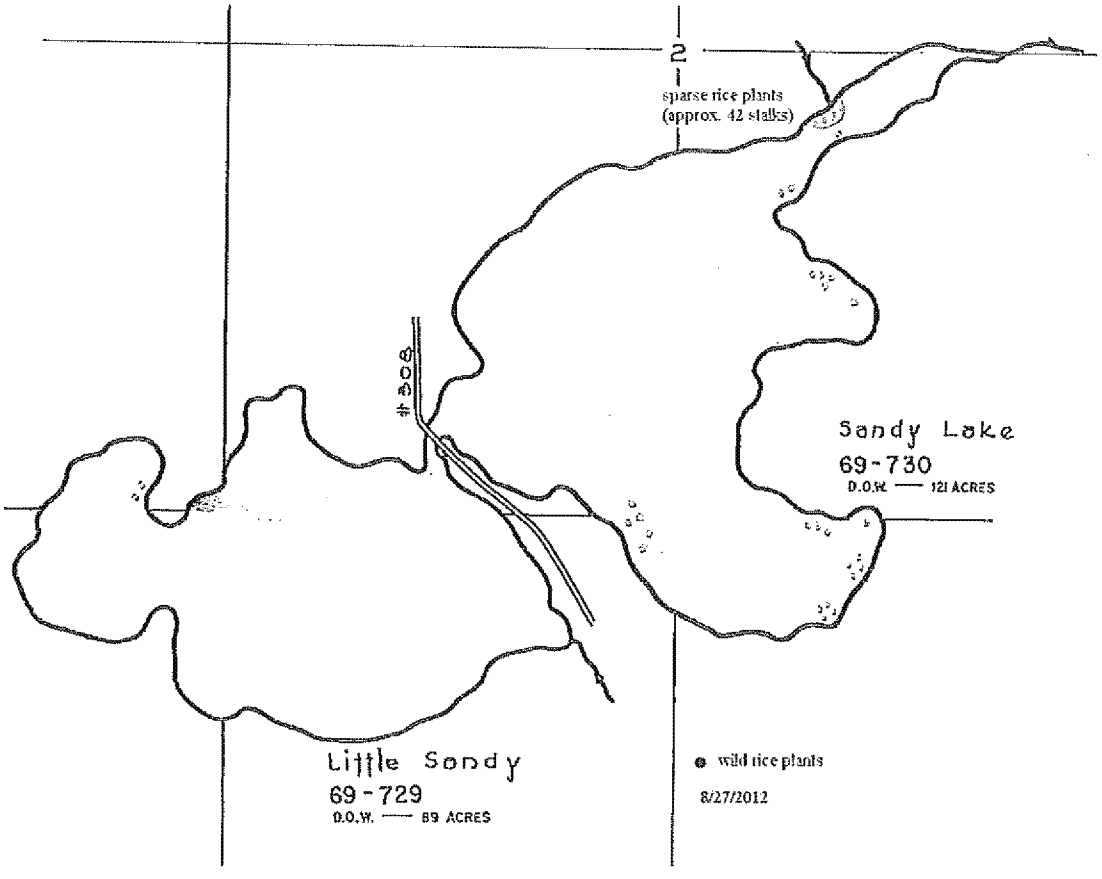

Figure 15: Wild Rice Locations in the Twin Lakes in 2012

The 2013 survey of wild rice presence was completed on August 26th. Some scattered wild rice plants were found along the northeast, east, and south shores of Sandy Lake. One notable difference from 2010-2012 was that no wild rice was observed in the northeast arm of Sandy Lake at the mouth of a small creek entering the system. One stalk of wild rice was found in Little Sandy Lake in 2013. Please see Figure 16 for wild rice locations in 2013.

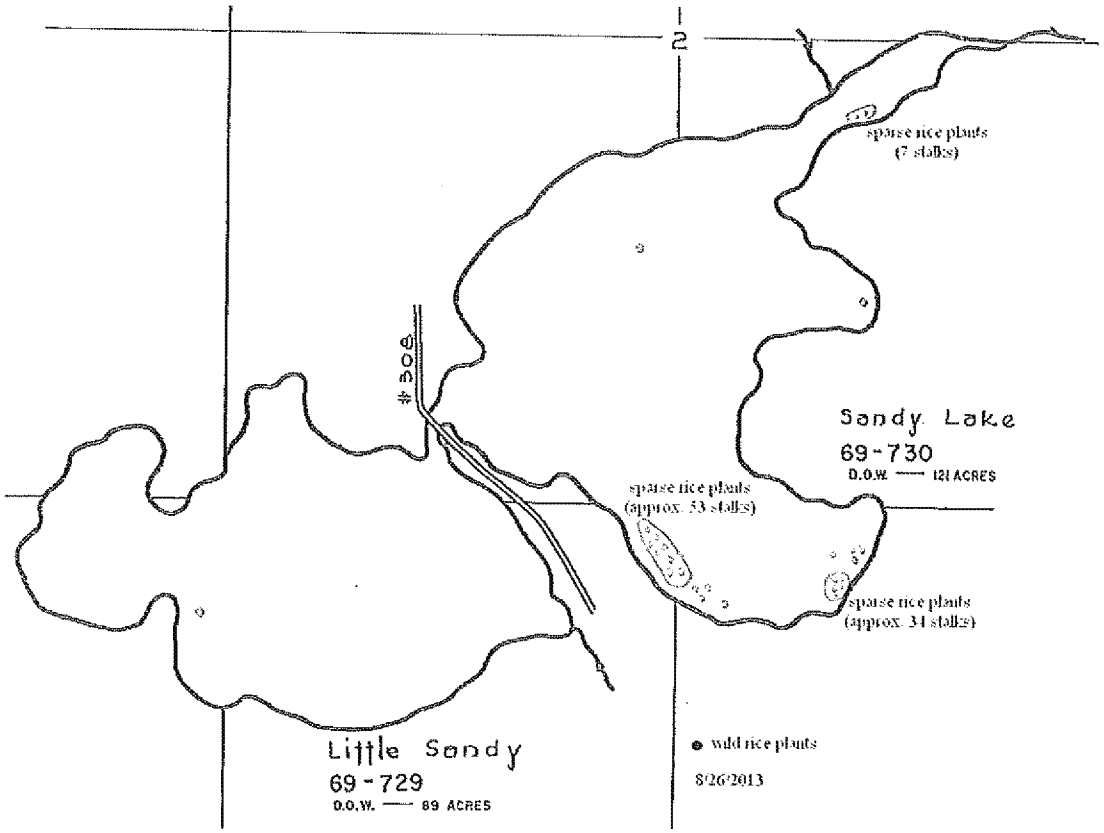

Figure 16: Wild Rice Locations in the Twin Lakes in 2013

In 2014, a total of 16 wild rice stalks was observed on Sandy Lake during the survey completed on August 21st. Wild rice plants were found along the southern shore of the lake, with one plant (short, just standing out of water) located in the northwest portion. For the first time since annual monitoring began in 2010, no wild rice was observed in the northeast arm of Sandy Lake. No wild rice was found in Little Sandy Lake in 2014. Please see Figure 17 for wild rice locations in 2014.

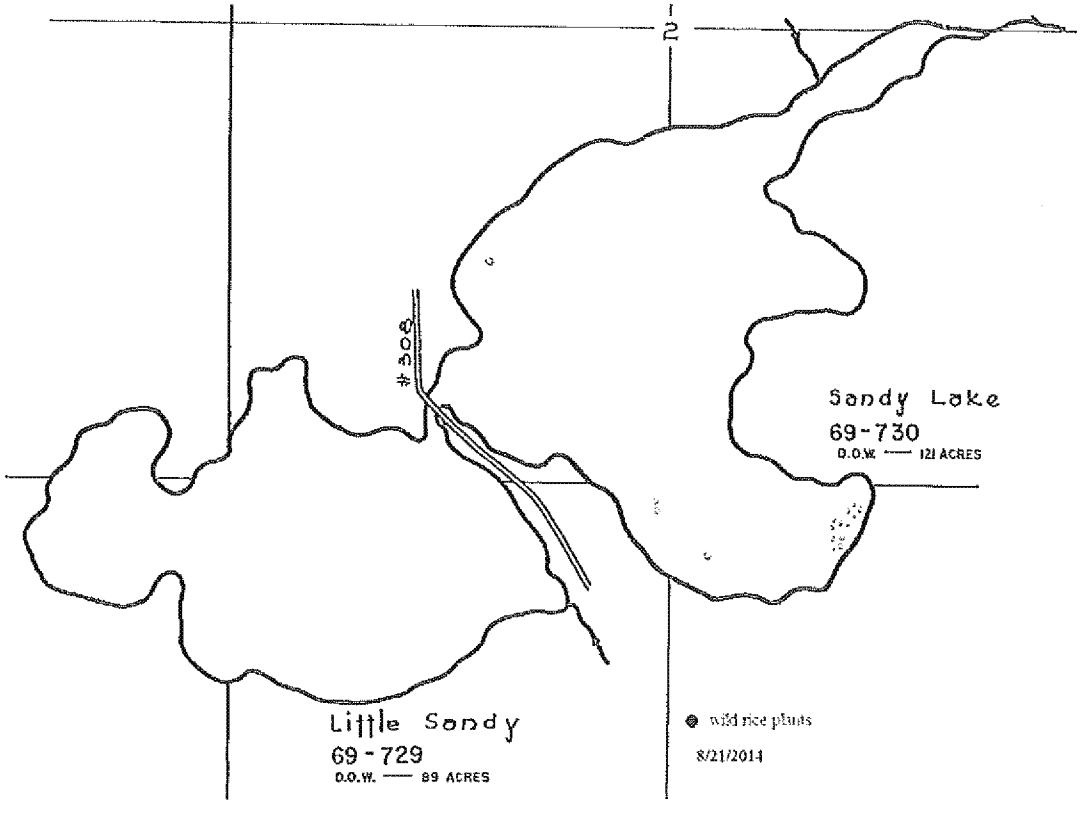

Figure 17: Wild Rice Locations in the Twin Lakes in 2014

In 2015, the survey for wild rice was conducted on August 20th. On Sandy Lake, a total of 36 stalks of wild rice was observed. Ten stalks were present in the northeast arm near the outlet, and one group of 26 stalks was found along the south shore. Some stalks were just standing out of the water or broken, and likely did not fully mature. No wild rice was seen in Little Sandy Lake in 2015. Please see Figure 18 for wild rice locations in 2015. U.S. Steel Minntac completed wild rice seeding on 10/23/15 using seed collected from the Sand River (approximately 40 lbs.). The seeding occurred in six small test plots, three in each lake. Success of wild rice growth was evaluated in 2016.

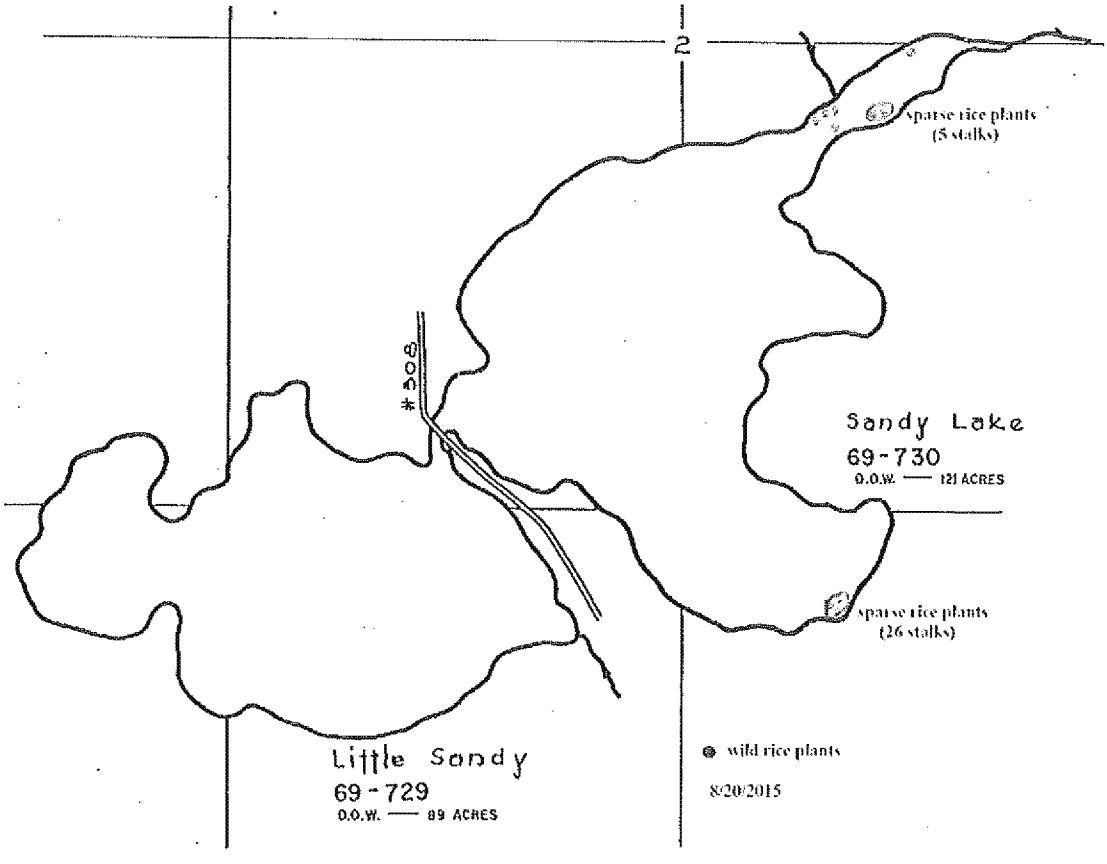

Figure 18: Wild Rice Locations in the Twin Lakes in 2015

During the 2016 wild rice survey completed on August 24th, wild rice was observed on both lakes. On Sandy Lake, 26 stalks of wild rice were seen outside of seeding plots. No wild rice was seen outside of seeding plots on Little Sandy Lake. Please see Figure 19 for wild rice locations in 2016. U.S. Steel Minntac completed wild rice seeding in fall 2015 in six test plots. Wild rice was observed in four of these plots, indicated on Figure 19.

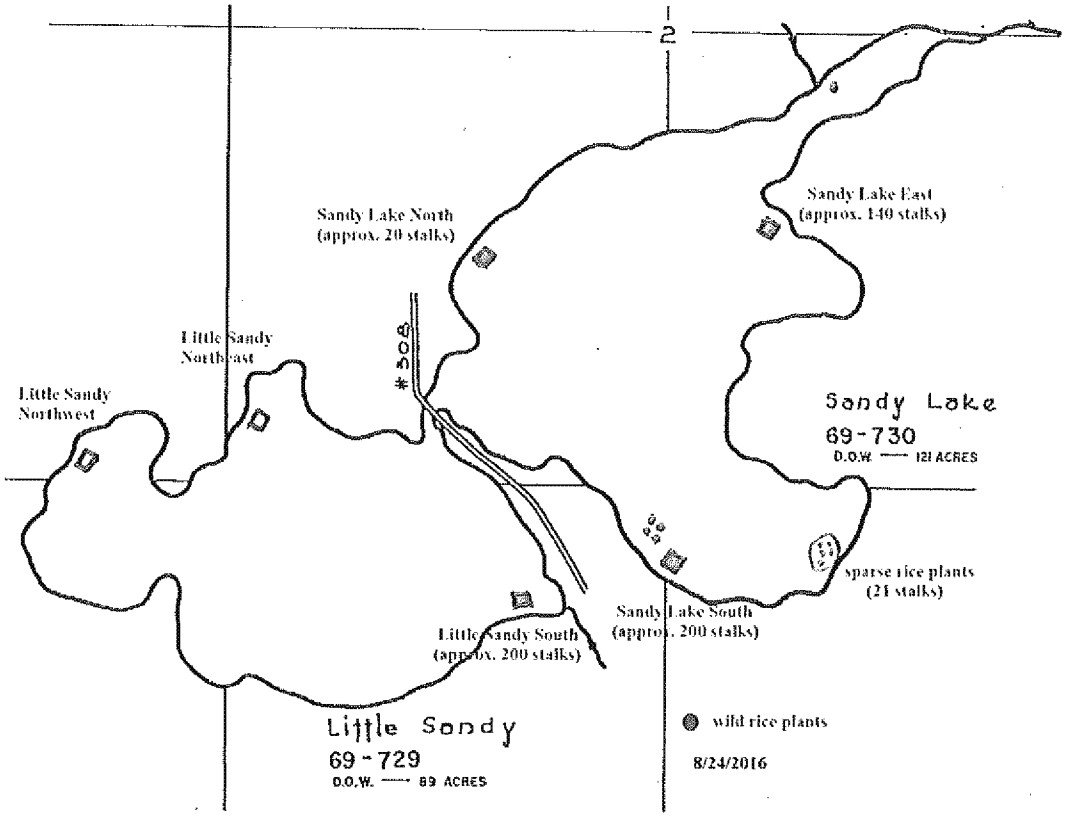

Figure 19: Wild Rice Locations in the Twin Lakes in 2016

Aerial Survey

To view the system and to document wild rice presence from the Minntac tailings basin downstream to Lake Vermilion, an aerial survey was conducted by helicopter each year in 2010-2014. In 2015-2016, flights were not conducted due to budget constraints. Flights began at the tailings basin, continued downstream to the Twin Lakes, followed the Sand River to its confluence with the Pike River, and then continued down the Pike River to the Pike River Flowage at its entrance into Lake Vermilion. In addition to taking digital photographs in 2010-2014, video of the flight was also recorded in 2010 and is available on a dvd.

Wild rice was identified in both the Sand River and Pike River during the aerial surveys. Viewed from the air, two stretches of the system have been identified to contain wild rice:

- Sand River / Pike River – Sand River from just downstream of County Road 303 crossing to confluence with Pike River, Pike River to County Road 792
- Pike River – from just upstream of County Road 367 crossing to Pike River Flowage

Some areas of wild rice may have been missed when viewed from the air. Please see Figure 20 for a map outlining areas containing wild rice.

Depending on the year, rice stands in portions of the rivers varied from sparse coverage to some areas with fair to good density. In 2016, limited observations from the ground indicated sparse wild rice stands in the Sand River upstream of the Highway 169 crossing, and fair wild rice stands along the banks in the Pike River at the County Road 26 crossing. With no helicopter flight in 2016, a report for other parts of the system is unavailable.

Wild Rice Restoration

Under a permit requirement from the U.S. Army Corps of Engineers, U.S. Steel Minntac developed a Twin Lakes Wild Rice Restoration Opportunities Plan in 2013. The plan outlines activities to evaluate and potentially implement wild rice restoration in Sandy and Little Sandy lakes. Annual reports are available that summarize project activities completed by U.S. Steel Minntac since 2013.

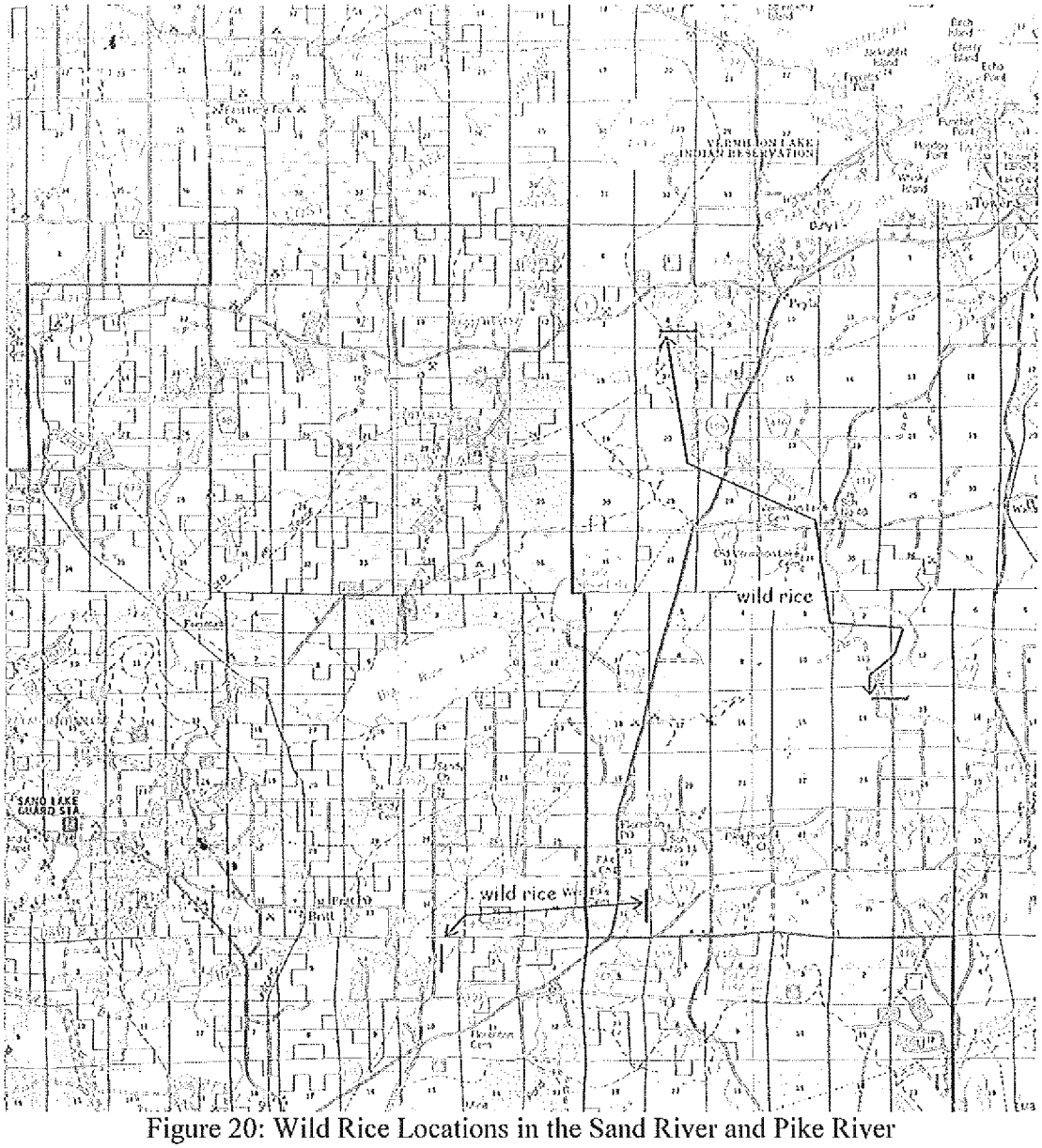

Figure 20: Wild Rice Locations in the Sand River and Pike River
(aerial surveys 9/9/2010, 9/6/2011, 9/11/2012, 9/6/2013, 9/6/2014)
United States Department of Agriculture, U.S. Forest Service, Superior National Forest map, 2003

Acknowledgments
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Minnesota Center for Environmental Advocacy

Using law, science, and research to protect Minnesota's environment, its natural resources, and the health of its people.

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December 22, 2016

Erik Smith
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Re: Draft NPDES Permit No. MN0057207, U.S. Steel Corp - Minntac Tailings Basin Area. Comments of Minnesota Center for Environmental Advocacy

Thank you for the opportunity to submit these comments on behalf of the Minnesota Center for Environmental Advocacy (MCEA) on the draft permit for the Minntac Tailings Basin Area owned by U.S. Steel Corp (USS), permit No. MN0057207. MCEA is a Minnesota non-profit environmental organization whose mission is to use law, science and research to preserve and protect Minnesota's wildlife, natural resources and the health of its people. MCEA has statewide membership. MCEA has been concerned about impacts on Minnesota's waters from mining wastewater discharges for a number of years, has made wastewater pollution a significant component of its work, and has participated in a number of related policy and legal matters.

MCEA objects to issuance of the permit as drafted because it fails to comply with state and federal law. The Minnesota Pollution Control Agency (MPCA) must regulate point source discharges to surface waters through hydrologically-connected groundwater according to water quality standards promulgated and approved pursuant to the Clean Water Act (CWA). Moreover, the draft NPDES permit MN0057207 (Draft Permit) and its accompanying fact sheet (Fact Sheet) lack clarity on whether unlimited surface seeps are allowed. Finally, MPCA has not demonstrated that the limits will protect uses in downstream and downgradient waters, for many reasons articulated herein. MPCA cannot await the collection of additional monitoring data over the next decade or more before imposing more stringent limits necessary to protect all waters affected by numerous pollutants in the facility's effluent that are known to be harming waters of the state and of the U.S.

MCEA incorporates the information in Dr. Lawrence Baker's Report "Evaluation of Minntac Tailings Basin on Little Sandy and Sandy Lakes," (Baker Report) its two appendices, and all of the supplementary supporting documents included with this comment[1] attached hereto by reference. MCEA also submits with these comments a petition for a contested case hearing pursuant to Minnesota Rules 7000.1800 and 7000.1900.

I. FACILITY AND PERMIT OVERVIEW

The Minntac mining operation consists of an open pit taconite mine, crushing plant, concentrating plant, agglomerating plant, tailings basin and associated equipment and administrative facilities. After drilling, blasting, and removing waste rock, crude ore is trucked to the site's facilities for crushing, processing and pelletizing. Wet waste from these processes, called "tailings," is pumped into an 8,000-acre holding basin (the tailings basin), where it is held in place by dikes approximately 900 feet tall. This wastewater makes its way into surface waters by seeping through or under dike walls, and by overtopping the surrounding dams. It also seeps through the bottom of the unlined basin into groundwater, which then flows through a direct hydrologic connection into area surface waters.

Minntac's tailing basin has been discharging polluted water as a point source since it was created, and has had a National Pollutant Discharge Elimination System (NPDES) permit for water pollution discharges since 1987. That permit expired in 1992 and the Minnesota Pollution Control Agency (MPCA) never re-issued it. The instant permitting process commenced less than a week following legal action by MCEA alleging legal deficiencies in the existing permit. In re-issuing the permit, MPCA must comply with both state and federal law.

The CWA prohibits the discharge of a pollutant from a point source to navigable waters of the United States without an appropriate permit. The NPDES permitting system allows Minnesota to issue NPDES permits to facilities that pollute waters of the United States from a point source discharge. However, NPDES must permits issued by MPCA must still comply with the CWA.

II. THE U.S. STEEL MINNTAC TAILINGS BASIN DISCHARGES ARE REGULATED BY THE CWA BECAUSE THE FACILITY DISCHARGES TO SURFACE WATER VIA HYDROLOGICALLY CONNECTED GROUNDWATER

A. The CWA Applies To Hydrologically-Connected Groundwater

The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. 40 C.F.R. § 122.2. The Minntac tailings basin is, itself, a "container" and therefore a point source. *See Friends of Santa Fe County v. LAC*

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[1] Supporting documents mailed separately in a data disc for the convenience of MPCA, and to avoid overloading the agency's email system just prior to a holiday weekend.

Minerals, 892 F. Supp. 1333, 1353 (D. New Mexico 1995); *Wash. Wilderness Coal. v. Hecla Min. Co.*, 870 F. Supp. 983, 988 (E.D. Wash. 1994).

The Minntac tailings basin also discharges pollutants through smaller point sources, such as conduits and discrete fissures, which leak to both navigable waters and to groundwater with a direct hydrologic connection to navigable waters protected by the CWA. In order to comply with the law, MPCA must include effluent limitations for *all* of Minntac's point source discharges that impact surface waters.

The Draft Permit contains an error of law that undercuts its viability and requires correction to include standards that comply with the CWA. This error is introduced on page 7 of the Fact Sheet and continued throughout the rest of the Fact Sheet and Draft Permit, when it creates three categories of "discharge" that are not supported by the CWA. Under the CWA there is no justification for MPCA's artificial distinction between the "hydrologic definition" and the "NPDES - CWA definition" of discharge. Fact Sheet at 7. Indeed, the CWA, federal caselaw, and the EPA's own interpretation of this law requires the MPCA to treat discharges to surface water via hydrologically-connected groundwater as regulated under the CWA, and subject to NPDES permit controls. As a result, the entire premise of not applying CWA standards to groundwater discharge from Minntac is arbitrary and capricious and contrary to federal law. MPCA must re-write this permit in order to apply federal pollution standards that include effluent limits necessary to protect surface waters from Minntac's discharge of pollutants via hydrologically-connected groundwater.

The U.S. Supreme Court, other federal court interpretations, and the EPA all agree on this issue—they interpret the CWA to cover point source discharge to directly hydrologically-connected groundwater. As the EPA concluded in guidance:

> As a legal and factual matter, EPA has made a determination that, in general, collected or channeled pollutants conveyed to surface waters via ground water can constitute a discharge subject to the Clean Water Act. . . . consistent with the case law, there must be information indicating that there is a "direct" hydrologic connection to the surface water at issue.

National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 3017 (Jan. 12, 2001); *see also id.* at 3015; NPDES General Permits for Storm Water Discharges from Construction Activities, 63 Fed. Reg. 7,858, 7,881 (Feb. 17. 1998); Amendments to the Water Quality Standards Regulations that Pertain to Standards on Indian Reservations, Final Rule, 56 Fed. Reg. 64876, 64892 (Dec. 12, 1991) ("[T]he affected ground waters are not considered 'waters of the United States' but discharges to them are regulated because such discharges are effectively discharges to the directly connected surface waters."). As can be seen in these citations, EPA's position is consistently stated across its CWA rulemaking and has been clear to MPCA for over a decade.

EPA summarized the consensus view in this way: "The reasonableness of the Agency's interpretation is supported by the fact that the majority of courts have determined that CWA jurisdiction may extend to surface water discharges via hydrologic

connections."[2] 66 Fed. Reg. at 3017. Nor can the MPCA credibly ignore the EPA's scientific expertise and authority that led to this interpretation of the law. Congress

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[2] EPA footnote in original states:

See e.g., Williams PipeLine Co. v. Bayer Corp., 964 F.Supp. 1300, 1319–20 (S.D. Iowa 1997) (''Because the CWA's goal is to protect the quality of surface waters, the NPDES permit system regulates any pollutants that enter such waters either directly or through groundwater.''); *Washington Wilderness Coalition* v. *Hecla Mining Co.*, 870 F. Supp. 983, 989–90 (E.D. Wash. 1994), *dismissed on other grounds*, (lack of standing) per unpublished decision (E.D. Wash. May 7, 1997) (finding CWA jurisdiction where pollution discharged from manmade ponds via seeps into soil and ground water and, thereafter, surface waters; and holding that, although CWA does not regulate isolated ground water, CWA does regulate pollutants entering navigable waters via tributary ground waters); *Friends of the Coast Fork* v. *Co. of Lane, OR*, Civ. No. 95–6105–TC (D. OR. January 31, 1997) (reaching same conclusion as court in *Washington Wilderness Coalition v. Hecla Mining Co.*, and finding hydrologically-connected ground waters are covered by the CWA); *McClellan Ecological Seepage Situation*, 763 F. Supp. 431, 438 (E.D. Cal. 1989), *cacated (on other grounds)*, 47 F.3d 325 (9th Cir. 1995), *cert. denied*, 116 S.Ct. 51 (1995) (allowing plaintiff to attempt to prove at trial that pollutants discharged to ground water are subsequently discharged to surface water); and *McClellan Ecological Seepage Situation* v. *Weinberger*, 707 F. Supp. 1182, 1195–96 (E.D. Cal. 1988), *vacated (on other grounds)*, 47 F.3d 325 (9th Cir. 1995), *cert. denied*, 116 S.Ct.51 (1995) (although NPDES permit not required for discharges to isolated ground water, Congress' intent to protect surface water may require NPDES permits for discharges to ground water with direct hydrological connection to surface waters); *Friends of Sante Fe Co.* v. *LAC Minerals, Inc.*, 892 F. Supp. 1333, 1357–58 (D.N.M. 1995) (although CWA does not cover discharges to isolated, nontributary groundwater, *Quivira* and decisions within Tenth Circuit demonstrating expansive construction of CWA's jurisdictional reach foreclose arguments that CWA does not regulate discharges to hydrologically connected groundwater); *Sierra club* v. *Colorado Refining Co.*, 838 F. Supp. at 1434 (''navigable waters'' encompasses tributary groundwater and, therefore, allegations that defendant violated CWA by discharging pollutants into soils and groundwater, and that pollutants infiltrated creek via groundwater and seeps in creek bank, stated cause of action); and *Quivira Mining Co.* v. *United States EPA*, 765 F.2d 126, 130 (10th Cir. 1985), *cert. denied*, 474 U.S. 1055 (1986) (affirming EPA's determination that CWA permit required for discharges of pollutants into surface arroyos that, during storms, channeled rainwater both directly to streams and into underground aquifers that connected with such streams); *Martin* v. *Kansas Board of Regents*, 1991 U.S.Dist. LEXIS 2779 (D.Kan. 1991) (''Groundwater . . . that is naturally connected to surface waters constitute 'navigable waters' under the Act.''); *see also Inland Steel Co.* v. *EPA*, 901 F.2d 1419, 1422–23 (7th Cir. 1990) (''the legal concept of navigable waters might include ground waters connected to surfacewaters—though whether

intended for the EPA to have the authority to interpret this issue, and it has done so to include direct hydrologically-connected groundwater under the purview of CWA regulation.

MPCA's reliance on an EPA guidance document from 1982[3] is misplaced, and obviously rebutted by subsequent EPA statements on this issue. MPCA has before it a 2013 letter from the EPA that explicitly applies this standard to Minntac's tailings basin.[4] That letter makes clear that water quality standards must be met in surface waters that are impacted by Minntac's seepage, both aboveground and through hydrologically-connected groundwater. The agency's continued failure to acknowledge EPA's position is contrary to its legal duties. Neither MPCA, nor EPA, has the authority to exempt point source mining pollution from CWA coverage.

MPCA must rewrite the final NPDES permit for Minntac to clearly acknowledge the facts that demonstrate that discharges to groundwater are directly hydrologically connected to surface waters. A connection is sufficiently "direct" if it can be traced from surface water to the point source that emitted the polluted water. *Washington Wilderness Coal.v. Hecla Min. Co.*, 870 F. Supp. 983, 990 (E.D. Wash. 1994); *Idaho Rural Council v. Bosma*, 143 F. Supp.2d 1169, 1180 (D. Idaho 2001). Some courts have also found that significant effects on the surface water is sufficient to show a direct connection. *Northern California River Watch v. City of Healdsburg*, 496 F.3d 993, 1001 (9th Cir. 2007). But other courts have found a direct hydrological connection regardless of significant effects,[5] and the CWA's strict liability scheme does not require a water to be effectively destroyed before a direct hydrological connection can be established. *See Hawai'i Wildlife Fund v. County of Maui*, 24 F.Supp.3d 980, 997 (D. Haw. 2014).

Additionally, recent precedent shows that the CWA is also applicable to this permit under the "conduit theory" articulated in *Hawai'i Wildlife Fund v. County of Maui*, 24 F.Supp.3d 980 (D. Haw. 2014). The test articulated by the *County of Maui* court is straightforward, and comports well with the CWA's protection of navigable waters of the United States. That case also shows there is no legal support for a state agency's attempt to distinguish "deep groundwater" from the CWA's jurisdiction if it is connected to a surface water. *Id.* at 999.

Since all the evidence before MPCA shows that groundwater pollution from Minntac's seeps can be directly traced to surface waters adjacent to the tailings basin, it is clear that these point source discharges must be regulated under the CWA.

> it does or not is an unresolved question. * * * [A] well that ended in such connected ground waters might be within the scope of the [CWA]'').

66 Fed. Reg. at 3017 n.1.

[3] Fact Sheet at 8.

[4] Letter from Peter Swenson, Chief, Watersheds and Wetlands Branch EPA, to Tamara Cameron, Chief, Regulatory Branch U.S. Army Corps of Engineers, "Environmental Impact Assessment for United States Steel Corporation - Minntac East Pit Extension (MVP-2012-00415), St. Louis County, Minnesota," May 15, 2013.

[5] *See, e.g.*, *Washington Wilderness Coal.*, 870 F. Supp. at 990 (requiring plaintiffs to show a surface water to be affected with traceable discharge, but not requiring significant effects).

B. The record demonstrates a hydrologic connection between Minntac's discharges from its tailings basin and nearby surface waters

The facts concerning the hydrological connection between the Tailings Basin and the Sand River and Little Sandy and Sandy Lakes (Twin Lakes), to the east, and the Dark River, to the west, do not seem to be in dispute. Provision 1.3 of the draft Schedule of Compliance states, "The MPCA recognizes that basin-impacted groundwater is currently reaching surface waters and having an impact on those surface waters." According to the Fact Sheet: "Monitoring results and the configuration of the local water table indicate that pollutants enter the Dark River from the tailings basin via surface flow, which originates at seeps such as SD001, and groundwater flow that enters the Dark River as baseflow both near the basin and at unknown distances downgradient from the basin." Several requirements in the "SDS" Schedule of Compliance are premised on the understanding that the area surface waters will not meet water quality standards even after all surface discharges are eliminated, due to pollutants from the tailings basin that travel to those surface waters via groundwater.

MPCA has more than adequate evidence of the direct underground hydrological connection between the tailings basin and the Sand River, Twin Lakes, and Dark River. In addition, we are submitting a report prepared by University of Minnesota professor Dr. Lawrence Baker, which summarizes many of the past studies that have confirmed this connection; our submission of materials for the record include the documents that Dr. Baker relied on in preparing his report. His findings include:

- Regarding the gradient of the groundwater flowpath(s) to the Sand River: Between the tailings basin and Little Sandy Lake, the groundwater elevation decreases from 870 feet to 850 feet over a distance of 0.4 miles. Between the tailings basin and Admiral Lake, the same decline in groundwater elevation occurs in about 0.25 miles.
- The ratios of sulfate-to-chloride and sulfate-to-TDS in the inflow to the Twin Lakes is similar to the groundwater in a well located directly between the tailings basin and the Twin Lakes, but very different from the corresponding ratios in regional lakes that are not affected by mining.
- A 2013 report determined that "The Tailings Basin pools are surface water bodies that create a mounding condition forcing groundwater flow in a primarily radial direction approximately perpendicular to the perimeter dike surrounding the Tailings Basin."
- The tailings basin water seeps to the Sand and Dark Rivers is "consistent with the idea that water from the tailings basin is draining through the deep cut through the bedrock" that exists because "the tailings basin was constructed over the original drainage of the Sandy River – a deep cut filled with coarse glacial deposits."
- The contribution of pollution from the tailings basin groundwater to surface waters is significant: "about one-third of the water but 94% of the sulfate enter the Twin Lakes through the stream below the tailings dam."

See Baker Report.

The combination of these findings, MPCA's own statements in the Fact Sheet, reports prepared by USS, its contractors, MPCA, and other experts, shows that water and pollution in both the Sand River and Dark River is traceable to Minntac's discharges. The fact that Minntac's

groundwater discharges significantly affect the pollution levels in these surface waters is in itself proof that these discharges are directly hydrologically connected. It is also clear on the face of the Draft Permit and its Fact Sheet that tailings-basin-impacted groundwater pollution has impacted surface waters in the past and will continue to do so in the future.

MPCA's legal position seems to be that discharge that first enters groundwater and is subsequently discharged to surface water is not subject to CWA limits. The applicability of the CWA does not depend on whether the groundwater itself is a point source, as MPCA incorrectly seems to assume.[6] Even aside from the fact that EPA and the federal courts have repeatedly held otherwise, MPCA's position is inconsistent and untenable as a factual matter. As Dr. Baker states in his report, "There is also evidence showing that groundwater just below the tailings basin . . . is largely the same water that flows into Little Sandy Lake through its surface water inflow." Whether this water immediately emerges at the surface or travels a short distance underground before doing so is largely irrelevant to either the operation of the tailings basin or to the impact on surface water. It is a distinction without a difference.

Furthermore, treating surface water seeps differently from what MPCA terms "deep seeps" results in a lack of clarity in the permit. According to the Fact Sheet, seeps that surface "adjacent to" the dam are considered NPDES discharges, while seeps that surface at some undefined distance further away are not. "Adjacent to" is not defined, and it appears that MPCA's real definition of NPDES discharge is any discharge that happens to be collected by the existing Seepage Collection and Return System (SCRS). But the CWA does not base the definition of a "point source" on the efficacy of a collection system.

Treating a portion of a discharge as subject to federal requirements while other discharge of the same water, from the same point source, polluting the same water is only offers polluters a method to circumvent the CWA. Under MPCA's interpretation, a mining company could simply discharge polluted water into the ground rather than directly to surface water; regardless of the impact on nearby surface water. The fundamental flaw in this position is apparent when one considers what happens to the water that is collected by Minntac's existing SCRS: it is pumped back into the tailings basin, where it will eventually make its way, underground, to the same surface water that it was initially prevented from entering. Although the system may delay the amount of pollutants entering the river and lakes for a time, as the water level increases in the basin due to the pump back, the higher hydrological head may simply force more water out at deeper levels, which may in turn increase the amount of water surfacing immediately beyond the reach of the SCRS. Under MPCA's reasoning and the facility's current system, the SCRS is little more than an elaborate scheme to transform pollution that previously entered surface water through surface seeps (and was thus subject to federal requirements) into pollution that enters surface water through groundwater (and thus is not). While the East SCRS may have lessened the load of pollutants to the Sand River in the short term, the long-term effects on either water quality or total load are unknown and may turn out to be negligible. The CWA prohibits pollution of navigable waters; MPCA's "solution" of sending the same pollution through a somewhat slower travel path is in fact no solution at all.

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[6] Fact sheet at 8 (discussing a "flow system" issue and concluding "This flow system is neither confined nor discrete and is not consistent with the examples of underground conveyances explicitly mentioned in the CWA definition of a point source (i.e., is not a tunnel or discrete fissure).").

Furthermore, while MPCA touts the SCRS as a "zero discharge" solution to Minntac's NPDES problem, the lakes and rivers might actually be better off without it, because it acts as a disincentive to install control or treatment technology that would more fully address the problem. In the absence of the SCRS, USS would presumably be required to treat *at least* its surface water discharge, which would improve the quality of the river and downstream waters even if the groundwater discharges were not subject to federal requirements. Treating groundwater and surface discharges differently in this case thus may be impacting the ability of CWA requirements to work as intended even for surface discharge.

MCEA submits that a polluter cannot escape the provisions of the CWA by discharging its pollutants into the ground adjacent to a lake or river, rather than into the lake or river itself. If the path of pollution from the source into the surface water is clear, that discharge is governed by the CWA.

III. THE WILD RICE SULFATE STANDARD WAS ENACTED PURSUANT TO THE CWA AND WITH EPA APPROVAL, AND IT THEREFORE MUST BE ENFORCED UNDER THIS PERMIT

A. MPCA must follow its EPA-approved water quality standards as part of its CWA delegation

MPCA's stated opinion in the Fact Sheet is "To be consistent with this legislation[2015 Minn. Laws 1st Sp. Sess. Ch. 4, Art. 4, Sec. 136], the draft permit contains no sulfate limits for wild rice and does not require expenditures related to wild rice sulfate limits." Fact Sheet at 33.This is illegal under the CWA and its federal regulations.

Once a state-adopted water quality standard is approved by EPA it remains the applicable standard according to federal law. This regulation is clear that "A State or authorized Tribe's applicable water quality standard for purposes of the Act remains the applicable standard until EPA approves a change, deletion, or addition to that water quality standard, or until EPA promulgates a more stringent water quality standard." 40 C.F.R. § 131.21(e). The wild rice sulfate standard of 10 mg/l has been promulgated consistent with CWA regulations and is currently in effect. The Supremacy Clause of the U.S. Constitution applies to make this federal regulation supersede the Minnesota legislature's subsequent attempt to undo a CWA water quality standard. *See* U. S. CONST. art. IV, cl. 2. Therefore MPCA must determine whether effluent limits are necessary to ensure the Minntac discharge meets the applicable 10 mg/l sulfate standard in receiving waters. Minn. R. § 7050.0224. The standard approved by EPA clearly states the applicability of the 10 mg/l sulfate standard to water used for production of wild rice, and also states, in part:

> Wild rice is an aquatic plant resource found in certain waters within the state. The harvest and use of grains from this plant serve as a food source for wildlife and humans. . . . The quality of these waters and the aquatic habitat necessary to support the propagation and maintenance of wild rice plant species must not be materially impaired or degraded. If the standards in this part are exceeded in waters of the state that have the class 4 designation, it is considered indicative of a

> polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses.

Minn. R. § 7050.0224, subp. 1.

Federal courts have accepted parties' arguments that "state permit programs are essentially part of federal law, since they must be approved by the EPA, and must comport with stringent federal requirements." *Wash. Wilderness Coal. v. Hecla Min. Co.*, 870 F. Supp. 983, 987 (E.D. Wash. 1994). Delegation of authority to issue permits does not shield MPCA from its duty to follow water quality standards as-approved by EPA.

B. Minntac discharges to waters covered by the 10mg/l sulfate standard

The applicability of the standard is not limited to waters that are explicitly designated as wild rice waters.[7] It applies to any waters that in fact historically produced wild rice. There does not seem to be any dispute about the fact that the Twin Lakes historically produced wild rice, and MPCA says as much in the Fact Sheet accompanying the Draft Permit. However, we are submitting several documents to that effect, for inclusion in the record. *See, e.g.*, Baker Report, Appendices, and other attachments.

MPCA has interpreted the wild rice standard to apply to all waters that in fact produce wild rice since the regulation was promulgated. Over the years, it has repeatedly informed USS that the Minntac tailings basin discharge was in violation of this regulation. In 1991, MPCA sent a letter to USS regarding a proposed siphon discharge of tailings basin water. That letter reads,

> In 1986 and 1987, the MPCA and MDNR staff raised numerous concerns about the impacts of a discharge from the Minntac tailings basin to the Dark River, Sand River, and the West Two Rivers River. . . . These issues must be addressed before the MPCA will consider authorization of any discharge from the tailings basin. . .
>
> . . .
>
> A siphon discharge to the Sand River may affect the water quality of both the river itself and twin Sand Lakes. These receiving waters have natural occurrences of wild rice, according to the MDNR. According to Minn. Rules ch. 7050, the waters of the state used for production of wild rice have a sulfate water quality standard of 10 mg/l, applicable during periods when the rice may be susceptible to damage by high sulfate levels. . . .

MPCA insisted that USS meet several requirements before a siphon discharge would be considered. They included:

> Undertake mitigation measures in order to achieve compliance with the 10 mg/l sulfate value in the wild rice portions of the Sand Lakes and the Sand River

[7] A partial list of "designated" wild rice waters which is also a part of existing regulations is clearly insufficient to cover the full breadth of Minnesota waters that are properly covered under the existing standard.

> between April 1 and June 30, or document evidence showing such measures are unnecessary.

William J. Lynott, Letter to Jane Hartley re: Minntac Tailings Basin Discharge Environmental Assessment Worksheet (May 28, 1991).

Many years went by, and MPCA finally issued a Letter of Warning in 2000. That letter reads:

> The Minnesota Pollution Control Agency (MPCA) is concerned about the existing high sulfate concentrations in the drainage from the Minntac tailings basin. The tailings basin wastewaters constitute the headwaters for both the Dark and the Sand Rivers, both of which flow to sensitive, highly valued waters, including Lake Vermillion. The quality of the tailings basin seepage in large part determines the water quality of downstream wetlands, and streams and lakes; surface water quality standards thus apply to wastewater released from the tailings basin.
>
> Sulfate has been identified as a pollutant of concern at the tailings basin since at least 1987. The expired National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit for the tailings basin, MN0057207, under which the facility continues to operate, does not include limits for sulfate nor specific conductance. . . .
>
> . . . While the MPCA may consider revisiting the sulfate standard in future rule revisions, this standard continues to apply presently as explained in our February 16, 2000 letter to USX. . . .
>
> The MPCA is issuing this Letter of Warning (LOW) to USX (Company) for alleged violations of the Clean Water Act and Minn. R. 7050 at the Minntac tailings basin located at Mountain Iron, Minnesota. The MPCA has sufficient information to indicate that the Company has violated the following provisions of state rules:
>
> 1. **Minn. R. 7050.0224, Specific standards of quality and purity for class 4 waters of the state; agriculture and wildlife.**
>
> . . .

Substance or Characteristic	Class 4A Standard
Specific conductance	1,000 micromhos per centimeter at 25° C
Sulfates (SO4)	10 milligrams per liter, applicable to water used for production of wild rice . . .

Deb Lindlief, Letter to L. Swearingen, Re: Letter of Warning, USX Minntac NPDES/SDS Permit No. MN0057201 (Aug. 21, 2000).

C. Waters Also Protected Under Class 2 Narrative Standard

While the State of Minnesota is currently conducting research to determine whether the sulfate standard for wild rice may be changed, existing uses must still be protected in the interim. In addition to the 10 mg/l numeric sulfate standard, a narrative standard applies as well. As with numeric standards, narrative water quality standards have been approved by the EPA, and thus are enforceable under the CWA as a matter of federal law.

> The narrative standard provides:
> For all Class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters.

Minn. R. § 7050.0150, subp. 3. "Fish and other biota" and "lower aquatic biota" include emergent vegetation. Minn. R. § 7050.0150, subp. 4(f). The materials that we are submitting that document the historic presence of wild rice on the Twin Lakes also document its steady decline over the years; it is now present only in isolated pockets along the shoreline. Again, MCEA's position is that there is no serious dispute that high sulfate levels are a contributing cause for this decline. *See* Baker Report.

It is clear that the propagation of wild rice, which is normally present on the Sand Lakes, is being prevented or hindered by the discharge of waste from the Minntac tailings basin. *See* Baker Report. MPCA must set WQBELs in the permit that will bring sulfate levels in the Sand Lakes down to a level that will not adversely affect wild rice.

IV. THE PERMIT MUST STATE MORE CLEARLY WHETHER UNLIMITED SURFACE SEEPS ARE PROHIBITED

Any discharge of pollutants from a point source to waters of the United States is strictly prohibited unless the discharge is authorized by a NPDES permit requiring compliance with effluent limits necessary to meet water quality standards. 33 U.S.C. §§ 1311(a), 1311(b)(1)(C), 1342(a)(1). However the Draft Permit potentially authorizes the discharge of pollutants via seeps without effluent limits necessary to meet water quality standards.

The Draft Permit and Fact Sheet both allude to the fact that there are additional surface seeps around the tailings basin perimeter, and that these seeps will need to be studied further under permit compliance. However, neither the Fact Sheet nor the Draft Permit include a map or schematic that shows the surface area where seepage is deemed to be a point source subject to NPDES requirements. Nor does either document identify the locations of all known seeps and differentiate between those that are collected and those that are not. We are thus left to wonder whether any enforcement is intended or would be available if surface seeps close to the dam are not collected. This is especially inappropriate since the MPCA Fact Sheet refers to "multiple dam seeps existing on the west and northwest perimeter of the tailings basin." Fact Sheet at 12. All of these seeps are point source discharges under the CWA, yet the permit provides no information on their location, monitoring, or control. MPCA must disclose this information

along with a final permit that sets monitoring requirements and effluent and flow limits at all known seeps.

As MPCA points out in its Fact Sheet, the agency has historically and consistently treated two of the surface seeps immediately beyond the dam as NPDES discharges. Other surface seeps seem not to have been treated as NPDES discharges. *See* Fact Sheet at 7. There seems to be no coherent criteria that MPCA applies to determine what discharge water falls under the purview of the CWA.

> MPCA's apparent justification for treating some of this water as a NPDES discharge is: NPDES permitting guidelines can be applied because flow from the large seeps is often observable, and with installation of a berm and outlet weir the flow can be measured, similar to flow from a ditch or channel. This allows quantification of flow volume and pollutant load, such that the reasonable potential to cause or contribute to exceedance of a water quality standard can be evaluated and, if necessary, effluent limits can be determined and applied.

Fact Sheet at 7. Again, nothing in the CWA or in federal regulations indicates that the definition of a point source subject to CWA requirements rests on an easy means to measure flow volume and pollutant load; discharge of pollutants from a point source to surface waters is prohibited without a permit regardless of the difficulty of measurement or quantification, and regardless of whether it has the reasonable potential to cause or contribute to exceedances of water quality standards.

The permit is ambiguous on this central issue. According to the Fact Sheet, "one requirement of this permit is to intercept/eliminate [NPDES] discharges," "the remedy for the impacts to the Dark River from this seepage is to eliminate the discharge (NPDES)," and "collection of surface seepage from the west side of the Minntac tailings basin for return to the recirculating process water system would eliminate the remaining surface discharge (NPDES) to waters of the United States." Fact Sheet at 9, 37. However, the Draft Permit is unclear as to whether continuing surface seepage is actually prohibited. Final limits are included for SD001 (following implementation of the West SCRS), with flow listed as "monitor only." The limit for sulfate is 1000 mg/L and manganese is "monitor only;" neither of these is sufficient as a WQBEL to protect the downstream use as a trout stream, particularly if there is no limit on flow. MCEA is concerned that if the SCRS is not built or does not operate as planned, or is discontinued due to unsafe water levels, reduced flow in the Dark River, or water management problems in the tailings basin, discharge will continue to be allowed under this permit.

Also, Chapter 5, paragraph 1 of the Draft Permit requires annual surveys for seeps that are not being collected. Although we agree with a monitoring requirement, the permit should clarify that this provision does not indicate that such seeps are allowed or legal. They are violations of the CWA. If MPCA instead intends to eliminate all of these seeps with seepage control and return systems, the permit should state so more clearly. As it is written now it seems to contemplate the continuation of unpermitted surface discharges, albeit studied by the permittee every October.

V. THE DRAFT PERMIT DOES NOT INCLUDE LIMITS NECESSARY TO PREVENT THE DISCHARGE OF POLLUTION VIA SURFACE SEEPS FROM CAUSING OR CONTRIBUTING TO A VIOLATION OF WATER QUALITY STANDARDS

MPCA has identified two major seeps on the western edge of the Minntac Tailings Basin via aerial photos. Fact Sheet at 16. These seeps, which constitute point source discharges to waters of the U.S.,[8] discharge to the headwaters of the Dark River, which "originates just outside of the tailing basin" and Timber Creek. Fact Sheet at 15–16. MPCA's failure to require compliance with effluent limits necessary to ensure the discharge from the Minntac tailings basin does not cause or contribute to an exceedance of water quality standards in these waters violates the CWA.

MPCA must impose effluent limitations necessary to achieve water quality standards in all segments of the Dark River and Timber Creek. 33 U.S.C. § 1311(b)(1)(C). No permit may be issued by MPCA "[w]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." 40 C.F.R. § 122.4(d). NPDES permits must include WQBELs necessary to achieve water quality standards applicable to waters impacted by the discharge. 40 C.F.R. § 122.44(d)(1). The WQBELs ensure that the discharge from the facility complies with all applicable water quality standards. 40 C.F.R. § 122.44(d)(1)(vii)(A).

A. MPCA has failed to assess the need for and impose limits necessary to protect Timber Creek

Despite clear indications that water discharged from the southwest portion of the basin via surface seeps enters Timber Creek upstream of its confluence with the Dark River MPCA failed to assess the need for effluent limits to protect this creek. Timber Creek, a Class 2B, 3C, 4A, 4B, 5 and 6 water, flows along the western edge of the Minntac tailings basin north to the Dark River. Fact Sheet at 15. While MPCA has indicated that "seeps on the southwest corner of the basin appear in aerial photo to be tributary" to Timber Creek no data have been provided about the flow or pollutant concentrations of this Creek. Fact Sheet at 15–16.[9]

MPCA must assess the need for WQBELs to protect Timber Creek from the discharge of pollutants from seeps in the Minntac Tailings Basin and impose necessary WQBELs in the Minntac NPDES permit. 33 U.S.C. §§ 1311, 1342; 40 C.F.R. § 122.4, 122.44(d); *United States v. Earth Sciences, Inc.*, 599 F.2d 368, 370 (10th Cir.1979). Such limits must apply at a compliance point upstream of Timber Creek, such as the aggregate compliance point identified below. 40 C.F.R. § 122.45(a).

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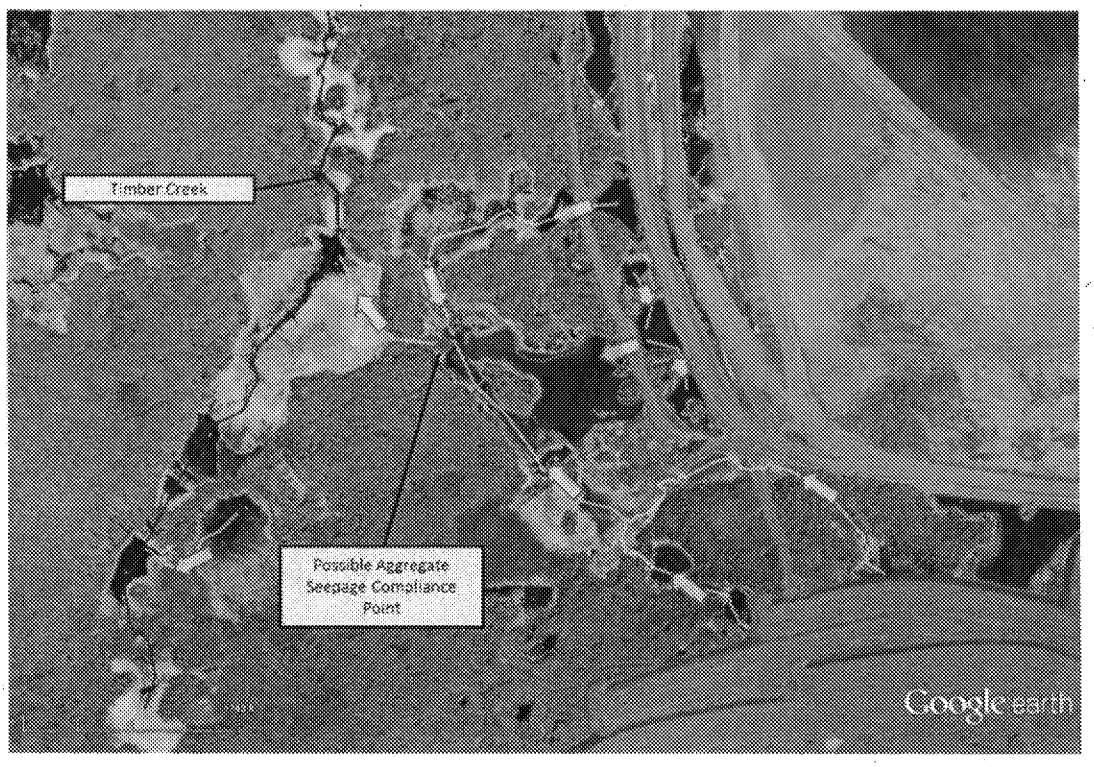
[8] *See* June 7, 2010 Memorandum from James Hanlon, Director Office of Wastewater, stating that seepage discharged directly via a point source to a water of the U.S. must be addressed under the NPDES permit for a facility.

[9] As part of the state conditions controlling discharges (SDS) to groundwater the draft permit does require compliance with some limits at a surface water compliance point near the confluence of Timber Creek with the Dark River. *See* Fact Sheet at 32; Draft Permit at 20.

Figure 5 – One Possible Seepage Compliance Point based on Inferred Flow Paths



B. MPCA failed to assess the need for and impose limits necessary to protect the Class 2B Reach of the Dark River

Where available data indicate the need for effluent limits to meet water quality standards, MPCA may not, as it has done here, issue a NPDES permit without WQBELs to meet water quality standards, while it awaits the collection of additional data. The threshold for making a decision to include WQBELs in NPDES permits is low: limits are necessary when a pollutant "may be discharged at a level which will cause, have a reasonable potential to cause, or contribute to an excursion above State water quality criteria." 40 C.F.R. § 122.44(d)(1)(i); *Upper Blackstone Water Pollution Abatement Dist.* 14 E.A.D. 577, 599 (EPA 2010); *City of Taunton, Dep't of Pub. Works*, 17 EAD_, 2016 WL 3352212, *39 (EPA May 3, 2016). MPCA must impose WQBELs based on available data, even when there is limited data available on the quality of the water discharged from the facility, or some uncertainty about the precise pollutant discharge levels and potential impacts of the discharge. *Upper Blackstone* at 599.

The Dark River, designated a Class 2B, 3C, 4A, 4B, 5, and 6 water, flows approximately 7.5 miles before it enters Dark Lake. Fact Sheet at 15. Elevated levels of sulfate, total dissolved solids, bicarbonate, hardness and specific conductance have been observed in this segment of the Dark River. Fact Sheet at 15. While MPCA calculated effluent limits of 1000 mg/L sulfate and 100 umg/cm specific conductance to meet water quality standards for these parameters in the Class 2B segment of the Dark River, MPCA did not perform a reasonable potential analysis to determine whether the Minntac discharge had the reasonable potential to cause or contribute to

an exceedance of water quality standards in this segment of the Dark River for any other pollutants or parameters. Fact Sheet at 26; Draft Permit at 17–18, 21.MPCA must use the two samples collected to assess the need for WQBELs to protect the Class 2B reach of the Dark River..

MPCA assesses the need for WQBELs using the procedures in part Minn. R. 7052.0220. *Minnesota Pollution Control Agency Wastewater Permit User's Manual*, November 2014, at page 24. Using this process, summarized in the Minntac Fact Sheet, MPCA finds that a WQBEL is needed where the projected effluent quality of the discharge exceeds the projected effluent limit necessary to meet the water quality standard.[10] Fact Sheet at 26; Minn. R. § 7052.0220, subp. 3; *see also Technical Support Document for Water Quality-based Toxics Control ("TSD")*, United States Environmental Protection Agency, March 1991, at page 53, Box 3-2. Here, because there is limited effluent data to characterize Minntac's discharge at SD001, there is not a high degree of certainty that the data actually includes the maximum potential effluent concentration discharged from a facility. NPDES Permit Writers Manual, EPA, September 2010, at 6–17. Therefore, permit drafters account for potential variability in effluent by multiplying a facility's highest recorded pollutant concentration by a Reasonable Potential Multiplying Factor – in this case 3.8. Fact Sheet at 26–27; Minn. R. § 7052.0220, subp. 3. This process is also endorsed by EPA in its TSD, at pages 52–54, see example in Box 3-2.

Using these procedures to compare Minntac's projected effluent quality to the projected effluent limits necessary to meet water quality standards (see below), shows that the absent more stringent effluent limits, the Minntac discharge has the reasonable potential to exceed applicable water quality standards for several parameters. Therefore MPCA must revise the draft permit to include WQBELs for Alkalinity, Bicarbonates, Hardness, TDS, Boron, Chloride, Copper, and Selenium.[11]

		Alkalinity (Bicarbonate as CaCO3) mg/L	Bicarbonates (HCO3)	Hardness (Ca+Mg as CaCO3)	TDS (mg/L)	Boron Total (ug/L)	Chloride (mg/L)	Copper (ug/L)	Selenium (ug/L)
Max Effluent Value SD001		503	614	1690	2230	270	139	3	4
PEQ Factor		3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
PEQ		1911	2332	6422	8474	1026	528	12	14
Water Quality Standards	2B						230	6	5
	3C			500			250		
	4A	250	305		700	500			
	4B								

[10] Where, as here the number of effluent samples is less than 10, the Reasonable Potential Multiplying Factor is determined using a coefficient of 0.6. Minn. R. § 7052.0220, subp. 3. *See also* EPA TSD at 53.

[11] In addition to the Sulfate and Specific Conductance WQBELs included in the draft permit.

C. The Draft Permit Does Not Include Effluent Limits Necessary to Meet Water Quality Standards in the Trout Stream Reach of the Dark River

The draft permit fails to establish effluent limits necessary to meet water quality standards in the Class 1B reach of the Dark River that is Downstream of Dark Lake. Here, MPCA did not perform a reasonable potential analysis to assess the need for limits to protect the Class 1B reach of the Dark River because Minntac had only collected comprehensive effluent data at SD001 on two occasions, and according to MPCA "a minimum of ten data points is required to perform a reasonable potential analysis." Fact Sheet at 29. Instead MPCA evaluated whether the discharge would exceed water quality standards using an average of the two samples it had collected at SD001 for each parameter. Fact Sheet at 29. MPCA projected instream concentrations of these pollutants in the trout stream reach by averaging the effluent data from the two samples and applying a dilution ratio. Fact Sheet at 28. Using this analysis, MPCA determined that the following monthly average limits were necessary to meet water quality standards in the Class 1B reach of the Dark River:

- 500 mg/L Hardness, Calcium & Magnesium (CaCO3); and
- 700 mg/L Total Dissolved Solids (TDS);
- 1000 us/cm Specific Conductance
- 305 mg/L Bicarbonates (HCO3)

Fact Sheet at 30; Draft Permit at 17–18.

However, MPCA's analysis fails to ensure effluent limits are included in the Minntac permit to protect the Class 1B reach of the Dark River from other pollutants discharged at SD001. This is because MPCA did not adequately assess the reasonable potential for the effluent to exceed water quality standards. Here, because there is limited effluent data available (two samples), it is unlikely that even the highest effluent sample reflects the actual maximum effluent from the facility. NPDES Permit Writers Manual, EPA, September 2010, at 6–17. Therefore, as above, when assessing the need for effluent limits the highest recorded pollutant concentration must be multiplied by the Reasonable Potential Multiplying Factor to account for effluent variability and *ensure* a discharge does not exceed water quality standards.

Adequately accounting for variability by applying the appropriate Reasonable Potential Multiplying Factor (see below) illustrates the need for additional effluent limits because the Minntac discharge has the reasonable potential to exceed the following water quality standards in the Class 1B reach of the Dark River: Alkalinity, Bicarbonates, Arsenic, Chloride, Manganese and Selenium.

		Alkalinity (Bicarbonate as CaCO3) mg/L	Bicarbonates (HCO3)	Arsenic Total (ug/L)	Chloride (mg/L)	Manganese Total (ug/L)	Selenium (ug/L)
Max Effluent Value SD001		503	613.66	1.2	139	1760	3.7
PEQ Factor		3.8	3.8	3.8	3.8	3.8	3.8
PEQ		1911	2332	5	528	6688	14
Project Concentration of Discharged Pollutant at start of 1B reach		822	1003	2	227	2876	6
WQ Standards At Trout Stream Reach	1B			10		50	50
	2A			2	230		5
	3B				100		
	4A	250	305				

D. The Draft Permit Does Not Include Manganese Limits Necessary to Ensure the Minntac Discharge at SD001 Does Not Contribute to a Violation of Water Quality Standards in the Class 1B Reach of the Dark River

MPCA has failed to include an effluent limit at SD001 to ensure the discharge of manganese from surface seeps meets the manganese standard in the Class 1B reach of the Dark River. Concentrations of manganese in the effluent discharged at SD001 exceed 1700 ug/L. Fact Sheet at 31. MPCA has determined that this concentration of manganese is likely diluted to 78.97 ug/L at the start of the Class 1B reach of the Dark River. Because Minntac's manganese discharge will exceed the manganese water quality standard applicable to the river, 50 ug/L, MPCA must impose a manganese effluent limit that ensures the Minntac discharge meets water quality standards.

Further MPCA, should explain the dilution ratio it applied to determine the likely concentration of manganese in the Class 1B reach of the Dark River. Here, MPCA applied a much lower dilution ratio, 0.045, to Minntac's surface discharge of manganese, than it did to all other pollutants discharged at SD001, 0.43. Fact Sheet at 29. However, the Fact Sheet fails to explain why such a lower dilution ratio is appropriate for Minntac's discharge of manganese.

E. The Draft Permit Does Not Include Sulfate Limits Necessary To Ensure The Minntac Discharge at SD001 Does Not Contribute To A Violation Of The Sulfate Water Quality Standard In The Class 1B Reach Of The Dark River

The draft sulfate effluent limit proposed for SD001, 1000 mg/L, is calculated to meet water quality standards in the Class 2 reach of the Dark River, but is insufficient to ensure Minntac's discharge meets the sulfate standard applicable to the Class 1B reach of the Dark River. *See* 40 C.F.R. § 122.45(a) ("[a]ll permit effluent limitations, standards and prohibitions shall be established for each outfall or discharge point of the permitted facility. . ."). According to MPCA's own dilution estimates, a discharge of 1000 mg/L sulfate would result in a likely concentration of 430 mg/L sulfate in the Class 1B reach of the Dark River, which exceeds the applicable 250 mg/L water quality standard. MPCA must impose a more stringent sulfate effluent limit applicable at SD001 that ensures the Minntac discharge meets water quality standards in the downstream Class 1B reach of the Dark River.

F. MPCA May Not Authorize Minntac to Cause a Violation of Class 3 and Class 4A Water Quality Standards Ten Percent of the Time

The Draft Permit improperly authorizes Minntac to cause or contribute to a violation of Class 3 and Class 4a water quality standards 10 percent of the time. According to the Draft Permit:

> **Final Limits for Class 3 and 4A Parameters**
>
> 1.2 To protect the class 3 (industrial consumption) and class 4a (agriculture) designated uses of surface water bodies, monthly monitoring results must be below the state water quality ambient standard for an applicable pollutant greater than 90 percent of the time. Therefore, the Permittee will be in violation of permit conditions during a given monitoring period when the following occurs:
>
> a. The monitoring result for that month exceeds the permit limit; and
>
> b. The compliance limit has been exceeded for that monitoring location greater than 10 percent of the time over the preceding 12 months in which monitoring was completed, ending during the most recent reporting month.

Draft Permit at 42. However nothing in state law indicates that the designated uses of the Class 3 and Class 4A waters are met if the applicable water quality standards are exceeded 10 percent of the time. The numeric and narrative water quality standards for Class 3 and 4A waters "prescribe the qualities or properties of the waters of the state that are necessary" to meet these designated uses. Minn. R. §§ 7050.0223, subp. 1, 7050.0224, subp. 1. Exceedance of the water quality standards applicable to these waters is "indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses." Minn. R. §§ 7050.0223, subp. 1, 7050.0224, subp. 1. State regulations simply do not indicate that the Class 3 and Class 4A uses can be maintained and attained if they are exceeded 10 percent of the time, and a reading of other regulations that do have that provision shows that MPCA knew

how to promulgate that language if it was applicable here.[12] Therefore any exceedance of the permit limits derived to meet the Class 3 and Class 4A water quality standards constitutes a violation of water quality standards. Limits that allow Minntac to exceed water quality standards do not ensure that the level of water quality achieved by Minntac "complies with all applicable water quality standards." 40 C.F.R. § 122.44(d)(1)(vii). Any violation of the WQBELs for Class 3 and Class 4A standards must be considered a permit violation.

VI. MPCA CANNOT ADDRESS ANY OTHER PERMITTEE APPLICATIONS AT THIS TIME

MCEA recognizes that the permittee has applied for several modifications, such as a Use Attainability Analysis and Site Specific Standard. MPCA cannot make any such modifications in this proceeding without having sufficient public comment and proceedings on the proposals, because any such change to MPCA's Draft Permit issued for comment is not a minor modification where the agency can act without full public review. 40 C.F.R. §§ 122.62, 122.63. As a result, MCEA makes no additional comments on these applications, which were not provided for comment with this Draft Permit.

/s/ Hudson Kingston
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[12] See Minn. R. §§ 7050.0223, 7050.0224, which does not say the numeric standards identified may be exceeded ten percent of the time. Compare to Minn. R. § 7050.0222, subp. 4 which clearly indicates that Minnesota's water quality standards for total suspended solids "may be exceeded for no more than ten percent of the time."

Minnesota Center for
Environmental Advocacy

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December 22, 2016

Erik Smith
Minnesota Pollution Control Agency
Industrial Division
520 Lafayette Road N.
St. Paul, MN 55155

VIA E-MAIL SERVICE

Re: U.S. Steel – Minntac Tailings Basin Area: Draft Proposed Reissued NPDES/SDS Permit No. MN0057207

PETITION FOR CONTESTED CASE HEARING TO THE MINNESOTA POLLUTION CONTROL AGENCY
Pursuant to Minnesota Rules 7000.1800 and 7000.1900.

Dear Mr. Smith:

Petitioner, the Minnesota Center for Environmental Advocacy (MCEA), hereby petitions the Minnesota Pollution Control Agency (MPCA) to hold a contested case hearing to address any and all disputed material issues of fact concerning the U.S. Steel – Minntac Tailings Basin Area draft National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit, no. MN0057207 ("Draft Permit").

This contested case petition is based on, and hereby incorporates by reference, the following documents:

1. MCEA's preceding and simultaneously filed comment letter, with attachments, dated December 22, 2016.

2. Stipulation of Settlement from Ramsey County Court File No. 62-CV-16-6257, *State of Minnesota ex rel., Minnesota Center for Environmental Advocacy, Save Lake Superior Association, and Save Our Sky Blue Waters v. Minnesota Pollution Control Agency*.

A contested case hearing is a formal proceeding before an administrative law judge empowered to advise the MPCA regarding issues of fact. Pursuant to Minn. R. 7000.1800, subp. 2, MCEA's timely, written petition for a contested case

hearing must include: (1) a statement of reasons or proposed findings supporting a decision to hold a contested case hearing, and (2) a statement of the issues MCEA proposes to address in a contested case hearing and the specific relief requested or resolution of the matter.

As a threshold matter, this written petition is timely. "[F]or permit matters, a petition for a contested case hearing must be submitted during the public comment period" if such a period has been established by the MPCA under 7001.0010 and 7007.0850. Minn. R. 7000.1800, subp. 1(A). Having been extended by one week, MPCA's public comment period for the Minntac Draft Permit ends at 4:30 PM on December 23, 2016. MPCA, Public Notice of Intent to Reissue, Wastewater MN0057207. As this petition is submitted before the close of the relevant comment period, it is timely. The following sections provide all additional content required by Minn. R. 7000.1800, subp. 2.

I. STATEMENT OF THE REASONS OR PROPOSED FINDINGS SUPPORTING A DECISION TO HOLD A CONTESTED CASE HEARING

MPCA's decision whether to hold a contested case hearing will be made under Minn. R. 7000.1900, subp. 1, which requires the MPCA commissioner to grant MCEA's petition for a contested case hearing if "there is a material issue of fact in dispute concerning the matter pending before the . . . commissioner," over which the commissioner has jurisdiction, and for which there is a reasonable basis underlying the disputed material issue of fact or facts such that a contested case hearing would allow the introduction of information that would aid the commissioner in the resolution of the disputed facts in making a final decision on the matter. The scope of the contested case shall be limited by the commissioner—or, at the commissioner's request, by the administrative law judge—in accordance with applicable law, due process, and fundamental fairness. Minn. R. 7000.1900, subp. 2.

At the threshold, the commissioner has jurisdiction over this matter. Disputed material issues of fact that arise from this Minntac Draft Permit are under MPCA's jurisdiction pursuant to its NPDES permitting authority under Minn. Stat. § 115.03, subd. 5.

While any person may petition for a contested case hearing, MCEA has a direct interest in this particular matter. MCEA is a Minnesota non-profit environmental organization whose mission is to use law, science, and research to protect Minnesota's wildlife, natural resources, and the health of its people. MCEA focuses extensively on water quality concerns and participates in many Clean-Water-Act-related policy and legal matters relevant or related to MPCA's decision to issue the Minntac Draft Permit.

On November 9, 2016, MCEA—joined by Save Lake Superior Association and Save Our Sky Blue Waters (collectively "Plaintiffs")—filed a lawsuit against the MPCA under Minn. Stat. §116B.10, alleging that the expired Minntac permit governing water discharges from the Minntac facility is inadequate to protect the air, water, land, or other natural resources. On November 15, 2016, the MPCA issued this Draft Permit for the Minntac facility and commenced its public comment period.

On December 6, 2016, MCEA filed a notice for voluntary dismissal of its lawsuit without prejudice, accompanied by a stipulation of settlement between the Plaintiffs and the MPCA. The stipulation expressly referenced several rights reserved by the Plaintiffs, including the right to seek a contested case hearing, and the right to refile the complaint if, in the sole judgment of the Plaintiffs, the requirements of the stipulation are not met. The stipulation also requires that Plaintiffs are included in any mediation between the MPCA and the permit holder, U.S. Steel, that may arise from the Minntac permit.

MCEA's participation in any contested case hearing held on this Draft Permit is directly related to the organization's position advocating for protection of Minnesota waters. Further, MCEA will be specifically affected if it is denied party participation in any contested case hearing held on a Minntac permit with respect to Plaintiffs' lawsuit, and may be forced, at an incurred cost, to refile the lawsuit as envisioned by the stipulation.

In addition to the factual and legal basis in support of this petition outlined by MCEA's simultaneously submitted comment letter and attachments to that letter, MCEA provides the following material facts related to the Minntac Draft Permit. Should MPCA agree with MCEA on each of these material facts with respect to the permit, MCEA recognizes that there will be no issue of factual dispute such that a contested case hearing is required. However, should MPCA dispute any of the following facts as articulated herein, there will exist a disputed material fact warranting a contested case hearing, as well as corresponding issues arising from any disputed material facts. Such issues will require address by a contested case hearing. Minn. R. 7000.1800, subp. 2(A)(2). Further, if any disputed issues of material fact exist between MCEA and MPCA, holding a contested case hearing would allow the introduction of information that would aid the MPCA in resolving such disputed facts and making its final permitting decision.

A. Pollution of Surface Waters by Mining-Impacted Groundwater

1. MPCA agrees that discharges from the tailings basin to groundwater are hydrologically connected to surface waters. "The MPCA recognizes that basin-impacted groundwater is currently reaching surface waters and having an impact on those surface waters." Draft Permit at 22.

2. MPCA agrees that pollution in the groundwater beneath and near the tailings basin is directly traceable to tailings basin discharge. "After more than 40 years of operation, essentially all groundwater in the surficial aquifer beneath the basin is likely to be tailings-impacted." Fact Sheet at 11.

3. MPCA agrees "the tailings basin is causing or contributing to exceedance of water quality standards in these downgradient [surface] waters." Fact Sheet at 14.

4. MPCA agrees that surface water quality is impacted by tailings basin discharge to groundwater. Draft Permit at 23. Similarly, MPCA recognizes this impact when it calls for the reduction of "surface water and groundwater quality impacts from the tailings basin" resulting from deep seepage. Draft Permit at 24.

5. MPCA agrees that "groundwater flow . . . enters the Dark River as baseflow both near the basin and at unknown distances downgradient from the basin." Fact Sheet at 16.

6. MPCA agrees that its reference to "surface waters impacted by deep seepage," Draft Permit at 22 & Fact Sheet at 38, refers to water pollution occurring in surface waters that is traceable to Minntac's discharge through connected groundwater.

7. MPCA agrees that surface waters adjacent to the Minntac basin are "downstream surface waters" and the basin's sulfate must be controlled to "protect applicable uses in downstream surface waters and in groundwater. . ." Draft Permit at 22.

8. MPCA agrees that waters with "applicable water quality standards" are both "downgradient and downstream of the Facility." Draft Permit at 28.

9. MPCA agrees that Minntac's tailings basin was constructed over the headwaters of the Dark River and Sand River, and now the headwaters commence at the tailings basin wall—fed by tailings basin groundwater discharge. "The tailings basin also straddles a north-south trending watershed divide and has buried the headwaters of the major streams in those watersheds, the Dark River to the west and the Sand River to the east. The headwaters for both streams are now adjacent to the basin dam." Fact Sheet at 11.

10. MPCA agrees that it is clear that elevated sulfate concentrations in Little Sandy Lake and Sandy Lake (Twin Lakes) are caused by sulfate inflows from the Minntac tailings basin. "There has been a long-standing issue with increasing concentrations of pollutants in the tailings basin (notably sulfate, specific conductance, and hardness), and the impact this has had on groundwater and surface water." Draft Permit at 6.

11. MPCA agrees that pollutants in Timber Creek, the Dark River, the Sand River, Dark Lake, Admiral Lake, Little Sandy Lake, and Sandy Lake are directly traceable to the tailings basin's discharge.

12. MPCA agrees that the Minntac tailings basin is a container and a discernible, confined and discrete conveyance from which pollutants are or may be discharged. *See, e.g.*, Fact Sheet at 6 ("The mitigation efforts and investigations conducted at the basin have shown that there is significant seepage escaping the basin over its 8000+ acre footprint and that this seepage is causing exceedances of water quality standards in surface water and groundwater in a broad area surrounding the basin."); *id.* (discussing "pollutants within the basin that will leak from it long-term.").

13. MPCA agrees that seeps from the Minntac tailings basin are discernible, confined and discrete conveyances from which pollutants are or may be discharged. *See, e.g.*, Fact Sheet at 7 (discussing MPCA treatment of seeps historically).

14. MPCA also agrees that there is no other, non-Minntac, significant point source discharge upstream of measured water pollution in the surface waters adjacent to the tailings basin.

15. MPCA agrees that sulfate concentrations in regional lakes that are not influenced by mine drainage are very low as compared to the Twin Lakes and Dark River adjacent to the tailings basin.

B. Water Table Slope/Gradient

16. MPCA agrees that there is a significant ("extreme" in the agency's characterization) gradient between the tailings basin and surrounding wetlands and surface waters, causing significant groundwater flow to nearby surface waters. Fact Sheet at 11. This gradient information finds further support in the Baker Report, attached, as well as permittee-provided reports such as, for example, CRA, Groundwater Flow and Sulfate Transport Modeling Report prepared for U.S. Steel (June 2013).

C. Unregulated Seeps in Tailings Basin Wall

17. MPCA agrees that it has not identified (with a map or other form of designation in the Draft Permit or Fact Sheet) or assigned effluent limits to all the seeps in the tailings basin it knows are present in the tailings basin wall. "There are also other seepage points along the basin perimeter, but these have not been monitored comprehensively enough to assess changes in gross discharge from the basin." Draft Permit at 7.

18. MPCA agrees that there are "individual seeps or seepage zones" around the tailings basin that are discernible, confined and discrete conveyances from which pollutants are or may be discharged. Draft Permit at 32. MPCA agrees that some of these are potentially "discharging at greater than 5 gallons per minute" in parts of the year. Draft Permit at 32.

D. Historic Significant Wild Rice Presence in Twin Lakes

19. MPCA agrees that MPCA staff have made a preliminary draft staff recommendation that Little Sandy Lake and Sandy Lake be considered waters used for the production of wild rice.

20. MPCA agrees that Little Sandy Lake and Sandy Lake have historically been waters used for the production of wild rice, and were so used on or after November 28, 1975.

21. MPCA agrees that "downstream surface waters" are potentially wild rice waters. Draft Permit at 27.

22. MPCA views sulfate as a "pollutant of greatest concern and as a surrogate for other dissolved solids." Draft Permit at 24.

II. STATEMENT OF ISSUES PROPOSED TO BE ADDRESSED BY THE CONTESTED CASE HEARING

Based on the record, it appears that MPCA and MCEA agree upon most or all of the material facts listed in Section I, above. For all agreed-upon facts, there exists no disputed material issue requiring address by a contested hearing. On the other hand, if MPCA disagrees with any of the factual assertions listed in Section I, there exists a corresponding disputed issue of material fact that requires address by a contested case hearing.

In the case that MPCA disputes any or all of the factual assertions in Section 1, numbered 1 through 22, such disputed statements of fact are hereby incorporated into this Section and all resulting factual issues in dispute will require address at a contested case hearing.

MCEA hereby expressly reserves the right to raise additional issues or questions of material fact prior to, during, or after the requested contested case hearing.

III. STATEMENT OF REQUESTED RELIEF

Based on the issues, reasons, and arguments articulated in this petition and in MCEA's simultaneously submitted comment letter and attachments to that letter, MCEA requests an order granting the following relief in this matter:

1. Declaring that the Draft Permit fails to include effluent limits that ensure the level of water quality discharged to Timber Creek, the Dark River, the Sand River, Dark Lake, Admiral Lake, Little Sandy Lake, and Sandy Lake ("affected surface waters") from the Minntac tailing basin via hydrologically connected groundwater complies with applicable water quality standards.

2. Requiring the MPCA to revise the Draft Permit to include water quality based effluent limits necessary to prevent Minntac's discharge of pollutants to affected surface waters from the Minntac tailings basin via hydrologically-connected groundwater from causing or contributing to a an instream excursion above water quality standards.

3. Finding that Minntac discharges pollutants from its tailings basin to affected surface waters via hydrologically-connected groundwater.

4. Finding that the discharge from the Minntac tailings basin via hydrologically-connected groundwater causes or contributes to an exceedance of surface water quality standards in affected surface waters.

5. Finding that the Minntac tailings basin is a discernible, confined and discrete conveyance from which pollutants are or may be discharged.

6. Finding that the seeps from the Minntac tailing basin to groundwater are discernible, confined and discrete conveyances from which pollutants are or may be discharged.

7. Requiring MPCA to identify all surface seeps from the Minntac tailings basin, assess the discharge of pollutants from these seeps, and impose any water quality based effluent limits necessary to ensure these discharge of pollutants from these surface seeps achieve water quality standards in affected surface waters.

8. Finding that wild rice is currently or has historically been produced in Little Sandy Lake and Sandy Lake, and these lakes are water used for production of wild rice.

9. Requiring MPCA to revise the Draft Permit to include water quality based effluent limits to meet the 10 mg/L sulfate standard in Little Sandy Lake and Sandy Lake.

10. Granting MCEA such further relief as deemed just and equitable.

MCEA hereby expressly reserves the right to request additional relief prior to, during, or after the requested contested case hearing.

IV. CONCLUSION

Based on the foregoing, and the analysis, reasoning, and arguments articulated in MCEA's simultaneously submitted comment letter and attachments to that letter hereby incorporated into this petition, MCEA respectfully requests that MPCA hold a contested case hearing pursuant to Minn. R. 7000.1800 and 7000.1900 in order to consider any and all disputed material issues of fact between MCEA and MPCA.

Respectfully submitted,

/s/ Hudson Kingston

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EVALUATION OF MINNTAC TAILINGS BASIN ON LITTLE SANDY AND SANDY LAKES

Lawrence A. Baker, Ph.D., Department of Bioproducts and Biosystems Engineering, University of Minnesota. Date: 12/22/16

SUMMARY OF KEY QUESTIONS

This report examines the impact of flows from the tailings basin at the U.S. Steel (USS) Minntac iron mine to Little Sandy Lake and Sandy Lake (together called the "Twin Lakes"), and the Sandy River. Three questions are addressed:

1. How do sulfate concentrations change along the flowpath from the tailings dam through the two lakes and into the Sandy River? Does this pattern prove that elevated sulfate levels in the downstream waters are caused by flows from the Minntac facility? (Section I).

Summary: It is clear that elevated sulfate concentrations in the Twin Lakes are caused by sulfate inflows from the Minntac tailings basin. My analysis shows that about one-third of the water but 94% of the sulfate enter the Twin Lakes through the stream below the tailings dam, represented by data from the "Twin 1" site. Also, the geochemical composition of inflow to Little Sandy Lake is very similar to the composition of groundwater just below the tailings basin, but slightly diluted with natural (uncontaminated) groundwater.

2. What are concentrations of sulfate in other lakes in the region and how do these differ from concentrations in the Twin Lakes? (Section II).

Summary: Sulfate concentrations in regional lakes that are not influenced by mine drainage are very low, typically < 10 mg/L. This points to mine drainage as the cause of elevated sulfate concentrations in the Twin Lakes (> 100 mg/L on average, even at the outlet).

3. Has wild rice been present in Big Sandy and Little Sandy Lakes in the past? What is the extent and condition of wild rice growth in nearby lakes? (Section III).

Summary: Little Sandy and Sandy Lakes are both designated as "Wild Rice Waters" according to the Draft List of MPCA Wild Rice Waters – October 26, 2015. There is ample evidence that wild rice grew in the Twin Lakes for many years and that it has disappeared in recent years, to near zero. In contrast, wild rice is commonly found in nearby lakes; analysis of trends in nine lakes from 2001-2014 showed that the area of wild rice beds has remained fairly constant (generally > 50% of lake area) but the density of stems within beds varies substantially within years. Taken together, the evidence strongly suggests that wild rice in the Twin Lakes has been negatively influenced by the Minntac tailings basin.

I. SULFATE ALONG THE FLOWPATH FROM THE MINNTAC TAILING POND THROUGH THE TWIN LAKES.

Summary of Prior Studies and Monitoring

The Minntac tailings basin was first constructed in 1966 and completed in 1972 (Adams 1994). Figure 1 shows that the tailings basin was constructed over the original drainage of the Sandy River – a deep cut filled with coarse glacial deposits (Figure 1, from CRA 2012).

The hydrologic contours in Figure 2 show that the Twin Lakes (Little Sandy and Sandy) are very near the Minntac tailings basin and down gradient from it (CRA 2012). Two flowpaths are drawn in Figure 2. Along Line A, between the tailings basin and Little Sandy Lake, the groundwater elevation decreases from 870 feet to 850 feet over a distance of 0.4 miles. Along Line B, between the tailings basin and Admiral Lake, the same decline in groundwater elevation occurs in about 0.25 miles.

Sulfate concentrations in groundwater seeps, the inlet to the Twin Lakes, and within the Twin Lakes (Little Sandy and Sandy lakes) have been elevated for some time. Data from Lapakko and Jagunich (1991) appear to be divided between seven wells influenced by mine drainage and three that were not (the issue of background concentrations will be discussed later).

Table 1. Historical sulfate concentrations observed in seeps and wells below the Minntac tailings basin and in the Twin Lakes.

Source	Site and dates	Number of samples	Sulfate, mg/L
MNDNR (1991)	Seeps to Dark R., 10/84-11/85	4	435
	Seeps to Dark R., 8/87-11/89	47	553
	Seeps to Sand R., 10/84-11/85	4	349
	Seeps to Sand R., 8/87-11/89	46	411
Thomas (2007)	GW003, 2005	?	651
" "	GW003, 2006		605
MNDNR (1991)	"Twin Lakes", 3/7[sic, probably intended to be 3/87] to 7/87.	6	140-350
Knoll (1987)	Inlet to Sandy, 4/7/87	1	346
Lapakko and Jagunich (1991)*	"tailings and seeps" to the Sand and Dark	?	400 (average)

	rivers		
Lapakko and Jagunich (1991)*	"seven of 10 groundwater wells"	7	380
Lapakko and Jagunich (1991)*	"three other groundwater wells"	3	26

*Cited in Adams (1994).

A number of reports conclude that water from the tailings ponds seeps toward the Sand River drainage on the east and the Dark River on the west. This is consistent with the idea that water from the tailings basin is draining through the deep cut through the bedrock shown in Figure 1. This drainage through glacial deposits in the cut is not in dispute, and is acknowledged in USS's NDPES permit for the tailings pond (Permit #MN0057207; Hall 1987). Barr Engineering estimated a seepage flow from the tailings pond of 1068 gallons/minute, or 2.4 cubic feet per second (cfs) in their Sandy River modeling project (Moe 2007). This appears to be for the Sandy River drainage side (east side) only.

A more recent study of sulfate modeling (CRA 2013) documents groundwater movement from the Minntac tailings basin to the Sandy River watershed more closely. The 2013 CRA report notes: "The Tailings Basin pools are surface water bodies that create a mounding condition forcing groundwater flow in a primarily radial direction approximately perpendicular to the perimeter dike surrounding the Tailings Basin."

This mounding causes a steep hydrologic gradient from the tailings basin to Little Sandy Lake, shown in Figure 2. Several studies indicate that flows from the tailings basin are substantial. As noted above, one early estimate was 2.4 cfs , which translates to 1.55 million gallons per day (MGD). More recently (STS 2007) estimated a value of 0.82 cfs (0.53 MGD), based on groundwater modeling. A memo from Johnson and Knudson (2010) noted that a total seepage estimate of 3070 gallons per minute (4.4 MGD) was agreed upon in a conference call on January 10, 2010 among USS, Hatch, CRA, and Liesch. In 2010 a pumpback system (also called a "seepage collection and return system") was installed, which produced an average return flow of 1.6 cfs (1 MGD: Langlie and Johnson 2013). For comparison, this 1 MGD is roughly the amount of water used by a city with a population of 10,000.

Water quality data from several wells and a piezometer (a device which measures ground water pressure and allows the collection of water samples from a specific point) located near the tailings basin (see Figure 3 for site locations) were examined to make inferences about the effect of the tailings basin on seepage water. Groundwater in Wells 3 and 4 have had elevated sulfate concentrations since 1998 (Figure 4) with average sulfate concentrations of 627 mg/L and 554 mg/L, respectively. In contrast, sulfate concentrations for Wells 9 and 10 have far lower average sulfate concentrations, 3.0 mg/L and 15 mg/L, respectively. CRA (2013) notes that background sulfate concentrations "ranging up to 10 mg/L can be

considered naturally occurring and unrelated to the Minntac Tailings Basin," so wells 9 and 10 would be considered as having natural background concentrations. The average concentration of the two Minntac-basin-affected wells is *65 times* that of the two non-affected wells.

There is also evidence showing that groundwater just below the tailings basin along Line A (in Figure 2) is largely the same water that flows into Little Sandy Lake through its surface water inflow. Two analyses allow a date-specific comparison. First, Table 2 shows that the sulfate value at Twin 1 (inflow to Little Sandy Lake) in August 2010 is very similar to values from PZ-5 (see location in Figure 3), suggesting that the lake inflow was mostly groundwater from the tailings basin. During May 2012, sulfate at Twin 1 is lower than values at PZ-5 and Well 12, suggesting that the groundwater is diluted with other runoff by the time it reaches Twin 1. This would also make sense, since May runoff would likely include snowmelt or spring precipitation, which would dilute the seepage water.

Table 2. Sulfate concentrations (mg/L) at PZ-5 (from Table 2.2 of CRA 2013) and at Twin 1 (August 26, 2010 and May 23, 2012, from Vogt (2014).

Location	August 2010	May 2012
PZ-5S	549	894
PZ-5D	673	748
Twin 1 (inflow to Little Sandy Lake)	661	270

The second line of evidence is the geochemical similarity between water well MW-12 (April 2010 to July 2015; eight samples) and the inflow at Twin 1 from May 2010 to August 2013; 14 samples)(Table 3). This well is positioned directly between the tailings dam and the Twin Lakes, as can be seen in Figure 3.

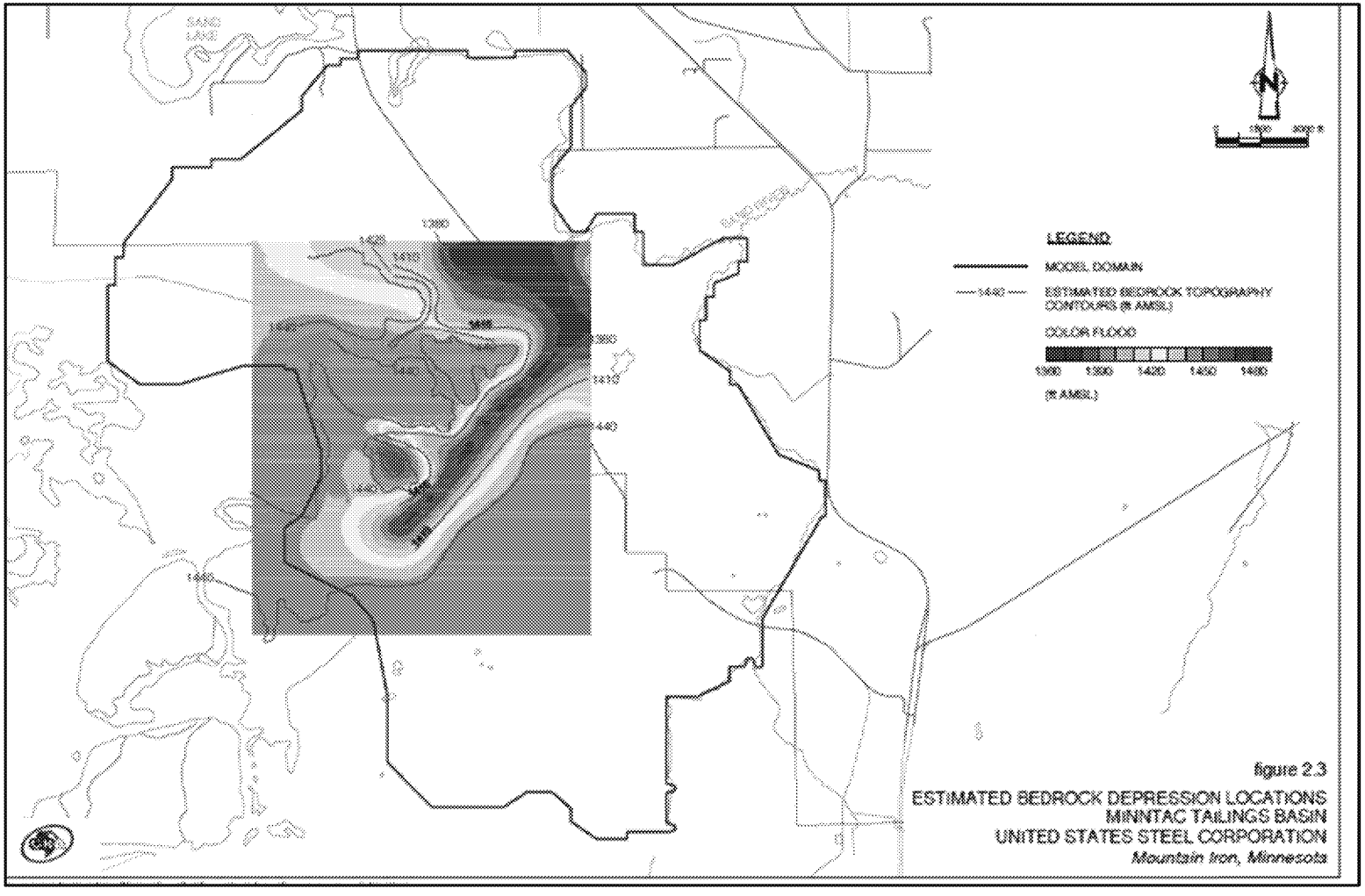

Figure 1. Map from CRA (2013) showing a glacial bedrock cut that creates a groundwater depression leading into the Sand River watershed.

Figure 2. Map of the region between the Minntac tailings basin and the Twin Lakes, showing hydrologic gradients and likely flowpaths. The map is from Figure 2.1 of CRA (2013); lines A and B were added for this report.

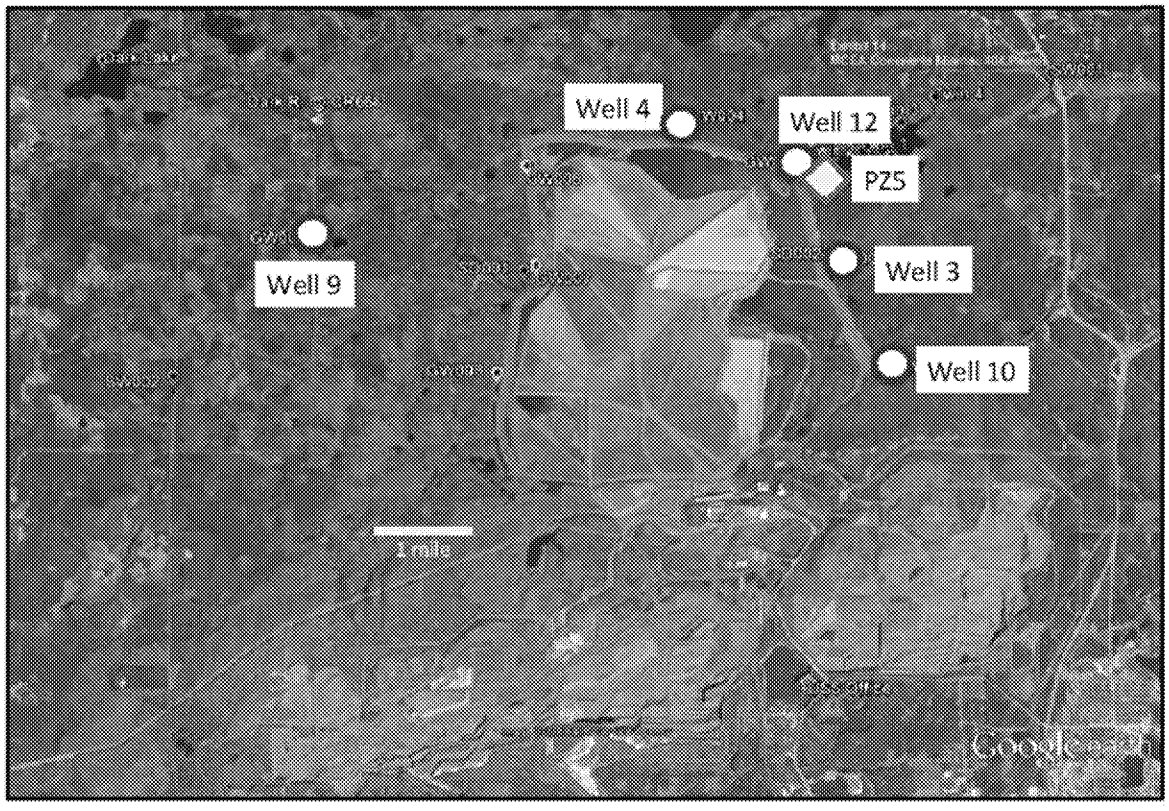

Figure 3. Location of four wells (3, 4, 9,10, and 12) and one piezometer (PZ5) near the Minntac tailings basin. In CRA (2013) the well numbers have the prefix "MW" (monitoring well). Data for wells 3, 4, 9, and 10 are plotted in Figure 4. Data from the piezometer (PZ 5) and a fifth well (MW 12) are discussed in Tables 2 and 3. Data are from USS monitoring files.

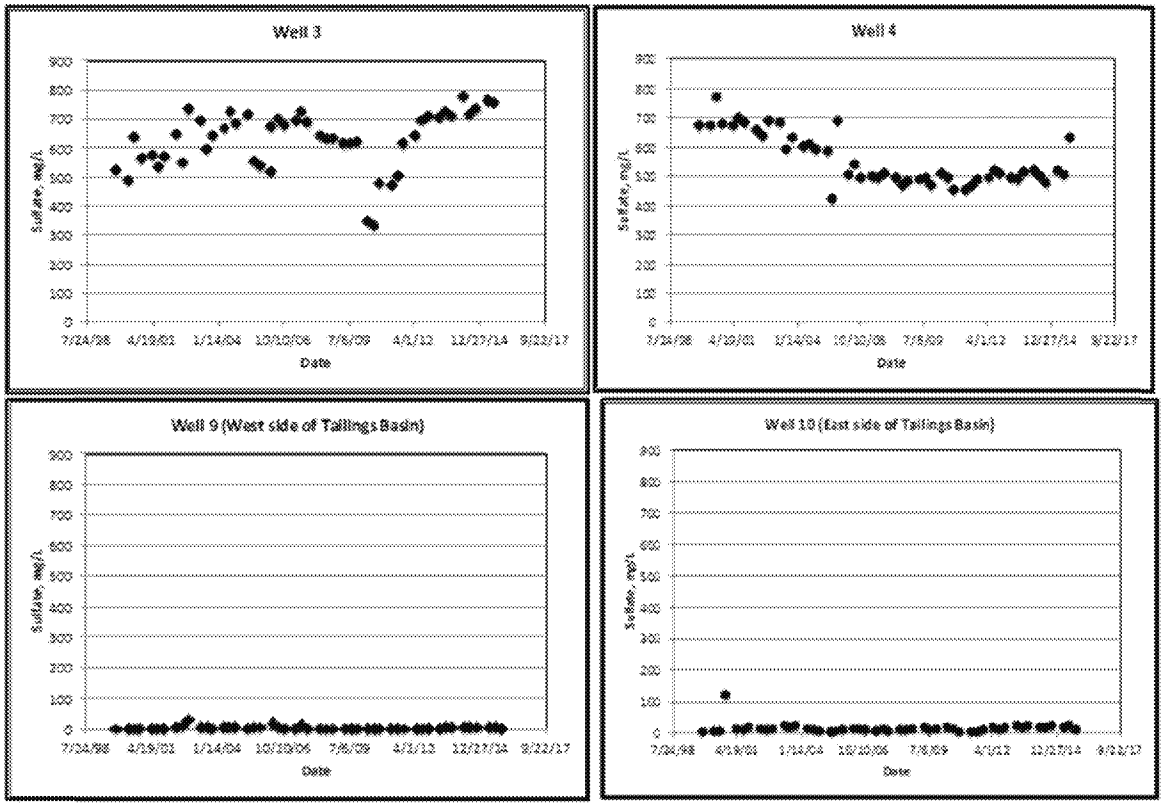

Figure 4. Historical sulfate concentrations in two wells (#3 and #4) near the east side of the tailings basin dam and that are affected by the mine drainage. The two other wells (#9 and #10) are representative of natural conditions.

Table 3. Chemical composition of water at Well 12 and Twin 1, 2010-2015 compared with the composition of non-mine affected lakes (2010-2014) from Vogt (2014). The average ratios are averages of ratios for individual samples, on weight: weight (mg/L: mg/L) basis. Total dissolved solids (TDS) is a measure of the total dissolve salt content of the water.

	Mean sulfate, mg/L	Mean chloride, mg/L	Mean total dissolved solids (TDS), mg/L	SO4:Cl	SO4:TDS
Well 12	394	87	862	4.5	0.46
Twin 1	337	58	755	5.9	0.45
Regional average	9.2	4.2	104	1.9	0.05

Concentrations of sulfate, chloride, and TDS at Twin 1 are slightly lower than at Well 12, suggesting that the water entering Little Sandy Lake is slightly diluted compared to the well water. Values for sulfate, chloride, and TDS in Well 12 and Twin 1 are far higher than those for regional lakes.

The fact that tailings basin water is the source of groundwater inflow to the lakes is supported by the fact that the ratios of sulfate-to-chloride and the ratio of sulfate-to-TDS are also similar in Well 12 and Twin 1, but very different for the corresponding ratios in regional non-mine affected lakes. This would be the expectation if groundwater (Well 12) were the dominant source of water at Twin 1. Together, the data in Tables 2 and 3 indicate that the groundwater below the tailings basin comprises a major portion of the inflow to Little Sandy Lake.

A recent analysis by Ng et al. (2016) also confirms that the basin is the major source of sulfate to eight down-gradient wells surrounding the Minntac tailings basin. Their study also indicates that reactions within the tailings dike (oxidation and reduction of sulfate) also in some net loss of sulfate as tailings water moves through the dike.

Recent Water Quality Patterns In The Twin Lakes

The 1854 Treaty Authority has collected data for many years in the Twin Lakes at four sites (Vogt 2014) (Figure 5):

Twin 1 = inlet to Little Sandy Lake
Twin 2 = middle of Little Sandy Lake
Twin 3 = Sandy Lake
Twin 4 = Outlet from Sandy Lake.

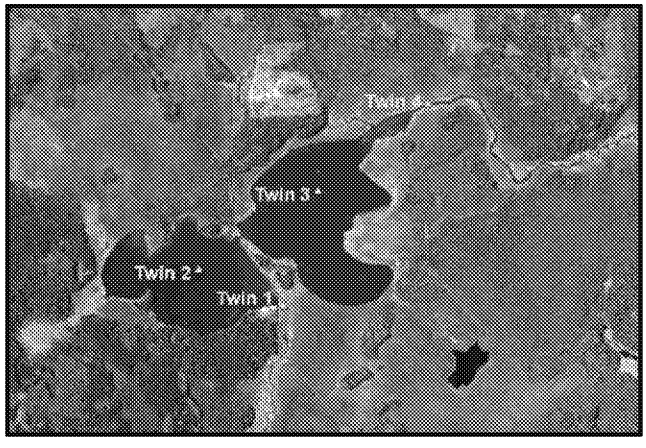

Figure 5 (at right). Sampling points in the Twin Lakes (from (Vogt 2014)).

The data presented below are averages for 2010-2014. The six graphs (Figure 6) show that the chemical composition of water flowing through the Sandy Lakes changes, and provides some inference as to why it changes.

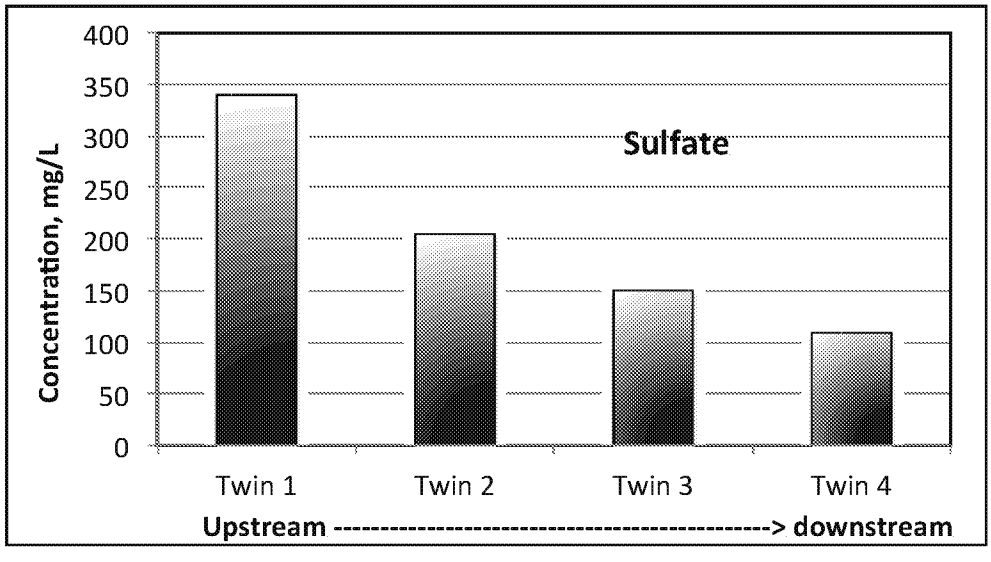

Figure 6A. Sulfate.

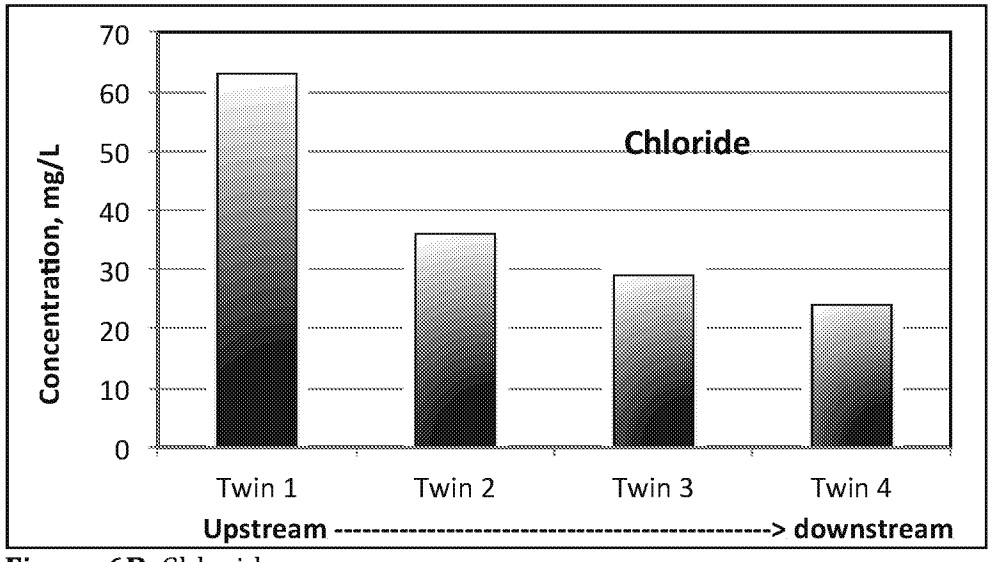

Figure 6B. Chloride.

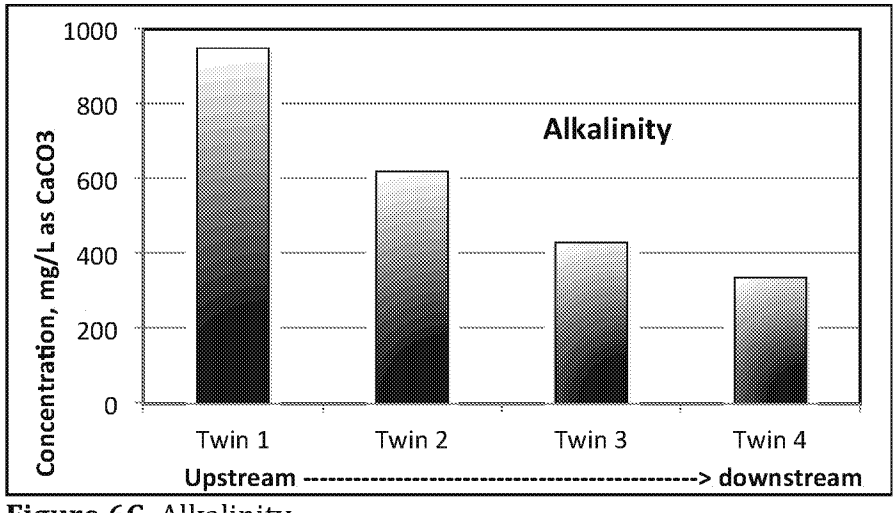

Figure 6C. Alkalinity.

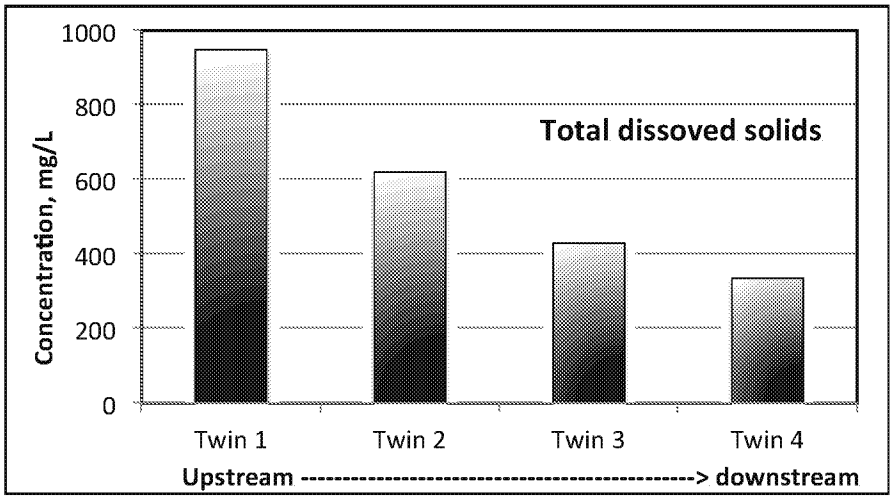

Figure 6D. Total dissolved solids.

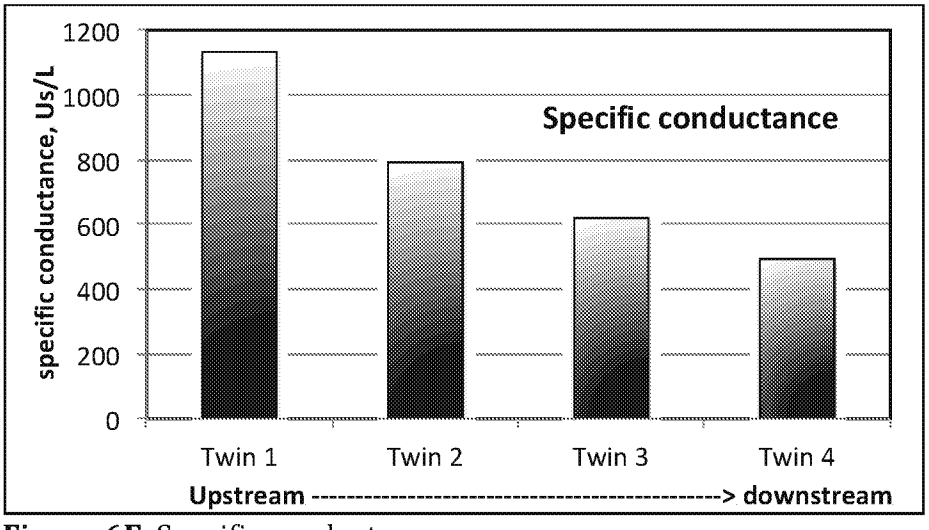

Figure 6E. Specific conductance.

High concentrations in the inflow (Twin 1) reflect the influence of the Minntac tailings basin discharge, with elevated levels of sulfate, chloride, alkalinity, total dissolved solids, and specific conductance.

The outflow from Twin 4 is diluted with runoff from the rest of the watershed (the portion not affected by drainage from the tailings basin). This is reflected in declining chloride values as water moves through the lakes, from Twin 1 to Twin 4. Chloride behaves conservatively – it does not undergo reactions that add or remove chloride from the lakewater. The ratio of chloride between Twin 1 and Twin 4 (2.6) therefore reflects the effect of dilution, presumably by inputs of low-chloride water from the watershed outside the influence of the Minntac tailings basin. By contrast to the elevated numbers in Figure 6B, waters sampled by the 1854 Treaty Authority that are not influenced by mining pollution have a mean chloride concentration of ~ 3 mg/L (Vogt 2014).

To apportion the inputs of sulfate and chloride from the tailings basin (as represented by Twin 1) and the rest of the watershed, I developed a simple mixing model. The general form of the mixing model is:

$C_1 * F_{Q1} + C_{ws} * F_{Qws} = C_4 * 1.0$
Equation 1

Where C_1= concentration of a constituent (chloride or sulfate) at the Twin 1 site, C_{ws} = concentration of constituent in water entering from the rest of the watershed, and C_4 = concentration of constituent at the outflow (Twin 4 site) of Sandy Lake. F_{Q1} and F_{Qws} are the fraction of total flow from Twin 1 and the rest of the lake watershed, respectively. This modeling allows us to calculate the ratio of water from two sources coming into the Twin Lakes, based on the concentration of constituents measured at the outflow and the two known inflow concentrations.[1]

Table 4 shows inputs and outputs from the model. Input values include measured values for chloride and sulfate at Twin 1 (inlet) and Twin 4 (outlet). Concentrations of chloride and sulfate from the rest of the watershed were assumed to be the same as the average measured concentrations of lakewater in non-mine affected lakes in the dataset of Vogt (2014).

Model outputs, based on equation 1, showed that 33% of the water flow comes through the Twin 1 site and 68% comes from the rest of the watershed (hence FQ_{ws} = 0.33 and F_{Q1} = 0.6 in equation 1). To check the validity of the model, I compared modeled to measured chloride concentrations at T4. Because chloride is conservative, I expected that the measured and model values would be the same (difference = 0%). In reality, the modeled value was 9% lower than the measured value, which indicated reasonable model accuracy. Modeled sulfate was 8% higher than measured sulfate, again reasonable agreement for this type of model.

With these assurances, I finally calculated the sulfate loading from T1 and the rest of the watershed. This apportionment indicated that 94% of the sulfate entered the lake from T1 and only 6% entered from the rest of the watershed.

In summary, chemistry data from the 1854 Treaty Authority shows that inflows from the tailings basin dominates the chemistry of the Twin Lakes; these inflows are diluted as they move from sites 1→ 4. Mass balance calculations indicate that 94% of the sulfate in this system enters the Twin Lakes via Twin 1, which receives most of its sulfate in drainage from the tailings basin. Only 6% of the sulfate comes from the rest of the watershed.

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[1] Concentrations of sulfate and chloride in precipitation in this region are very low. Data from the National Atmospheric Deposition Program's Marcell, MN, site show that average concentrations of sulfate and chloride for the period 2010-2014 were 0.02 mg/L and 0.27 mg/L, respectively (NADP 2016). Hence, precipitation has sulfate and chloride levels an order of magnitude lower than concentrations for watershed inputs; hence precipitation inputs were assumed to be negligible.

Table 4. Sulfate and chloride balances for the Twin Lakes, 2010-2014.

Model inputs		
Inlet (Twin 1)		
Average Chloride, mg/L	63	Measured Vogt 2014
Average sulfate, mg/L	340	Measured, Vogt 2014
Outlet (Twin 4):		
Average Chloride, mg/L	24	Measured Vogt 2014
Average sulfate, mg/L	108	Measured, Vogt 2014
Rest of watershed:		
Average chloride, mg/L	4.2	For non-mine affected lakes in Vogt 2014
Average sulfate, mg/L	9.2	For non-mine affected lakes in Vogt 2014
Model outputs		
Percent input from T1	33	Calculated
Percent input from rest of watershed	68	Calculated
Chloride check:		
Modeled Cl in outflow (T4)	21.8	9% lower than measured.
Measured Cl in outflow (T4)	24.0	
Sulfate balance		
Modeled sulfate, mg/L	117.5	8% higher than measured
Measured sulfate at T4, mg/L	108.7	
% sulfate entering from T1	**94**	
% sulfate entering from watershed	**6**	

Trend in Sulfate Concentrations at the Inlet To Little Sandy Lake

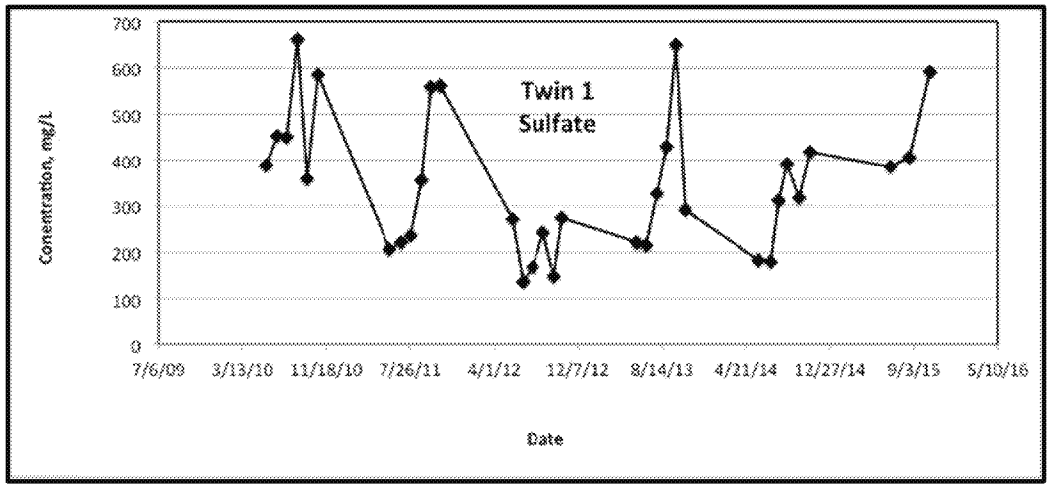
Additional insights regarding the source of sulfate to the Twin Lakes were gained by analyzing temporal trends at the Twin 1 site from 2010-2015. This analysis used data from Vogt (2014) with additional data from 2015 provided by Darren Vogt (2015, Personal Communication). This data is laid out in Figure 7.

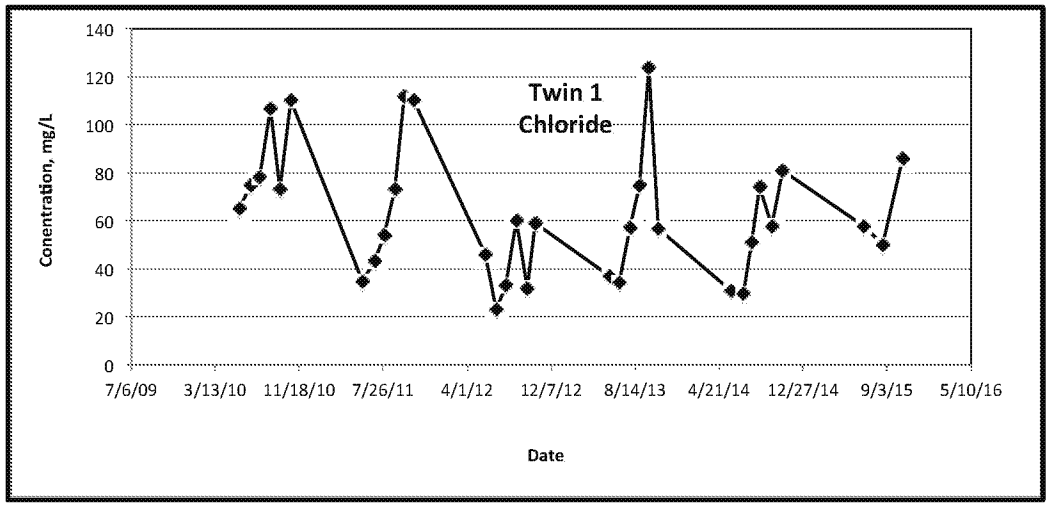
The first observation is that sulfate levels are quite variable and show no clear upward or downward trend. This suggests that the installation of the pumpback system below the tailings basin dam in 2010 had little effect on sulfate concentrations.

The second observation is that sulfate concentrations are very closely correlated with concentrations of chloride and TDS throughout the five years from 2010 to 2015. Note that very high concentrations of sulfate occur at the same time as very high concentrations of TDS and chloride; conversely low sulfate levels occur when TDS and chloride are also low. Scatterplots (Figure 8) show that both TDS and chloride are very strongly correlated with sulfate, as indicated by very high r^2 values ~ 0.9. The consistency of these relationships over the period 2010-2015 suggests that the

source of these constituents is the same and has remained constant, as would happen if the tailings basin were the main source of water flowing through Twin 1.

Summary: It is clear that elevated sulfate concentrations in the Twin Lakes are caused by sulfate inflows from the Minntac tailings basin. My analysis shows that about one-third of the water but 94% of the sulfate enter the Twin Lakes through the stream below the tailings dam, represented by data from the Twin 1 site. Also, the geochemical composition of inflow to Little Sandy Lake is very similar to the composition of groundwater just below the tailings basin, but slightly diluted with natural (uncontaminated) groundwater.





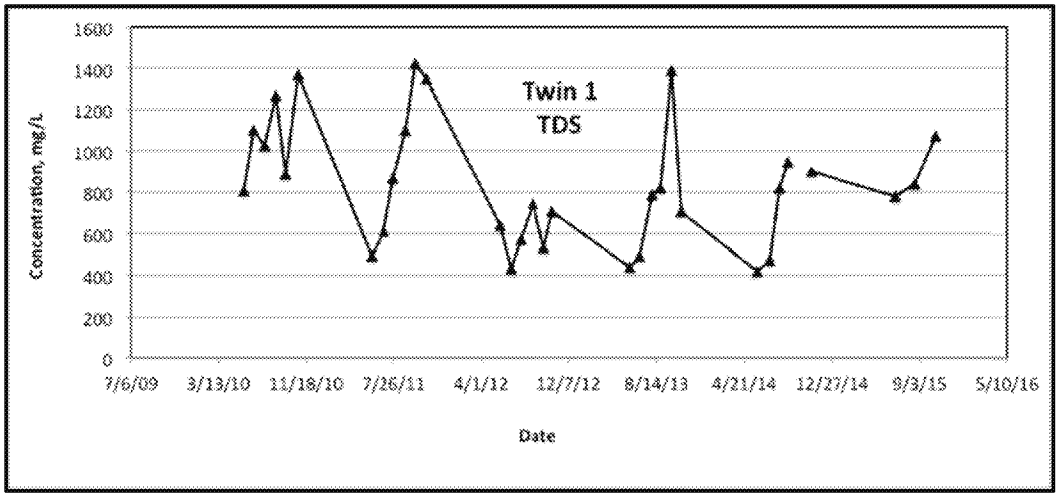


Figure 7. Concentrations of sulfate, chloride, and TDS at Twin 1 from 2009-2016.

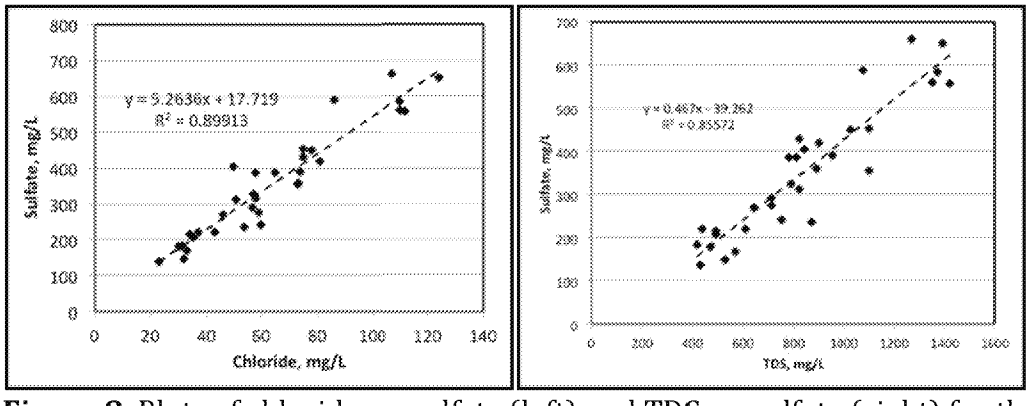


Figure 8. Plots of chloride vs. sulfate (left) and TDS vs. sulfate (right) for the Twin 1 (inflow) site. Data from Vogt (2014).

II. SULFATE PATTERNS IN REGIONAL LAKES

The sulfate concentrations in the Twin Lakes are far higher than sulfate concentrations in similar lakes in this region that are not influenced by mining. I used two databases to verify this fact: (1) the National Surface Water Survey (NSWS); and (2) a regional sampling program conducted by the 1854 Treaty Authority.

National Surface Water Survey

The EPA analyzed lakes in this region as part of the National Surface Water Survey (NSWS), a nation-wide EPA study of surface waters in areas vulnerable to acidic deposition, conducted in the 1980s. Eilers et al. (1988) reported results for lakes in the Upper Midwest. Unlike many lake surveys, which are statistically haphazard, the NSWS was statistically designed to represent water quality in lakes throughout the region and within specific subregions.

Sampling was stratified based on region, subregion, and alkalinity class, from a well-defined population of regional lakes. The Upper Midwest portion of the NSWS sampled 587 lakes, representative of a population (N) of 8501 lakes. The population included only lakes larger than four hectares (about 10 acres) and smaller than 2000 hectares (about 4900 acres), and excluded lakes that were "surrounded by or adjacent to intense anthropogenic influence" (i.e. urban/industrial/agricultural influences). It also excluded lakes with very high specific conductance values (greater than 1500 uS/cm). These criteria would very likely have excluded lakes affected by mine wastes. This sample design means that results are highly representative of lakes in the region that are not influenced by mining activities.

The Minntac facility is located near the intersections of NSWS subregions 2A (northeastern Minnesota) and 2D (upper Great Lakes area) (Figure 9).

Table 5 shows that median sulfate levels were 3.0 mg/L in subregion 2A and 2.4 mg/L in subregion 2D. Chloride levels were also extremely low, with medians well below 1 mg/L in both subregions. Median specific conductance levels were only 30 uS/cm in subregion 2A and 92 uS/cm in 2D.

Cumulative distributions of sulfate concentrations (Figure 10) 98% of the drainage lakes (the same hydrologic type as the Twin Lakes) in subregion 2A and 92% of the lakes in subregion 2D have sulfate concentrations < 10 mg/L (~200 ueq/L)(after converting sulfate values from ueq/L to mg/L). Moreover, median concentrations of chloride, alkalinity, and specific conductance are very low, reflecting the dilute nature of lakes in this region.

In summary, data from the Upper Midwest NSWS shows that minimally impacted lakes in the region encompassing the Minntac site have extremely low concentrations of sulfate and chloride, as well as other ions, which is reflected by extremely low specific conductance values.

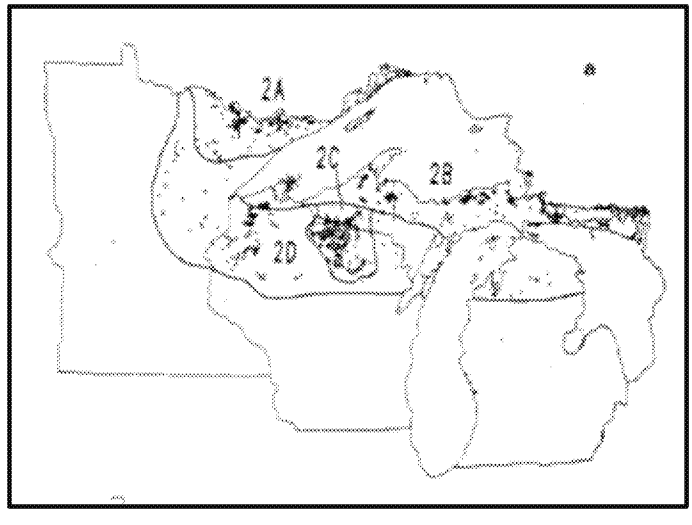


Figure 9. Map showing NSWS lakes sampled in the Upper Midwest.

Table 5. Characteristics of Upper Midwest NSWS lakes (Eilers et al. 1988). Values are medians.

	Subregion 2A	Subregion 2D
Area, ha	17.0	16.2
Sulfate, mg/L	**3.0**	**2.4**
Chloride, mg/L	0.32	0.78
Alkalinity, mg/L as CaCO3	7.2	38
Specific conductance, uS/cm	30.4	91.6

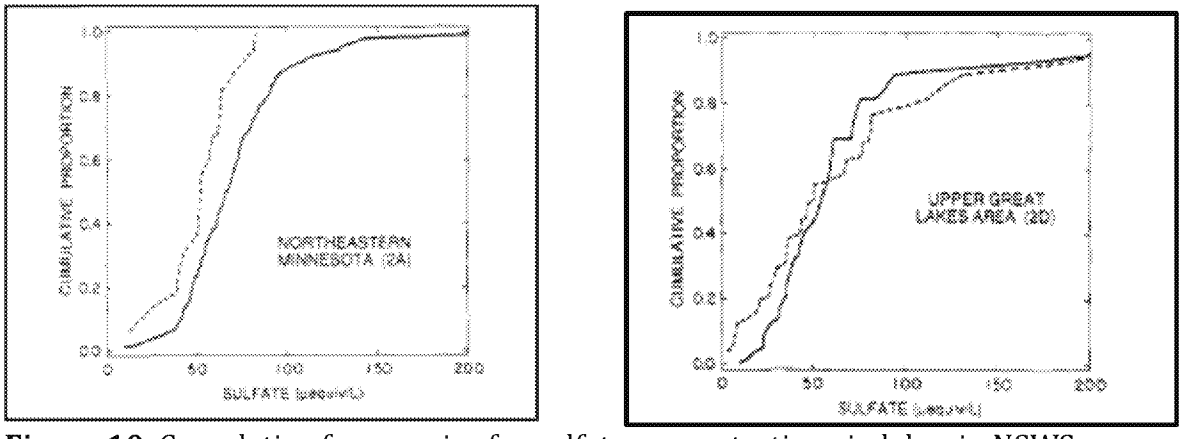


Figure 10. Cumulative frequencies for sulfate concentrations in lakes in NSWS subregions 2A and 2D. The dark line represents drainage lakes, such as the Twin Lakes, while the dotted line represents seepage lakes.

1854 Treaty Authority sampling program

The 1854 Treaty Authority's contemporary sampling program includes monitoring of twenty lakes in the region, including the Twin Lakes, for the period 2010-2014. Note from Figure 11 that most lakes that are not impacted by mines have sulfate concentrations < 10 mg/L. By contrast, mean sulfate concentrations for the Twin Lakes for the same period were 340 mg/L at T1, 207 mg/L at T2, 147 mg/L at T3, and 109 mg/L at T4 – more than an order of magnitude higher. This information corroborates the findings of NSWS and brings them into the current day.

Taken together, data from the NSWS (Eilers et al. 1988) and the ongoing monitoring by the 1854 Treaty Authority (Vogt 2014) show that surface waters away from mining areas nearly always have sulfate concentrations less than 10 mg/L. The naturally low sulfate levels reflect the dilute nature of lakes in this region, with low alkalinity, chloride, and specific conductance. This dilute chemistry is very different from that of the Twin Lakes and the Minntac mine tailings basin, demonstrating the current and ongoing mining impact on the Twin Lakes.

Summary: Sulfate concentrations in regional lakes that are not influenced by mine drainage are very low, typically < 10 mg/L. This points to mine drainage as the cause of elevated sulfate concentrations in the Twin Lakes (> 100 mg/L on average, even at the outlet).

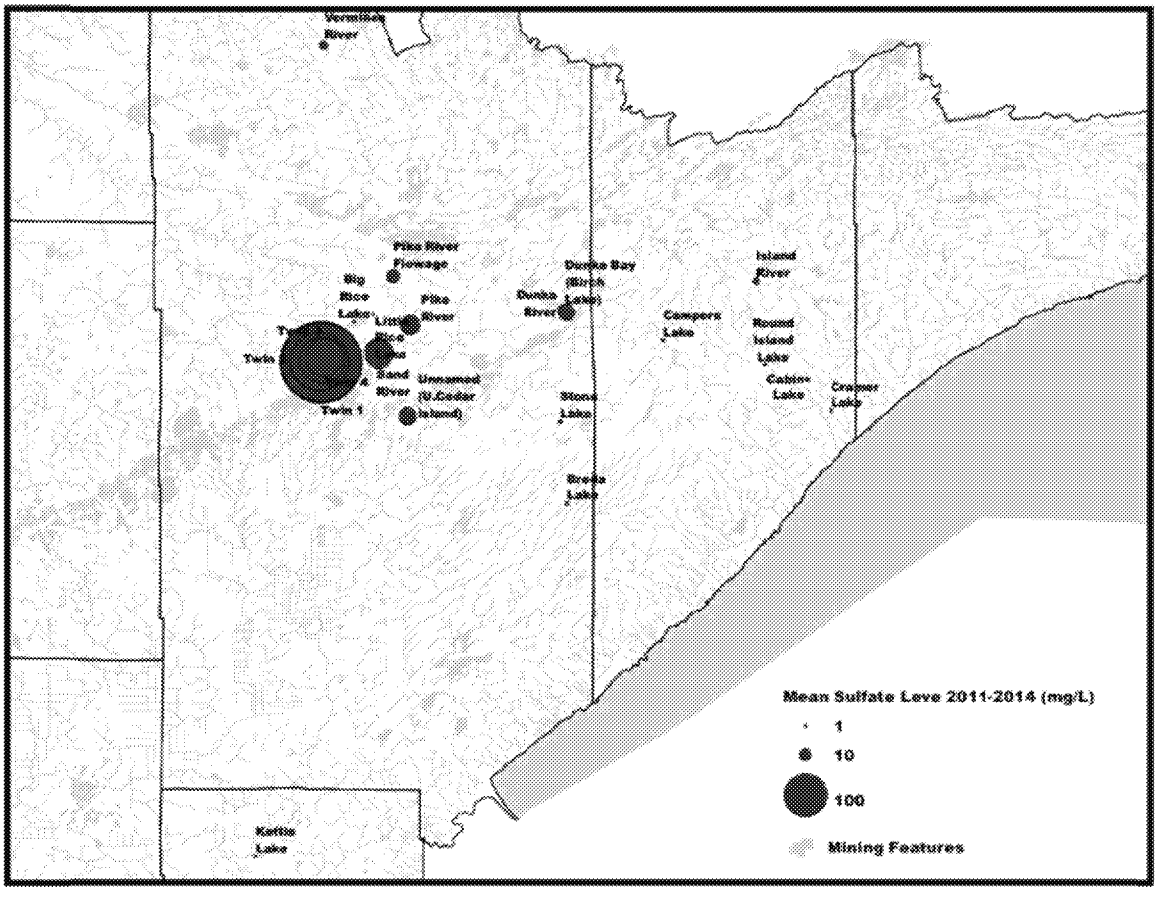


Figure 11. Average sulfate concentrations in the Twin Lakes and in other regional waters (rivers and lakes). Data from Vogt (2014).

III. HISTORICAL AND SPATIAL PATTERNS OF WILD RICE SURVIVAL

This section examines the historical evidence for wild rice in the Twin Lakes, indicating that wild rice used to grow plentifully in these waters but has recently disappeared; and wild rice growing patterns in similar lakes in the region, which shows that wild rice is still present in all waters that have not been impacted by pollution such as the Minntac discharge.

Historical evidence of wild rice beds in the Twin Lakes. The 1854 Treaty Authority has assembled a series of high resolution air photos of wild rice lakes in the region from 1941 to 1989 (**Appendix A**). It would be difficult to confirm that these images are wild rice beds solely based on aerial photos, but the visual inspection is augmented with data from several reports documenting the condition of wild rice in the Twin Lakes.

1940. From Figure A-1. Sandy Lake appears to be almost completely covered with emergent aquatic plants; emergent plants in Little Sandy Lake are not quite as dense.

1948. From Figure A-2. Emergent plant growth is much less abundant, and mostly on the northern third of Sandy Lake and the northwestern third of Little Sandy Lake.

1961. From Figure A-3. There are plant beds only near the shoreline also the northeastern part of Big Sandy Lake, and scattered plant beds in Little Sandy, mostly on the southern shoreline.

1966. A report by Minnesota Fish and Game (Sternberg and Hope 1966) examined the biota of Little Sandy Lake. They reported:

"Little Sandy had an area of 83 acres, a maximum depth of 3 feet and a median depth of 2.5 feet. The bottom was generally muck. A sparse stand of wild rice was general throughout the lake with a moderate stand in the northeast and east shoreline."

At another point in the report, wild rice was noted to be "abundant."

Their report template also notes the presence of wild rice:

LOCATION OF WILD RICE STANDS IF PRESENT (OUTLINE ON MAP)
Near Heaviest standing in N.E. corner of lake although lighter stands present throughout lake.

DENSITY AND CONDITION OF WILD RICE STANDS IF PRESENT
Heaviest stand in N.E. part of lake, of moderate density and in good condition.

HISTORY OF WILD RICE HARVESTS
The lake is apparently riced yearly.

1972. From Figure A-4. The mine tailings basin is now quite visible. There are fairly widespread plant beds in Sandy Lake, especially in the northeast third, but they do not appear to be very dense. Emergent plants in Little Sandy are mostly on the eastern half of the lake and along the southern edge.

1987. DNR's Gerald McHugh, Wild Rice Coordinator, conducted a "game lakes survey" of Sandy and Little Sandy Lakes (McHugh 1987) He notes:

"I conducted a game lake survey on Sandy and Little Sandy Lake today as we had discussed. The aquatic vegetation has changed very little since the last survey was done in 1966 with one noticeable exception. Wild rice, for all practical purposes is absent from both lakes. Two other changes have occurred since the 1966 survey, the water levels are considerably higher now than then (approximately two feet) and the water clarity has improved dramatically (improving from 1.3 feet in 1966 to approximately 6 feet today)."

McHugh also tabulated his estimates of wild rice quality in the Twin Lakes back to 1966, based largely on aerial photos, rating conditions as "poor," "fair," or "good".

Figure 12 summarizes his assessment in graphical form, with 1 = poor, 2 = fair, 3 = good.

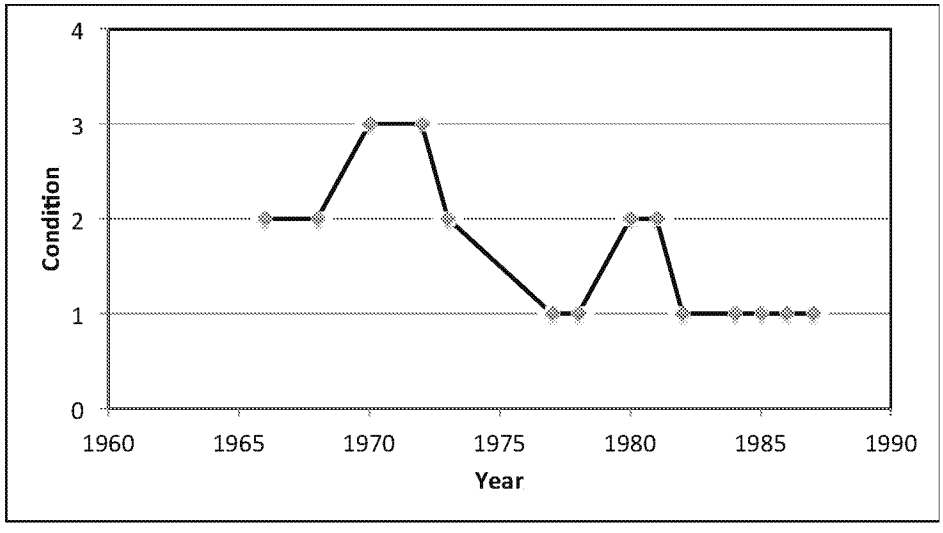


Figure 12. Condition of wild rice in the Twin Lakes, based on assesssment of (McHugh 1987).

Figure 12 shows that the condition of wild rice in the Twin Lakes was variable, but that "poor" conditions (value = 1) occur only after 1977, following completion of the tailings basin in 1972.

McHugh noted that the discharge from the tailings basin "presents two hazards to the above mentioned wild rice beds, high sulfate concentrations and increased volume of water," the latter referring to increased flow rates. With regard to sulfate, he notes that the "sulfate ion concentration of the water in a series of tests exceed 200 ppm and up to over 300 ppm [sic]."

1989. From photo A-6. A final aerial photo appears to show dense plant beds in the center of Little Sandy, with sparser but widely distributed beds in Sandy. At this point, the tailings basin has been completed and is full of water.

2007-2014. The 1854 Treaty Authority mapped wild rice beds in the Twin Lakes in 2007, 2010, 2011, 2012, 2013, and 2014 (see Appendix B, from Vogt 2015). Previously, in 2000 and 2001, only "traces" of wild rice were noted in these lakes by the Bois Forte Department of Natural Resources (Vogt 2015). Note that there was sparse wild rice in Little Sandy Lake in 2006, but no more than a few stalks in this lake in 2007, 2010, 2011, 2013, or 2014. Wild rice in Sandy Lake was present in all years, mostly located in a few small beds (see Appendix B), with never more than 100 total stalks counted in these beds. Vogt also recorded water levels, and noted that water levels were often higher than optimal (1-3') for wild rice beds. Runoff from the Minntac tailings basin, higher than normal precipitation, and beaver dams in the Sandy River may have contributed to elevated water levels.

2012-2013. The MPCA's field study of wild rice distribution, which was part of their study to develop a sulfate standard (MPCA 2015b), found virtually no wild rice in their sampling of Twin Lake sites (T1, T2, and T3) in 2012-2013, with stem densities ranging from 0 to 3.8/m^2 (data file provide by Dr. Ed Swain, MPCA).

2015. Little Sandy and Sandy Lakes are included in MPCA's list of wild rice waters (MPCA 2015a).

2015. Kathryn Hoffman (MCEA) and I visited the Twin Lakes on Sept. 25, 2015, guided by Darren Vogt from the 1854 Treaty Authority. At this time, there was no emergent vegetation of any kind in the open water area of either Sandy or Little Sandy.

Other lakes in the region still have wild rice. In light of the above trends one might assume that all, or at least most, lakes in the region have also lost their wild rice. If this were so, the underlying causal mechanism would likely be some factor *other* than the influence of the Minntac tailings basin.

A recent report from the 1854 Treaty Authority (Vogt, 2015) reveals trends in a number of wild rice lakes in the region. Twelve waters have been sampled in this program since 1998. The analysis presented below includes nine waters that were sampled every year from 2001-2014. This survey is notable for its methodology, which includes detailed mapping of wild rice beds in each lake to determine the *area* of wild rice beds, along with the *density of stems* (#/0.5 m^2 plot) in each bed, for 20 (minimum) to 118 plots per lake. An *abundance index* was then calculated as the product of area of wild rice beds and the density of stalks. The study team also measured water depth, temperature, and water quality. The sampled lakes are in the vicinity of the Minntac mine and the Twin Lakes (Figure 13). Big Sandy Lake is approximately six miles southwest of the closest sampled lake (Big Rice).

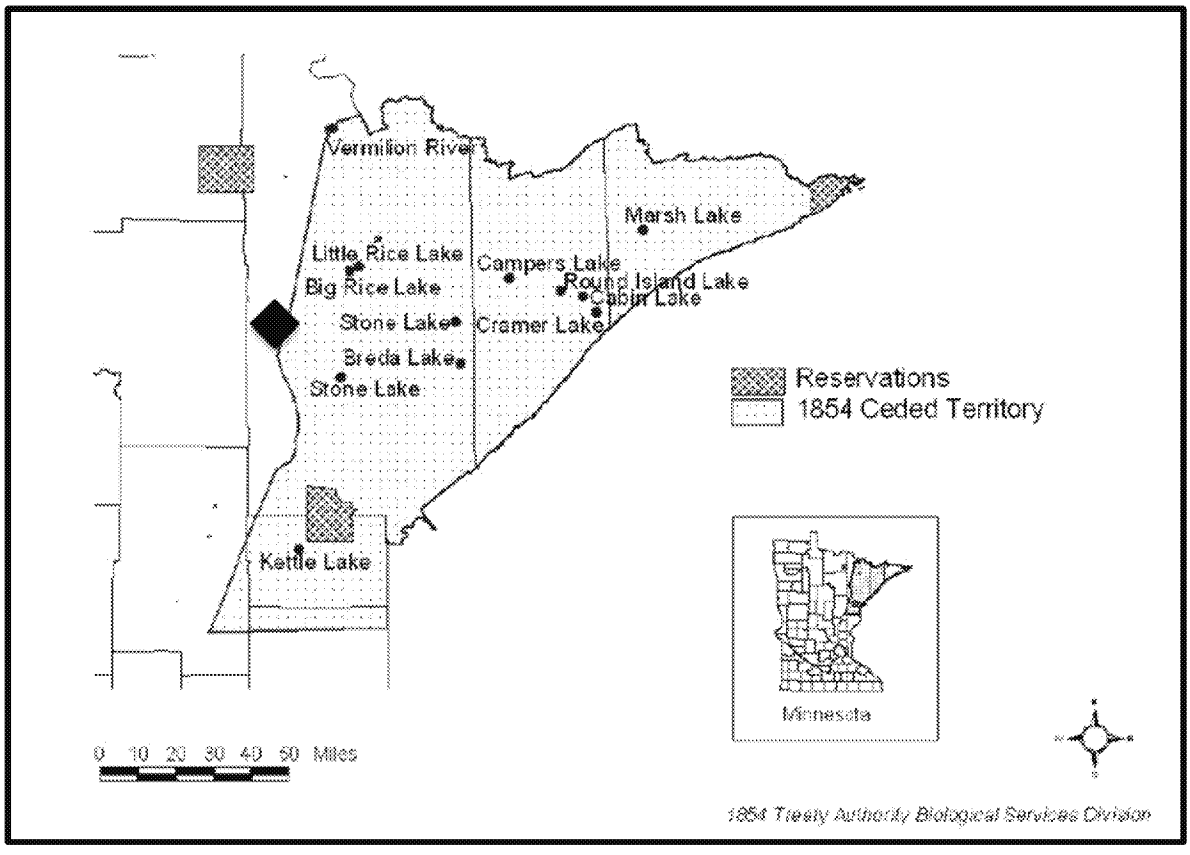


Figure 13. Location of the sampled wild rice lakes in relation to the Twin Lakes (indicated by black diamond).

Wild rice distribution and density trends varied among lakes. Furthermore some lakes have far more and denser wild rice beds than others, making it difficult to compare trends among lakes from raw data. To resolve this problem, I normalized data for abundance and stem density over the period 2001-2014 to 1.0. To do this, I first calculated the normalized value for each year, which is the value for year divided by the long-term average for each lake. When the normalized values for each lake are averaged, the long-term average is 1.0. This procedure allows one to compare trends in relative abundance among lakes with varying absolute abundance.

For example, each lake has a calculated wild rice abundance value for a given year. Over the period of record, the average normalized abundance will be 1.0. Within that time period, that lake would have values greater than 1.0 during years when wild rice abundance is above average and below 1.0 when abundance is below average.

Finally, I averaged the normalized values for *all* lakes for each year to determine overall trends in key variables (area of beds, density within beds, and abundance). These are the values plotted in Figure 14.

Inspection of Figure 14A shows that abundance of wild rice beds varies considerably among years, with average normalized values varying from a high of 1.7 to a low of 0.3. Figures 14B shows that the normalized area of wild rice beds (as percentage) is fairly high, ranging from 45% to 79% of sampling area, with no apparent trend over time. Finally, Figure 14C shows that the average normalized density of wild rice stems declined from 2001-2012 and then increased in 2013 and 2014.

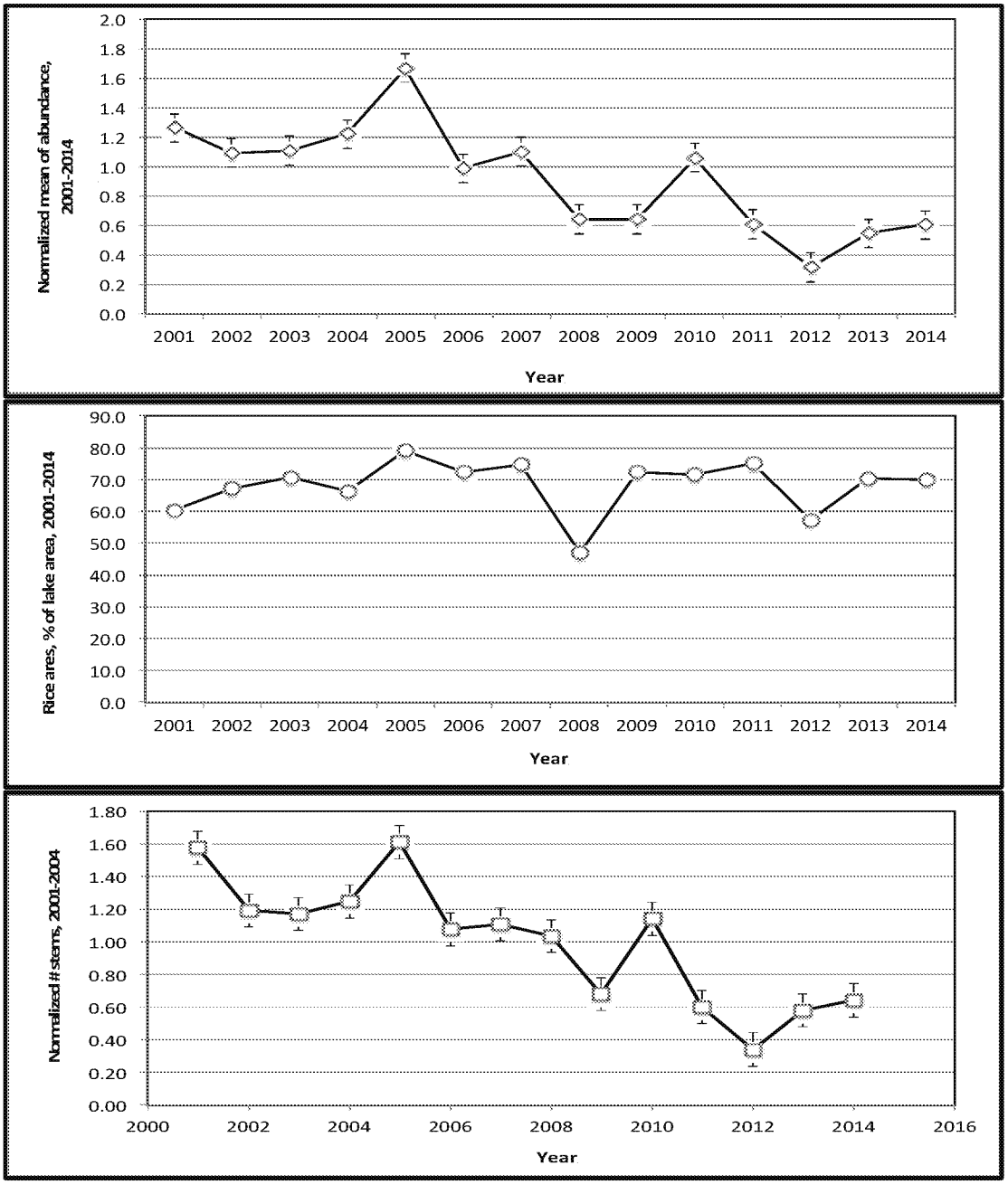


Figure 14. Normalized values for wild rice parameters, 2001-2014: (A) abundance; (B) area of beds; and (C) density of stalks within beds. Error bars represent standard error.

Overall, Figure 14 shows that the trend in abundance is driven by changes in stem density, whereas wild rice coverage was fairly constant throughout the study period. By contrast, none of the lakes exhibited almost total disappearance of wild rice, as has occurred in the Twin Lakes. This strongly suggests that a local influence – such as increased sulfate load and/or volume of inflows – are likely the cause of this disappearance. The Twin Lakes are showing degradation that does not track with the year-to-year variation of a representative peer group.

Summary: Little Sandy and Sandy Lakes are both designated as "Wild Rice Waters" according to the Draft List of MPCA Wild Rice Waters – October 26, 2015. There is ample evidence that wild rice grew in the Twin Lakes for many years and that it has disappeared in recent years, to near zero. In contrast, wild rice is commonly found in nearby lakes; analysis of trends in nine lakes from 2001-2014 showed that the area of wild rice beds has remained fairly constant (generally > 50% of lake area) but the density of stems within beds varies substantially within years. Taken together, the evidence strongly suggests that wild rice in the Twin Lakes has been negatively influenced by the Minntac tailings basin.

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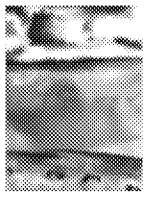
APPENDICES

Two appendices that are part of this report are attached as separate files.

Appendix A: Aerial Photographs of the Twin Lakes in 1940, 1948, 1961, 1972, 1981, and 1989.

Appendix B. Figures showing sampled wild rice distribution in the Twin Lakes, from Vogt 2015:2006, 2007, 2010, 2011, 2012, 2013, 2014, 2015.



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December 23, 2016

DELIVERED BY MESSENGER
Erik Smith (erik.smith@state.mn.us)
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Rd. N.
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RE: U.S. Steel Minntac Tailings Basin Area Draft NPDES/SDS Permit MN0057207

Dear Mr. Smith,

The following comments are submitted on behalf of WaterLegacy, a Minnesota non-profit organization formed to protect Minnesota's water resources and the communities that rely on them. We've provided these comments with referenced exhibits on a recordable DVD.

WaterLegacy appreciates that the Minnesota Pollution Control Agency (MPCA) has finally placed the U.S. Steel Minntac Tailings Basin Area Draft NPDES/SDS Permit MN0057207[1] (Minntac Tailings Basin Draft Permit) on public notice nearly a quarter of a century after the prior permit lapsed in 1992. However, we believe that the MPCA's Minntac Tailings Basin Draft Permit is inadequate to protect Minnesota waters, waters of the United States, or the wild rice, aquatic life and human beings who depend on clean water.

WaterLegacy believes that critical facts providing the foundation for issuance of a more rigorous permit are beyond reasonable dispute, and that the MPCA should take immediate action to rewrite the Minntac Tailings Basin Permit and issue a final permit in compliance with state water quality standards and the federal Clean Water Act. The revised Minntac Tailings Basin Permit should achieve the following:

1. Both Minntac Tailings Basin direct discharge to surface waters and discharge through groundwater shown to be hydrologically connected to surface waters of the United States should be controlled under the National Pollutant Discharge Elimination System (NPDES) program and in accordance with the Clean Water Act (CWA).

2. Under the Clean Water Act, Minnesota's existing wild rice sulfate standard of 10 milligrams per liter should be applied to all wild rice waters impacted by Minntac Tailings Basin discharge, including the Sand River, Sandy Lake, Little Sandy Lake and possibly also Dark Lake.

3. Limitations on specific conductance should be set for Minntac Tailings Basin discharge to Class B waters to protect aquatic life in compliance with the Clean Water Act and

[1] U.S. Steel Minntac Tailings Basin Area Draft NPDES/SDS Permit MN0057207 (November 2016), attached as Exhibit 1 (Minntac Tailings Basin Draft Permit).

Minnesota's narrative water quality standards.

4. Minnesota's water quality standard for manganese should be applied in compliance with state law and the Clean Water Act to prevent pollution of drinking water with a contaminant that impairs neurological functioning of infants, children and adults.

5. Compliance mechanisms, including the compliance schedule, monitoring and toxicity testing proposed for the Minntac Tailings Basin Permit, should be revised to provide a reasonable assurance of compliance with water quality standards set in accordance with state and federal law.

6. Effects of elevated sulfate discharge from the Minntac Tailings Basin on downstream impairments due to mercury methylation and phosphorus release from sediments should be considered in determining appropriate monitoring, treatment technologies and pollution prevention.

1. Both Minntac Tailings Basin direct discharge and discharge through groundwater that is shown to be hydrologically connected to surface waters of the United States should be controlled under the Clean Water Act NPDES permit program.

The MPCA argues in the Fact Sheet for the Minntac Tailings Basin Draft Permit that federal NPDES program requirements under the Clean Water Act only govern the SD001 outfall to surface waters on the west side of the Tailings Basin and do not govern discharges to groundwater or seepage from the Minntac Tailings Basin.[2] This position is inconsistent with the Clean Water Act, the weight of legal precedent, and specific interpretations of the application of the Clean Water Act to Minntac Tailing Basin discharge to surface waters through hydrologically connected groundwater rendered by the U.S. Environmental Protection Agency (EPA) over the past three years. In addition, the factual record is clear that the Minntac Tailings Basin is a point source where pollutants have been collected and channeled and that these pollutants have discharged to and impacted hydrologically connected surface waters of the United States, including the Dark River, Sand River and their tributaries and adjacent wetlands, including Sandy Lake, Little Sandy Lake, Dark Lake, Timber Creek and Admiral Lake.

The Clean Water Act prohibits "the discharge of any pollutant" except in compliance with certain sections of the Act, including section 1342, which is applicable to NPDES permits. 33 U.S.C. §1311(a). The Clean Water Act defines "discharge of a pollutant" as "any addition of any pollutant to navigable waters from any point source." 33 U.S.C. §1362(12). Navigable waters are defined by the Clean Water Act as "waters of the United States," 33 U.S.C. §1362(7) and a "point source" is

> any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

[2] MPCA, NPDES/ SDS Permit Program Fact Sheet Permit Reissuance MN0057207 (November 2016) (MPCA Fact Sheet), p. 12, attached as Exhibit 2.

33 U.S.C. §1362(14). The Clean Water Act only allows discharge of pollutants when an NPDES permit governing the pollutant is issued and complied with. See 33 U.S.C. §1342.

The EPA has long interpreted its rules to find that a wide range of discharges come within the purview of the NPDES program under the Clean Water Act. "As a legal and factual matter, EPA has made a determination that, in general, collected or channeled pollutants conveyed to surface waters via ground water can constitute a discharge subject to the Clean Water Act."[3]

The question of whether groundwaters connected to surface waters are *themselves* navigable waters of the United States is an unresolved question. However, "The majority of courts have held that groundwaters that are hydrologically connected to surface waters are regulated waters of the United States, and that unpermitted discharges into such groundwaters are prohibited under section 1311." *Williams Pipe Line Co. v. Bayer Corp.*, 964 F. Supp. 1300, 1319 (S.D. Iowa 1997).

As explained in *Hawai'i Wildlife Fund v. County of Maui*, 24 F. Supp. 3d 980, 998 (D. Haw. 2014), "it would make no sense to exempt a polluter from regulation simply because its pollution passes through a conduit . . . when it is established that groundwater is a conduit for pollutants, liability may attach to a discharge into that groundwater. *See also N. Cal. Riverwatch v. Mercer Fraser Co.,* No. C-04-4620 SC, 2005 U.S. Dist. LEXIS 42997, at *7-8; 2005 WL 2122052 (N.D. Cal. Sept. 1, 2005)("[I]t would hardly make sense for the CWA to encompass a polluter who discharges pollutants via a pipe running from the factory directly to the riverbank, but not a polluter who dumps the same pollutants into a man-made settling basin some distance short of the river and then allows the pollutants to seep into the river via the groundwater.")

Several cases involving tailings ponds and similar mining impoundments have held that an NPDES permit is required for discharge to groundwater with a demonstrated hydrological connection to surface waters. In *Washington Wilderness Coalition v. Hecla Mining Co.*, 870 F. Supp. 983, 990-991 (E.D. Wash., 1994), the court allowed plaintiffs to pursue a claim for discharge without a NPDES permit against the mining company for seeps and leaks from a tailings pond into groundwater where pollution could be traced to a hydrologically connected creek and lake. Recently, in *Yadkin Riverkeeper, Inc. v. Duke Energy Carolinas, LLC*, 141 F. Supp. 3d 428, 444-446 (M.D. N. Car., 2015), a claim was allowed under the Clean Water Act for a utility's failure to obtain an NPDES permit for seepage from a coal ash lagoon impoundment point source into groundwater that was hydrologically connected to a lake and a river, thus serving as a conduit to navigable waters. In *Ohio Valley Envtl. Coalition v. Pocahontas Land Corp.* 2015 U.S. Dist. LEXIS 59910, at *22-23; 80 ERC (BNA) 2193; 2015 WL 2144905 (S. D. W. Va., May 15, 2015), the court ordered a coal mining company to apply for an NPDES permit for discharge from a sedimentation pond which leached pollutants into a hydrologically connected receiving stream, resulting in elevated levels of conductivity, sulfates, calcium, magnesium, and TDS.

The surface waters potentially impacted by the Minntac Tailings Basin are waters of the United States under the Clean Water Act. Sand River and Dark River are navigable in fact and are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce. 40 C.F.R. §230.3(o)(1)(i). Dark River is a headwater tributary of the Little Fork

[3] U.S. EPA, *Proposed National Pollutant Discharge Elimination System Regulations for Concentrated Animal Feeding Operations*, 66 Fed. Reg. 2960, 3016 (Jan. 12, 2001).

River and Sand River is a major tributary of the Pike River, which flows into Lake Vermillion's Pike Bay in the Vermillion River Watershed. Both the Little Fork River and the Vermillion River watersheds are in the Rainy River Basin, whose waters flow north into Canada, eventually arriving in Hudson Bay.[4] Sandy Lake, Little Sandy Lake, Dark Lake, Admiral Lake, Timber Creek and the wetlands adjacent to the Minntac Tailings Basin are tributaries of the Sand River or Dark River or lakes or wetlands adjacent to these rivers. 40 C.F.R. §§230.3(o)(1)(v) and (iv); 230.3(o)(3)(i), (iii) and (iv).

As with the tailings pond in the *Hecla Mining Co.* case, the coal ash lagoon impoundment in the *Duke Energy Carolinas* case and the sedimentation pond requiring an NPDES permit in the *Pocahontas Land Corp.* case, the Minntac Tailings Basin has contained, channeled and impounded wastes constituting a point source. As the Minntac Tailings Basin Draft Permit explains, an average of 35 million long tons per year of tailings are disposed of each year in the tailings basin.[5] Surface runoff water enters the basin through four culverts; stockpile runoff seeps through the perimeter dam; and wastewater is impounded in various basin cells by dams.[6] Wastewater is channeled into the tailings basin: "The agglomerator process water, sewage plant discharge, laboratory wastewater, plant non-process water and surface runoff from the plant area enter the south side of the basin through a series of pipes and ditches."[7]

The EPA has specifically discussed the need to apply NPDES requirements to seepage from the Minntac Tailings Basin to groundwater that is hydrologically connected to surface waters. Discussing impacts of the Minntac Tailings Basin on the Sand River and Dark River in 2013, the EPA emphasized, "EPA has consistently interpreted the Clean Water Act (CWA) to apply to discharges of pollutants from a point source to surface water that occur via directly connected ground water." [8]

The EPA cautioned that, based on surface water monitoring in the Sand River watershed, both the seep collection and return system (SCRS) already installed in the Sand River watershed and a similar system proposed for the Dark River watershed "may not be inclusive of all the seepage discharging" from the tailings basin.[9] The EPA stated that Minntac discharge through ground water with a direct hydrological connection to surface water would require an NPDES permit to comply with the Clean Water Act:

> EPA understands that USS may have installed the seep collection and return system as an approach to eliminate the surface discharge. . . Section 301 of the CWA prohibits point source discharges to surface waters, either directly or via directly connected ground water, unless the discharge is in compliance with an NPDES permit. . .
>
> To the extent that USS may only be converting the path through which pollutants are discharged to surface water or reducing the volume of the discharge, EPA expects that the discharges will continue to be subject to NPDES permit requirements. If a permit is

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[4] Summary information from MPCA describing and mapping Basins and Major Watersheds in Minnesota, Rainy River Basin, Little Fork River and Vermillion River is attached as Exhibit 3.
[5] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, p. 5.
[6] *Id.*
[7] *Id.*
[8] EPA Region 5, letter of Peter Swanson, Chief Watersheds and Wetlands Branch to Tamara Cameron, U.S. Army Corps St. Paul District (May 15, 2013), p. 4, attached as Exhibit 4.
[9] *Id.*

> terminated (or a discharger decides not to seek renewal of a permit) without permanent elimination of the entire discharge, the discharger would risk being found in violation of the CWA for discharge without a permit. [10]

When the MPCA circulated a pre-public notice draft Minntac Tailings Basin Permit in December 2014, that draft permit[11] and the MPCA's draft Fact Sheet supporting it (like the current draft and Fact Sheet) denied application of Clean Water Act requirements to discharge from the tailings basin through groundwater.[12] In December 2014, the EPA clearly stated that the Clean Water Act required an NPDES permit to apply to *all* discharges from the tailings basin causing exceedances of surface water:

> We are concerned that this draft permit as written does not address, under MPCA's approved National Pollutant Discharge Elimination System (NPDES) program and in accordance with the Clean Water Act (CWA), all discharges to surface waters from this tailings basin. MPCA acknowledges in the fact sheet that discharges from this 8,000 acre tailings basin are causing exceedances of surface water quality standards. Based on this and facts supporting this conclusion, the CWA requires an NPDES permit for all such discharges to surface waters from the tailings basin. The original NPDES permit, which was issued in 1987, did not contemplate the full extent of the discharges to surface water from this facility. In the years between expiration of that permit and today the discharges to surface waters have continued and are better understood. . . [W]e are concerned that some of the statements in MPCA's draft fact sheet regarding EPA's interpretation of the scope of the NPDES program are incorrect and should be corrected prior to public notice of this draft permit.[13]

There can be no reasonable dispute that seepage from the Minntac Tailings Basin through hydrologically connected groundwater is resulting in exceedances of surface water quality standards. The MPCA has repeatedly confirmed this direct connection and causal relationship:

> The MPCA recognizes that basin-impacted groundwater is currently reaching surface waters and having an impact on those surface waters.[14]
>
> The mitigation efforts and investigations conducted at the basin have shown that there is significant seepage escaping the basin over its 8000+ acre footprint and that this seepage is causing exceedances of water quality standards in surface water and groundwater in a broad area surrounding the basin.[15]
>
> Monitoring results and the configuration of the local water table indicate that pollutants enter the Dark River from the tailings basin via surface flow, which originates at seeps such as SD001, and groundwater flow that enters the Dark River as baseflow both near

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[10] *Id.*, p.5
[11] U.S. Steel Minntac Tailings Basin Area Pre-publication Draft NPDES/SDS Permit MN0057207 (December 2014), attached as Exhibit 5.
[12] MPCA, NPDES/ SDS Permit Program Fact Sheet Permit Reissuance MN0057207 (December 2014 DRAFT), pp.6-8 (MPCA Pre-pub Draft Fact Sheet 2014), attached as Exhibit 6.
[13] EPA Region 5, letter of Kevin Pierard, Chief, NPDES Programs Branch, to Ann Foss, Minnesota Pollution Control Agency (December 19, 2014), p. 1, attached as Exhibit 7.
[14] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, p. 22; identical quote in MPCA Fact Sheet, *supra*, Ex. 2., p. 38.
[15] MPCA Fact Sheet, *supra*, Ex. 2, p. 6.

> the basin and at unknown distances downgradient from the basin.[16]
>
> [T]he permit proposes monitoring for compliance in the Dark River at two locations: a headwaters location and a downstream location where it is likely that most or all of the tailings-impacted baseflow has emerged.[17]

The MPCA Fact Sheet defines "Discharge(H)" as the "Hydrologic definition" as follows: "The flow of water, including any suspended solids, dissolved chemicals, and or biological materials from one water body or aquifer to another, or through a given cross-sectional area. This includes movement through **both surface water and ground water**."[18] The MPCA then explains that surface waters on both the west and east sides of the Minntac Tailings Basin are or have the potential to be impacted by this discharge:

> Surface water monitoring for compliance with numeric water quality standards and narrative criteria is proposed in streams and lakes that are, or have the potential to be, affected by discharge (H) from the tailings basin. On the west side, this includes the Dark River and Timber Creek. On the east side this includes the Sand River which originates near the basin and passes through Admiral Lake, Little Sandy Lake, and Sandy Lake.[19]

The causal relationship between Minntac Tailing Basin discharge and surface water impacts is clear in the MPCA's explanation that to the north, where hydraulic gradient prevented seepage of discharge(H) to surface waters, parameters were not elevated:

> To the north, there are no surface water features known or suspected of receiving discharge(H) from the basin. There is a lesser hydraulic gradient to the north than to either the east or west and monitoring has not shown any impact to Sand Lake from the basin. Sampling conducted there in 2010 and 2011 indicated an average sulfate concentration of 3.2 mg/L and specific conductance of approximately 100 uS/cm, which are in the anticipated range of background concentrations for these parameters in this region.[20]

Monitoring data since the installation in 2010 of a seep collection and return system (SCRS) on the east side of the Minntac Tailings Basin has confirmed that discharge from the Tailings Basin through groundwater with a direct hydrological connection to Sandy Lake and Little Sandy Lake groundwater continues to impact surface waters despite the SCRS system. The MPCA acknowledges, that although there is no longer any observable flow at SD002 since the SCRS was installed on the east side of the tailings basin, 1854 Treaty Authority monitoring shows that "concentrations of water quality parameters impacted by the tailings basin are greatest at the upstream Twin 1 location and decrease at each successive downstream sampling location."[21]

The 1854 Treaty Authority monitoring, in fact, has shown that there was a decrease in sulfate

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[16] *Id.*, p. 16.
[17] *Id.*
[18] *Id.*, p. 7, emphasis in the original.
[19] *Id.*, p. 14.
[20] *Id.*
[21] *Id.*, p. 17.

concentrations in the Sandy Lake and Little Sandy Lake sites after the first year of seep collection operation, but since then, "sulfate levels in 2011-2016 have varied and showed a trend upward."[22]

Although MPCA asserts in its Fact Sheet that collection of surface seepage from the west side of the Minntac tailings "would eliminate the remaining surface discharge (NPDES) to waters of the United States,"[23] this position is inconsistent with federal law and with clearly demonstrated facts. The Clean Water Act requires that Minntac Tailings Basin discharge to surface waters of the United States through hydrologically connected groundwater be controlled through an NPDES permit in compliance with both state and federal law.

Recommendations:

- The MPCA should revise the Minntac Tailings Basin Draft Permit to apply NPDES controls to all tailings basin discharge to groundwater shown be hydrologically connected to surface waters in the Sand River and Dark River sub-watersheds.

- Limits on Minntac Tailings Basin discharge to surface water through hydrologically connected groundwater must comply with all Minnesota surface water quality standards in conformity with the Clean Water Act.

2. Under the Clean Water Act, Minnesota's existing wild rice sulfate standard of 10 milligrams per liter should be applied to all waters used for the production of wild rice affected by Minntac Tailings Basin discharge.

Under the Clean Water Act, a state with a federally authorized NPDES program is required to issue permits that achieve compliance with all federally-approved water quality standards. 33 U.S.C. §1311(b)(1)(C). Unless the state is imposing more stringent requirements, the state is precluded from issuing an NPDES permit "When the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA." 40 C.F.R. §§122.4(a); 123.25(a)(1). Each NPDES permit must include "conditions necessary to achieve water quality standards established under section 303 of the CWA." 40 C.F.R. §§122.44(d)(1);123.25(a)(15).

Minnesota's existing water quality standard (Minn. R. 7050.0224, Subp. 2) limiting sulfate in waters used for the production of wild rice to 10 milligrams per liter (mg/L) is a regulation established under section 303 of the Clean Water Act and approved by the EPA in 1973. In 2011, when the Minnesota Legislature was considering changes to the wild rice sulfate standard, EPA Region 5 clearly explained that the wild rice standard was a federally-approved water quality standard that could only be changed through a federal review process to ensure protection of the beneficial use of waters for wild rice:

> As you know, H.F.1010 and S.F. 1029 propose to modify or suspend the current, federally-approved water quality standard for wild rice waters of 10 mg/L, and H.F. 1010-3 (sec. 19, lines 41.15-41.20), specifically sets 50 mg/L as the numeric criterion for

[22] 1854 Treaty Authority, Sandy Lake and Little Sandy Lake Monitoring (2010-2016), Technical Report 16-06, December 2016, autop. 13 (1854 Treaty Authority Monitoring Report), attached as Exhibit 8.
[23] MPCA Fact Sheet, *supra*, Ex. 2, p. 37.

> sulfate in wild rice waters until a new standard is developed. To the extent that any legislation changes the EPA-approved water quality standards for Minnesota, such revised water quality standards must be submitted to EPA for review and approval pursuant to 33 U.S.C. §1313(c)(2)(A), Clean Water Act (CWA)§303(c)(2)(A), and are not effective for CWA purposes, including National Pollutant Discharge Elimination System (NPDES) permits, unless and until approved by EPA (see 40 C.F.R.§131.21). Should Minnesota wish to submit these to EPA as changes to Minnesota's water quality standards, the federal regulations at 40 C.F.R. §131.6 provide the submittal requirements. These include, among other things, the methods and analyses conducted to support the water quality standards revisions, including how the revised water quality criteria are sufficient to protect the designated uses (see generally 40 C.F.R. §131 Subpart B, and 40 C.F.R. §§ 131.11 and 131.20).[24]

In proposing the Minntac Tailings Basin Draft Permit, the MPCA explicitly declined to apply Minnesota's federally-approved water quality standard limiting sulfate to 10 mg/L to protect the beneficial use of surface waters for wild rice. Minn. R. 7050.0224, Subp. 2. The MPCA cited a law passed by the Minnesota Legislature during the 2015 special session stating that "the agency shall not require permittees to expend money for design or implementation of sulfate treatment technologies or other forms of sulfate mitigation." 2015 Minn. Laws 1st Sp. Sess. Ch. 4, Art. 4, Sec. 136.[25] The MPCA has stated, "To be consistent with this legislation, the draft permit contains no sulfate limits for wild rice and does not require expenditures related to wild rice sulfate limits."[26]

The MPCA's reliance on this session law to avoid application of Minnesota's federally-approved 10 mg/L wild rice sulfate standard to Minntac Tailings Basin discharge[27] violates the federal Clean Water Act. As the EPA emphasized with respect to Minnesota's earlier proposals to legislate change to the wild rice sulfate rule, "A state with a federally authorized NPDES program is required to issue permits that ensure the protection of federally approved water quality standards."[28] Where a state proposes to issue a permit that fails to apply, or to ensure compliance with, any applicable requirement, including water quality based effluent limitations, EPA has the authority to block such permit issuance and issue a permit that meets Clean Water Act requirements. 33 U.S.C. §1342(b); 40 C.F.R. §123.44(e)-(h). EPA may also withdraw its approval of a state NPDES program if a state is not administering the program in compliance with federal requirements. 33 U.S.C. §1342(c)(3); 40 C.F.R. §§123.63, 123.64.

The Clean Water Act also requires that the EPA review new or revised state regulations that disable the application of water quality standards. "The EPA cannot choose to review and approve water quality standards while ignoring separate provisions which have the potential to

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[24] EPA Region 5, letter of Tinka Hyde, Water Division Director, to Senator Thomas Bakk and Representative David Dill (May 13, 2011), p. 1, attached as Exhibit 9.
[25] Full text of 2015 Minn. Laws 1st Sp. Sess. Ch. 4, Art. 4, Sec. 136 attached as Exhibit 10.
[26] MPCA Fact Sheet, *supra*, Ex. 2, p. 33.
[27] MPCA told U.S. Steel's predecessor more than 16 years ago that the revised draft permit for the Minntac Tailings Basin was likely to include discharge limits for "sulfate (10 mg/L April through September for the Sand River drainage. . .)." MPCA, Douglas Hall letter to USX-Minnesota Ore Operations, David Johnson, Feb.16, 2000, attached as Exhibit 11.
[28] EPA, Tinka Hyde May 2011 letter, *supra*, Ex. 9, p. 2.

cripple the application of those standards." *Northwest Envtl. Advocates v. U.S. EPA*, 855 F. Supp. 2d 1199, 1211 (D. Ore. 2012). The Eleventh Circuit held in *Fla. Pub. Interest Research Group Citizen Lobby, Inc. v. U.S. EPA*, 386 F 3d 1070, 1088-1089 (11th Cir. 2004) that EPA review of a new impaired waters rule would be nondiscretionary if its application had an effect on water quality standards. *See also Miccosukee Tribe of Indians v. U.S. EPA*, 105 F. 3d 599, 603 (11th Cir. 1997)(However the state characterized its law, if as a factual matter a Florida law had the effect of changing water quality standards, it would invoke a mandatory duty of review by the EPA); *Rivers Unlimited v. Schregadus*, 86 Ohio Misc. 2d 78, 93; 685 N.E.2d 603, 613 (1987)(State legislation that "stands as an obstacle to the accomplishment and execution of the full purposes and objectives" of federal water pollution control laws invalidated).

The MPCA is required under the Clean Water Act to ensure compliance with Minnesota's wild rice sulfate standard in issuing a Minntac Tailings Basin Permit. The EPA has the authority to block a permit that fails to comply with Minnesota's wild rice standard and the duty, in the course of its review, to disapprove application of the state session law precluding compliance with Clean Water Act requirements. It would defy all logic if a state, advised by EPA that a water quality standard amendment must conform to Clean Water Act federal review to protect a beneficial use, were allowed to circumvent the Act by precluding application of that standard.

There is no reasonable dispute that Sand River watershed receiving waters for Minntac Tailings Basin discharge through hydrologically connected groundwater are wild rice waters to which Minnesota's existing wild rice sulfate standard applies. Dark Lake waters impacted by Minntac Tailings Basin discharge may also be wild rice waters protected by Minnesota's existing wild rice sulfate rule.

It is well-established that Sandy Lake and Little Sandy Lake are wild rice waters. The Fact Sheet for the Minntac Tailings Basin Permit states that MPCA anticipated that "Sandy Lake and Little Sandy Lake will be designated as wild rice waters subject to the wild rice sulfate water quality standard."[29] The MPCA's Draft List of Wild Rice Waters includes both Sandy Lake and Little Sandy Lake as proposed wild rice waters,[30] and the MDNR's Natural Wild Rice in Minnesota 2008 report to the Legislature identifies both Sandy Lake and Little Sandy Lake as wild rice lakes.[31] The 1854 Treaty Authority Monitoring Report for Sandy Lake and Little Sandy Lakes explains, "Sandy Lake and Little Sandy Lake, also known locally as the Twin Lakes, historically have produced good stands of wild rice. Wild rice harvesters utilized the lakes when suitable crops were present."[32] The 1854 Authority Report also summarizes vegetation surveys in 1966 and 1987 by the Minnesota Division of Game and Fish and the MDNR:

> The 1966 survey described Sandy Lake with dense wild rice over the entire lake, and Little Sandy Lake with moderately dense rice over the entire lake. The report also mentions that the wild rice is harvested at the lakes when the crop is adequate. Results from the 1987 survey indicated that the aquatic vegetation changed little since the 1966 survey, with one noticeable exception. Wild rice for all practical purposes was absent from both lakes. . . The report also describes the rice crop at Twin Lakes in some years

[29] MPCA Fact Sheet, *supra*, Ex. 2, p. 33.
[30] MPCA, Draft List of MPCA Wild Rice Waters – October 26, 2015, attached as Exhibit 12. (highlighting added)
[31] MDNR, Natural Wild Rice in Minnesota, a Wild Rice Study document submitted to the Minnesota Legislature, Feb. 15, 2008, Appendix B, pp. 80-81, attached as Exhibit 13.
[32] 1854 Treaty Authority Monitoring Report, *supra*, Ex. 8, autop. 2.

> from 1966 to 1987: 1966-fair, 1968-fair, 1970-good, 1972-good, 1973-fair, 1977-poor, 1978-poor, 1980-fair, 1981-fair, 1982-poor, 1984-poor, 1985-poor, 1986-poor, 1987-poor.[33]

Sparse wild rice was found in Sandy and Little Sandy Lakes by the Bois Forte Department of Natural Resources in 2000 and 2001 and by the 1854 Treaty Authority in 2006. Surveys by the 1854 Treaty Authority in 2007 and from 2010 to 2016 found sparse wild rice in Sandy Lake, the lake further from the Minntac Tailings Basin.[34]

As explained in Section 1 of these comments, there is no reasonable dispute that discharge from the Minntac Tailings Basin impacts hydrologically connected surface waters in the Sand River, Little Sandy Lake and Sandy Lake to the east of the Basin. Unlike Sand Lake, which is located north of the Tailings Basin and protected from tailings basin seepage due to its hydraulic gradient (see page 6 of these comments), Little Sandy Lake and Sandy Lake have markedly elevated sulfate levels, far exceeding Minnesota's wild rice sulfate standard of 10 mg/L.

Monitoring by the 1854 Treaty Authority since the SCRS was installed on the east side of the Minntac Tailings Basin in 2010 demonstrates the impact of discharge through groundwater. Annual average sulfate levels in the years 2011-2016 at the Little Sandy Inlet (Twin 1) ranged from 207-460 mg/L. From 2011-2016, sulfate levels decreased at each site further from the Tailings Basin, but still exceeded Minnesota's 10 mg/L wild rice sulfate standard. Average sulfate levels in the middle of Little Sandy Lake (Twin 2) ranged from 144-295 mg/L; in the middle of Sandy Lake (Twin 3) from 97-217 mg/L; and at the outlet to Sandy Lake (Twin 4) from 66-145 mg/L.

Despite surface seepage collection on the east side of the Minntac Tailings Basin, after 2011 sulfate levels did not decline; over the past six years, at each Twin Lakes site the highest average sulfate levels were in 2015.[35] As the EPA noted in 2012, reviewing the initial data from 1854 Treaty Authority monitoring in the Twin Lakes, since the data indicated that wild rice sulfate water quality standards were not being met despite the seepage collection system, "if the NPDES permit was to be reissued, it is likely that WQBELs would be established in that permit."[36]

Minnesota's wild rice sulfate limit of 10 mg/L should also apply to the Sand River. The MPCA's Draft List of Wild Rice Waters includes the Sand River as a proposed wild rice water, noting that both the 1854 Treaty Authority and the U of M/MPCA study identified Sand River as a wild rice water.[37] The 1854 Treaty Authority conducted aerial surveys of the Sand River and Pike Rivers from 2010-2014 and conducted observations on the ground in 2016 and found, "Depending on the year, rice stands in portions of the rivers varied from sparse coverage to some areas with fair to good density."[38]

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[33] *Id.*, autop. 16.
[34] *Id.*, autop. 17, 20-26.
[35] *Id.*, autop. 13, pp. 31-48.
[36] EPA Region 5, Kevin Pierard, Chief NPDES Programs Branch letter to Tamara Cameron, Chief Regulatory Branch USACE St. Paul District, re U.S. Steel – Minntac Mine pending Clean Water Section 402 and 404 Actions (Oct. 22, 2012), p. 2, attached as Exhibit 14.
[37] MPCA, Draft List of Wild Rice Waters, *supra*, Ex. 12.
[38] 1854 Treaty Authority Monitoring Report, *supra*, Ex. 8, autop. 27.

The field data collected by Myrbo et al. at the University of Minnesota under contract for the MPCA Wild Rice Sulfate Standards Study found wild rice in the Sand River in both 2011 and 2012.[39] MPCA discharge monitoring reports show that sulfate levels at sampling site SW001, where the Sand River crosses Highway 53, approximately 2 ½ miles downstream from Sandy Lake,[40] averaged 155.9 mg/L from 2011 through 2014, with all but one sampling event in excess of 10 mg/L.[41]

It is likely that Minnesota's wild rice sulfate limit of 10 mg/L should also apply to Dark Lake on the west side of the Minntac Tailings Basin. In 2013, an MPCA staff scientist documented the presence of wild rice in Dark Lake:

> The recent MDNR list identified the presence of wild rice in Dark Lake (69-0790-00) during a July 30, 2012 survey of the northeast bay of the lake (see June 16, 2013 email message below from Karen Myhre, MDNR).
>
> > *I conduct rare aquatic plant searches for the Minnesota Biological Survey of the MNDNR (in 75 to 100 lakes per year, 1840 lakes surveyed since the survey began in 1995). In the course of those searches, I record every aquatic and emergent plant species that I observe, creating a species list for each lake in which I do a search.*
> >
> > *I conducted a rare aquatic plant search in the northeast bay of Dark Lake on 7/30/2012 and recorded that I observed wild rice in the course of the survey. The northeast bay has extensive emergent borders with wild rice as a component of these borders (there are more extensive emergent borders in the main body of the lake-visible on air photos, but I did not survey the main body of the lake). . .Wild rice was one of the first species that I recorded (looking at the field data), which would indicate to me that it was immediately noticeable at the lake, but I don't remember stand density.* [42]

The MPCA's email also noted that the University of Minnesota field study identified small stands of wild rice in Dark Lake in 2013.[43] The Myrbo et al. Field Survey found wild rice in two Dark Lake locations on three sampling dates in 2013.[44] Photographs of wild rice in Dark Lake in 2016 confirm the presence of small stands of wild rice.[45]

No monitoring is available for Dark Lake. However, MPCA has conducted sampling in the Dark River at County Road 668 between Dark Lake and the Minntac Tailings Basin and in the Dark River at County Highway 65, 1.59 miles downstream of Dark Lake.[46] MPCA Dark River

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[39] Myrbo et al. Field Survey Data (University of Minnesota research for MPCA Wild Rice Sulfate Standards Study), complete spreadsheet attached as Exhibit 15; Myrbo Field Survey Excerpt Wild Sites Near Minntac Tailings Basin attached as Exhibit 15A. The Myrbo Field Survey also found sparse wild rice in Sandy Lake and Little Sandy Lake.
[40] Location described in MPCA Fact Sheet, *supra*, Ex. 2 p. 17.
[41] MPCA Discharge Monitoring Reports, provided in response to December 2014 DPA request as "Minntac Basin Data Dump Post 2008" with email from Erik Smith, MPCA to Krista McKim, EPA on October 20, 2014, attached as Exhibit 16; Excerpt from Ex. 14 pertaining to SW001 Sulfate attached as Exhibit 16A.
[42] MPCA, Gerald Blaha emails to MPCA, Stephanie Handeland and Darren Vogt, 1854 Treaty Authority regarding Dark Lake wild rice, June 20, 2013- September 6, 2013, p. 2, attached as Exhibit 17.
[43] *Id.*, p. 1.
[44] Myrbo et al. Field Survey and Excerpt Wild Rice Sites Near Minntac Tailings Basin, *supra*, Ex. 15; Ex.15A.
[45] Dark Lake Photos by Scott Cardiff, University of Wisconsin, on July 31, 2016, sent to GLIFWC on August 8, 2016, attached as Exhibit 18.
[46] Locations explained in MPCA Fact Sheet, *supra*, Ex. 2, p. 33.

Monitoring indicates that sulfate levels sampled from 2011 through 2014 average 656.7 mg/L in the Dark River upstream of Dark Lake and 308.5 mg/L in the Dark River at CH 65, farther from the Tailings Basin. Samples at both locations are more than an order of magnitude above Minnesota's wild rice sulfate standard.[47]

Minntac Tailings Basin receiving waters Sandy Lake, Little Sandy Lake and the Sand River are and have been waters used for the production of wild rice, and it is likely that Dark Lake is also a wild rice water. Sulfate levels in all of these receiving waters exceed or have the potential to exceed Minnesota's wild rice sulfate standard of 10 mg/L by more than an order of magnitude.

Recommendations:

- The MPCA should revise the Minntac Tailings Basin Draft Permit to require compliance with Minnesota's 10 mg/L wild rice sulfate standard in Sandy Lake, Little Sandy Lake and the Sand River.

- The MPCA should determine, in consultation with tribal authorities, whether Dark Lake should also be considered a water used for the production of wild rice. If so, the Minntac Tailings Basin Draft Permit should require compliance with Minnesota's 10 mg/L sulfate standard in Dark Lake.

3. Limits on specific conductance should be set for Minntac Tailings Basin discharge to Class B waters to protect aquatic life in compliance with the Clean Water Act and narrative water quality standards.

The fundamental purpose of the Clean Water Act is to attain "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water." 33 U.S.C. §1251(a)(2). This goal is achieved, in part, by requiring point source dischargers to comply with NPDES permits. 33 U.S.C. §1342(a)-(d).

As previously discussed in these comments, the Clean Water Act establishes the requirements for state NPDES permit control of pollutants. States assuming delegated authority under the Act must establish water quality standards "to protect the use of waters for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes and other purposes including navigation." 33 U.S.C. §1313(c)(2)(A); 40 C.F.R. §131.10.

Each state NPDES permit must include conditions needed to "achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." 40 C.F.R. §§122.44(d)(1) 123.25(15). NPDES permit limitations "must control *all pollutants or pollutant parameters* . .which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, *including State narrative criteria for water quality*." 40 C.F.R. §122.44(d)(1)(i) (emphasis added).

[47] MPCA Fact Sheet, *supra*, Ex. 2, Table 1 on p. 16.

All of the surface waters affected by Minntac Tailings Basin direct surface discharge and discharge through hydrologically connected groundwater are designated under Minnesota law as Class 2 waters, the beneficial use of which includes fish and aquatic life. The following receiving surface waters affected by Minntac Tailings Basin discharge are Class 2B waters: Timber Creek, Dark River, Dark Lake, Sand River, Sandy Lake, and Little Sandy Lake. A segment of the Dark River beginning 1.59 miles north out of Dark Lake is designated as a Class 2A trout stream for the next 7.91 miles. [48]

In addition to numeric standards, Minnesota's federally-approved Rules prohibit exceedance of narrative water quality standards for Class 2 waters:

> The narrative water quality standards in subpart 3 [pertaining to Class 2 waters] prescribe the qualities or properties of surface waters that are necessary for the protection of designated public uses and benefits. If the narrative standards in this part are exceeded, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses of the waters of the state. Minn. R. 7050.0150, Subp. 1.
>
> For all class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner . . . the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters. Minn. R. 7050.0150, Subp. 3.

Under Minnesota Rules, "fish and other biota" and "lower aquatic biota" include "game and nongame fish, minnows and other small fish, mollusks, insects, crustaceans and other invertebrates, submerged or emergent rooted vegetation, suspended or floating algae, substrate-attached algae," and "microscopic organisms and aquatic or semiaquatic organisms that depend on aquatic systems for food or habitat such as amphibians and certain wildlife species." Minn. R. 7050.0150, Subp. 4, Item I.

The Draft Permit conducts no analysis of impacts to aquatic life and provides no water quality based effluent limitations to protect fish or lower aquatic biota in *any* of the Class 2 waters impacted by Minntac Tailings Basin discharge.[49]

The only limits on sulfate in the Draft Permit are the Class 1B drinking water standard which is applied for the trout stream segment (SW003) of the Dark River (250 mg/L) and the Class 4B

[48] *See* MPCA Fact Sheet, *supra*, Ex. 2, pp. 15, 17, 28, for designations of receiving waters.
[49] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, pp. 11-21.

standard (1,000 mg/L) for adult livestock drinking water,[50] which is applied to SD001 discharge, Admiral Lake, Timber Creek and the Dark River (SW008) upstream of Dark Lake.[51]

Similarly, where the Minntac Draft Tailings Basin Permit set any limits for total dissolved salts or total dissolved solids (TDS), the MPCA used Class 1B drinking water and Class 4B agricultural standards (700 mg/L) to set final limits for SD001 discharge, Admiral Lake, Little Sandy Lake, Timber Creek, and the Dark River.[52] Class 4A agricultural standards were used to set final limits for bicarbonates (5 milliequivalents per liter – equivalent to 250 mg/L) and specific conductance[53] (1,000 micromhos per centimeter - equivalent to 1,000 µS/cm) in SD001 discharge, Admiral Lake, Little Sandy Lake, Timber Creek, and both sites on the Dark River.[54] Finally, Class 3C industrial standards were used to set final limits on calcium and magnesium measured as hardness (500 mg/L) and chlorides (250 mg/L) in SD001 discharge, Admiral Lake, Little Sandy Lake, Timber Creek, and both sites on the Dark River.[55]

In 2011, EPA finalized its *Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams,* which concluded that mixtures of ions dominated by salts of calcium, magnesium, sulfates and bicarbonates resulting in high conductivities were associated with impairment of aquatic life.[56] Peer-reviewed literature based on EPA's conductivity research analyzed the causal nature of this relationship, the threshold for protection of aquatic life, the relationship between mining land use and elevated conductivity and the importance of benthic macroinvertebrates (aquatic insects) to ecosystem health.[57]

EPA's 2011 Conductivity Benchmark Study set a chronic aquatic life benchmark of 300 µS/cm in the Appalachian ecoregions studied, noting that this limit was applicable in waters with circumneutral pH where concentrations of dissolved ions are dominated by salts of calcium, magnesium, sulfates and bicarbonates and the background conductivity is below the benchmark.[58] EPA's methods and benchmark were reviewed by the EPA's Science Advisory Board, which validated the benchmark and concluded that both the benchmark and its methodology may be applicable to other states and regions with appropriate validation.[59]

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[50] *See* MPCA, Gerald Blaha email to Erik Smith, MPCA, Re: class 4B sulfate criterion, February 12, 2014, attached as Exhibit 19, which notes that 1,000 mg/L sulfate may not be protective for young livestock or wildlife.
[51] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1 pp. 13, 18-20; MPCA Fact Sheet, *supra*, Ex. 2, pp. 32,33. *See* Minn. R. 7050.0220, Subp. 3a, Item A(30); 7050.0224, Subp. 3 for these sulfate standards.
[52] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, pp. 18-20; MPCA Fact Sheet, *supra*, Ex. 2, p. 32. *See* Minn. R. 7050.0220, Subp. 3a, Item A (34) for "total dissolved solids" standard; Minn. R. 7050.0224, Subp. 3 for "total dissolved salts" standard.
[53] Minnesota rules use the term specific "conductance," while EPA studies use the term specific "conductivity." These terms have the same meaning.
[54] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, pp. 17-20; MPCA Fact Sheet, *supra*, Ex. 2, p. 32. See Minn. R. 7050.0224, Subp. 2 and Subp. 4.
[55] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, pp. 17-20. MPCA Fact Sheet, *supra*, Ex. 2, p. 32, See Minn. R. 7050.0223, Subp. 4. The Dark River trout reach (SW003) is a Class 3B water, so industrial standards of 250 mg/L of hardness and 100 mg/L of chlorides would apply.
[56] U.S. EPA, *A Field--Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*, Office of Research and Development, National Center for Environmental Assessment, Washington, DC., 2011 EPA/600/R-10/023F, p. viii, (EPA 2011 Conductivity Benchmark Study), attached as Exhibit 20.
[57] Peer reviewed literature based on EPA's research to develop a benchmark for conductivity is attached as Exhibits 20A through 20G.
[58] EPA 2011 Conductivity Benchmark Study, *supra*, Ex. 20, pp. xv, 41. Specific ions identified were Ca^{2+},Mg^{2+}, SO_4^{2-} and HCO_3^-.
[59] *Id.*, p. viii.

On December 20, 2016, the EPA published draft guidance to assist states and tribes in setting numeric limits to protect aquatic life from both chronic and acute effects of elevated ionic concentration as measured by specific conductivity in geographic areas beyond the Appalachian ecoregion for which a benchmark had been set in 2011.[60]

This EPA's 2016 Conductivity Criteria Methods draft confirmed that increased specific conductivity was causally related to reduced benthic macroinvertebrate (e.g. aquatic insects) occurrence and that aquatic life criteria should be based on survival of 95 percent of the genera of these lower aquatic biota.[61] Based on analysis of background and criteria in Region 50, Northern Lakes and Forests, applicable to the region of Minnesota where the Minntac Tailings Basin is located, EPA determined that a provisional value to protect aquatic life well-supported by the data would be a specific conductivity limit of 320 µS/cm.[62]

The EPA referenced an evaluation conducted by two retired Minnesota regulators using data from the 1976-1980 Minnesota *Regional Copper-Nickel Study* as well as from more recent state, federal and tribal sources.[63] The Johnson and Johnson (2015) report found that background conductivity in unimpacted northeast Minnesota streams was lower than that of streams in Appalachia measured in the EPA's 2011 benchmark study of Appalachia; that the major ions driving elevated specific conductivity in Minnesota were calcium, magnesium, sulfate and bicarbonates as in the benchmark study ecoregion; and that Minnesota data demonstrated impacts on invertebrate genera from elevated specific conductance in mining impacted waters.[64] The Johnson and Johnson report concluded:

> In the Minnesota ecoregions discussed in this report, discharge of specific conductance above the level of 300 µS/cm, established as guidance for Appalachian streams is highly likely to result in extirpation of 5% or more of invertebrate genera. Such discharge should be prohibited under Minnesota narrative standards preventing degradation and toxic pollution.[65]

The EPA's Office of Research and Development reviewed the Johnson and Johnson (2015) evaluation, using 40,585 MPCA benthic invertebrate and water quality samples,[66] to overcome uncertainty and assess the validity of the Johnsons' findings.[67] EPA validated the conclusions in the Johnson and Johnson (2015) evaluation, stating,

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[60] EPA, *Public Review Draft, Field-Based Methods for Developing Aquatic Life Criteria for Specific Conductivity*, December 2016, pp. xv, 1-1 (EPA 2016 Conductivity Methods) attached as Exhibit 21. EPA's Fact Sheet; December 2016 Responses to 2014 and 2015 Peer Review Comments; and Appendix D: Development of a Background-to-Criterion Regression Model are attached as Exhibits 21A through 21D.
[61] EPA 2016 Conductivity Methods, *supra*, Ex. 21, pp. 2-24 to 2-25.
[62] EPA, Appendix D. Development of a Background-to-Criterion Regression Model, *supra* attached as Exhibit 21D, at p. D-23.
[63] Johnson & Johnson, *An Evaluation of a Field-Based Aquatic Life Benchmark for Specific Conductance in Northeast Minnesota* (November 2015) prepared for WaterLegacy, attached as Exhibit 22 (Johnson and Johnson 2015).
[64] *Id.*, pp. 14, 42.
[65] *Id.*, p. 42.
[66] MPCA Invertebrate and Water Chemistry Data (2015), attached as Exhibit 23, referenced in EPA Minnesota Conductance Review.
[67] EPA, Susan Cormier, Office of Research and Development, Review Memo "An Evaluation of a Field-Based Aquatic Benchmark for Specific Conductance in Northeast Minnesota," Feb. 2, 2016, pp. 2, 6 (EPA's Minnesota Conductance Review"), attached as Exhibit 24.

> Overall, the weight of evidence supports the inference that effluents that increase water body SC [specific conductivity] to more than 300 µS/cm have adverse effects in northeast Minnesota waters. Using effect levels developed in central Appalachia, more than 5% of these shared genera are likely to be extirpated in waters with SC >300 µS/cm.[68]

EPA's Minnesota Conductance Review concluded, that a "benchmark for SC in Ecoregion 50 is not expected to be greater than the benchmark for central Appalachia, i.e. 300 µS/cm."[69] Conducting an analysis of an independent data set of paired benthic invertebrate and SC data from Ecoregion 50 in Minnesota EPA estimated that more than 5% of genera would be extirpated in streams with specific conductivity greater than 320 µS/cm.[70]

The MPCA has determined that Minntac Tailings Basin discharge has the reasonable potential to exceed Minnesota's specific conductance water quality standard for agricultural use of 1,000 µS/cm in SD001 discharge and in Admiral Lake (SW007), Little Sandy Lake (SW005), Timber Creek (SW006), and both sites (SW008 and SW003) on the Dark River.[71] Monitoring by the 1854 Treaty Authority at the outlet from Sandy Lake to Sand River from 2011-2016 showed elevated specific conductance averaging from 435 µS/cm to 616 µS/cm.[72]

The weight of evidence, including the EPA 2011 Conductivity Benchmark Study, the EPA 2016 Conductivity Criteria Methods Draft and Appendix D, the peer-reviewed literature, the Johnson and Johnson (2015) Northeast Minnesota report, the data collected by the MPCA and reviewed by EPA, and the EPA Minnesota Conductance Review all suggest that a limit on specific conductivity would need to be set at less than a third of the 1,000 µS/cm to protect aquatic life in waters receiving discharge from the Minntac Tailings Basin.

Recommendations:

- The MPCA should revise the Minntac Tailings Basin Draft Permit to limit specific conductivity in receiving waters to protect aquatic life as well as agricultural uses.

- To set limits on specific conductivity for Minntac Tailings Basin discharge, the MPCA should use Minnesota data and reports and EPA benchmarks and methods to protect 95 percent of benthic invertebrate genera, with a predicted protective numeric value for specific conductivity for this permit of 320 µS/cm.

- Waters impacted by Minntac Tailing Basin discharge through hydrologically connected groundwater should be evaluated for the reasonable potential to exceed the protective value for specific conductivity, and mitigation of tailings basin concentrations on specific conductivity as well as sulfate should be required in the final permit.

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[68] *Id.*, p. 2.
[69] *Id.*, p. 9.
[70] *Id.*, p.10.
[71] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, pp. 13, 18-10; *see also* MPCA Fact Sheet, *supra*, Ex. 2, pp. 16, 27, 30, 35, 37. Discharge from the seepage violation at SD002 on the east side of the Tailings Basin in June 2015 had a specific conductivity concentration of 2,265, *Id.*, p. 46.
[72] 1854 Treaty Authority Monitoring Report, *supra*, Ex. 8, pp. 34-48.

4. Minnesota's numeric water quality standard for manganese should be applied in compliance with state water quality standards and Clean Water Act protection of drinking water and human health.

Under Section 303 of the Clean Water Act, surface water quality standards are established to protect the use and value of surface waters for public water supplies, among other uses. 33 U.S.C. §1313(c)(2)(A); 40 C.F.R. §131.10(a). An NPDES permit must then include conditions necessary to achieve these water quality standards. 40 C.F.R. §§122.44(d).

Minnesota water quality standards for Class 1B waters apply to surface and underground waters with a moderately high degree of natural protection so that with approved disinfection, water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the EPA. Minn. R. 7050.0221, Subp. 3. EPA's Secondary Drinking Water Standards limit manganese to 50 µg/L.[73]

In addition, the Minnesota Department of Health (MDH) establishes health risk limits for groundwater to protect human health. Minn. Stat. §103H.201. These health risk limits are developed for use in determining whether groundwater should be regulated based on human health concerns. Minn. R. 4717.7810, Subp. 2. The health risk limit for manganese is 100 ug/L. Minn. R. 4717.7500, Subp. 61. The manganese health risk limit was reviewed by the Minnesota Department of Health in 2012, and the 100 µg/L guidance was set to protect the developing brains of formula-fed infants from adverse neurological effects. Manganese levels in drinking water also result in adverse neurological effects to children and adults.[74]

The Minntac Tailings Basin Draft Permit contains no limits on manganese in Class 1 surface waters, namely the trout stream reach of the Dark River downstream of Dark Lake classified as a Class 1B water. The MPCA Fact Sheet for the draft permit identifies two samples of manganese in SD001 discharge, one at 1760 µg/L and one at 1730 µg/L, averaging 1745 µg/L.[75] The MPCA then claims that dilution in the Dark River between SD001 and the Class 1B reach of the Dark River will reduce manganese to 78.97 µg/L, which would not exceed the applicable water quality standard of 50 µg/L.[76]

MPCA's assertion that manganese in the Dark River at SW003 does not have the potential to exceed 50 µg/L is inconsistent with the MPCA's own data on Minntac Tailings Basin seepage of manganese to the Dark River. Although not disclosed in the Fact Sheet, MPCA's prediction that SD001 discharge averaging 1745 µg/L will be diluted to comply with the applicable 50 µg/L standard when it reaches Class 1B waters is based on a striking assumption that the Dark River water diluting the SD001 discharge *contains no manganese at all*. As the MPCA noted in the analysis on which the prediction of compliance was based, "The stream dilution water was

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[73] EPA, Secondary Drinking Water Standards, available at https://www.epa.gov/dwstandardsregulations/secondary-drinking-water-standards-guidance-nuisance-chemicals, last visited Dec. 15, 2016.
[74] MDH, Manganese: Tiered Health Based Guidance for Water, May 2012, attached as Exhibit 25.
[75] MPCA Fact Sheet, *supra*, Ex. 2, p. 31. These two samples, the only ones used in MPCA's analysis, were taken by Minntac within two months of each other, in May and July 2014, as reflected in Minntac SD001 2014 Sampling, attached as Exhibit 26.
[76] MPCA Fact Sheet, *supra*, Ex. 2, p. 31.

assumed to have a concentration of 0 mg/L for all parameters for the purpose of this analysis."[77] However, MPCA's own monitoring data invalidates this assumption.

In 2014, MPCA found surface waters west of the Minntac Tailings Basin, the Dark River (seep origin), had a highly elevated 3160 µg/L concentration of manganese.[78] As previously quoted, the MPCA Fact Sheet admits "pollutants enter the Dark River from the tailings basin via surface flow. . . and groundwater flow that enters the Dark River as baseflow both near the basin and at unknown distances downgradient from the basin."[79] Modeling dilution with Dark River stream waters having no manganese is patently unreasonable.

The Minntac Tailings Basin Draft Permit also contains no limits on manganese in groundwater. While concentrations of manganese in an unimpacted well (GW009) have been from 139 to 167 µg/L, manganese levels in wells impacted by the Minntac Tailings Basin have ranged from 102 µg/L as high as 4558 µg/L.[80] Although MPCA stated in its Fact Sheet "there is little correlation between the concentrations discharged (H) to groundwater and those measured in the downgradient monitoring wells,"[81] no data was provided supporting MPCA's assertion that Minntac Tailings Basin seepage did not cause or contribute to markedly elevated groundwater manganese in wells downgradient from the tailings basin.

The record supports the need to set limits on manganese to protect Class 1B waters of the Dark River and groundwater impacted by Minntac Tailings Basin discharge. Failure to set such limits requires reliance on patently unreasonable assumptions and denial of monitoring results.

Recommendations:

- The MPCA should reassess the reasonable potential of Minntac Tailings Basin discharge from SD001 to exceed the Dark River Class 1B water quality standard (50 µg/L) and health risk limit (100 µg/L) for manganese based on reasonable dilution assumptions reflecting deep seepage of manganese from the tailings basin.

- The MPCA should disclose all available monitoring data and assess the reasonable potential of Minntac Tailings Basin discharge to cause or contribute to an exceedance of the applicable water quality standard and health risk limit for manganese.

5. Compliance mechanisms, including the schedule of compliance, monitoring and toxicity testing proposed for the Minntac Tailings Basin Draft Permit should be revised to provide reasonable assurance that pollution will be controlled and water quality protected.

A. Compliance Schedule Deficiencies

[77] MPCA, Scott Kyser memo to MPCA, Erik Smith, Dark River Class 1 Water Quality Standards, Feb. 5, 2015, p. 2, attached as Exhibit 27.
[78] MPCA, Minntac Parameters – Analytes & Standards Sheets (Mar. 19, 2014), SW Analytes sheet, attached as Exhibit 28.
[79] MPCA Fact Sheet, *supra*, Ex. 2, p. 16
[80] *Id.*, p. 32.
[81] *Id.* Pertinent data, such as the geohydrology of the tailings basin and whether tailings basin parameters are stratified, as well as the manganese monitoring data in groundwater is not provided.

The Minntac Tailings Basin Draft Permit fails to require a compliance mechanism to achieve any attainment of water quality standards by any definite time.

The most definite requirement in the Draft Permit is that a Dark River Seepage Collection and Return System (SCRS), comparable to that installed on the Sand River in 2010, will be operational by December 31, 2017.[82] However, as demonstrated by 1854 Treaty Authority monitoring in Sandy Lake and Little Sandy Lake after construction of the SCRS on the Sand River watershed east side of the Minntac Tailings Basin in 2010,[83] it is virtually certain that the SCRS will not result in compliance of Dark River watershed surface waters with water quality standards. The Draft Permit and Fact Sheet acknowledge that surface seepage returned to the Minntac Tailings Basin will discharge to surface waters through hydrologically connected groundwater.[84] As with the previously installed Sand River SCRS system, the Draft Permit does not require treatment of seepage collected on the Dark River side of the Tailings Basin before that seepage is returned to the Tailing Basin.

The MPCA Fact Sheet states that "MPCA has historically regulated seepage that emerges either from the side of the basin dam, or within the vicinity of the toe of the dam, under federal NPDES guidelines."[85] The MPCA continues,

> The remedy for the impacts to the Dark River from this seepage is to eliminate the discharge (NPDES). Therefore, final compliance with the conditions of the NPDES Compliance Schedule contained within this permit occurs upon implementation of the SCRS and cessation of discharge from identifiable seeps.[86]

Rather than eliminate exceedance of water quality standards in impacted surface water, the requirement of a Dark River SCRS seems to be designed to eliminate Clean Water Act NPDES regulatory accountability by rechanneling "identifiable seeps." The EPA has already criticized this theory in commenting on the 2014 pre-public notice draft permit for the Minntac Tailing Basin, stating that "some of the statements in MPCA's draft fact sheet regarding EPA's interpretation of the scope of the NPDES program are incorrect and should be corrected."[87] As stated previously, in connection with the SCRS system on the Sand River side of the Minntac Tailings Basin, the EPA emphasized three years ago, "To the extent that USS may only be converting the path through which pollutants are discharged to surface water or reducing the volume of the discharge, EPA expects that the discharges will continue to be subject to NPDES permit requirements."[88]

Beyond requiring installation of a collection system to change the path of polluted discharge on the Dark River side of the Minntac Tailings Basin, the Draft Permit's compliance schedule is indefinite, unverifiable and is likely to fail to achieve compliance with surface water quality standards applicable under state law and the federal Clean Water Act or with groundwater standards applicable under Minnesota law.

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[82] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, p. 26.
[83] 1854 Treaty Authority Monitoring Report, *supra*, Ex. 8, discussed at pp. 9-10, 16 of these comments.
[84] See discussion, *supra*, at pp. 5-6 of these comments.
[85] MPCA Fact Sheet, *supra*, Ex. 2, p. 37.
[86] *Id.*
[87] EPA Letter to MPCA (Dec. 19, 2014), p. 1, *supra*, Ex. 7, p. 1
[88] EPA Letter to USACE (May 15, 2013), *supra*, Ex. 4, p. 5.

The proposed compliance schedule includes work plans and study plans intended to result in "concentration of sulfate (as the pollutant of greatest concern and as a surrogate for other dissolved solids) within the tailings basin to 800 mg/L within 5 years of permit issuance, and 357 mg/L within 10 years from permit issuance, or in the shortest reasonable period of time."[89] Although the Draft Permit states that the permittee shall initiate construction or begin implementation of its chosen treatment system no later than 49 months after permit issuance,[90] this requirement does not seem to include achieving specific pollution reductions. The Draft Permit allows modification of the eventual 357 mg/L sulfate concentration limit if approved by MPCA and allows material changes of plans under the compliance schedule upon submittal of the revisions.[91] The Draft Permit implies that neither modification or revision would require public notice and comment on a revised permit.

In addition to its indefinite terms, even if the permittee were to reduce sulfate concentrations in the Tailing Basin to the proposed 357 mg/L eventual limit, compliance with either Minnesota's 250 mg/L groundwater standard or wild rice sulfate standards in hydrologically connected groundwater is poorly substantiated.

The MPCA asserts that its modeling showed that a sulfate limit of 357 mg/L in tailings basin water would allow groundwater to meet a 250 mg/L sulfate limit at the "northeastern site property boundary."[92] However, Minnesota rules protect *all* underground waters from pollution, not just those at a certain property boundary. Minn. R. 7060.0400. The assumption made in MPCA modeling that tailings basin sulfate concentrations would be diluted by groundwater beneath the Minntac Tailings Basin is also demonstrably unreasonable. Sulfate concentrations in groundwater wells impacted by Tailings Basin seepage (GW001, GW002, GW003, GW004, GW005, GW006, GW007, GW008) range from an average sulfate concentration of 486 mg/L to 795 mg/L, with maximum sulfate concentrations as high as 1090 mg/L.[93]

Further, although the use of sulfate as a surrogate for all pollutants is attractive in its simplicity, neither the Fact Sheet nor the Draft Permit establishes that methods to decrease sulfate in the Minntac Tailings Basin would necessarily bring other parameters of concern discharged to hydrologically connected surface waters into compliance. Levels of hardness, bicarbonates, chlorides, total dissolved salts and specific conductance may not decline to meet standards even if sulfate concentrations are reduced.

Continuing a decades-old pattern, the Minntac Tailings Basin Draft Permit does not provide an enforceable mechanism for tailings basin pollution reduction. The MPCA has struggled for at least 15 years with various schedules of compliance to secure water quality treatment and changes in wet scrubber air pollution controls to mitigate impacts of Minntac Tailings Basin pollution. MPCA's Fact Sheet states:

> The Permittee has already conducted significant site investigation and research into treatment and remedial technologies under a series of SOCs since 2001. It is difficult to

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[89] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, pp. 22 at 1.1, 24 at 1.12.
[90] *Id.*, p. 26 at 1.21.
[91] *Id.*, p. 24 at 1.12 and 1.13b; p. 27 at 2.5.
[92] MPCA Fact Sheet, *supra,* Ex. 2, p. 36. The modeling assumptions resulting in this conclusion are not specified.
[93] MPCA, Minntac Parameters – Analytes and Standards, *supra*, Ex. 28, Sheet 1(3).

> schedule a timeframe for implementation of a remedy when the nature and scale is unknown.[94]
>
> In March 2009 USS submitted an NPDES Permit Application that included plans to construct a 7000 gallon per minute Process Water Treatment System (PWTS), in part to satisfy a 2008 Stipulation Agreement for line 3 hardness issues. USS predicted the PWTS would lower the basin sulfate concentration from 900 to 350 mg/L in one permit cycle. USS then requested MPCA not act on the application while it investigated refinements to the proposed PWTS. Instead, USS proposed replacement of wet emissions scrubbers on the pelletizing furnaces with dry controls. This would remove a significant source of pollutants to the basin (as well as reduce air emissions) and was forecast to lower the basin sulfate concentration to 476 mg/L within 20 years. The phased installation of dry controls, beginning with line 6, was included in a June 9, 2011, Schedule of Compliance (SOC). In 2015, USS informed MPCA it did not intend to install dry controls.[95]

The Fact Sheet details multiple violations found in the most recent compliance inspection of Minntac Tailings Basin five years ago, including violations of limits on the mass of sulfate deposited in the tailings basin (57,558 pounds net increase) and violations of hardness deposited in the tailings basin (741,468 pounds net increase).[96] The long history of Minntac violations of schedules of compliance to limit sulfate and hardness deposited in the tailings basin are well-documented.[97] Minntac also directly discharged wastewater to the Sand River watershed in June 2015 (from SD002), resulting in a modest administrative fine for this violation.[98]

Minntac's failure to follow through on commitments to reduce pollution is summarized in a recent letter from MPCA Commissioner John Linc Stine to Iron Range legislators:

> Since the early 2000's, the MPCA and US Steel have developed various mitigation efforts. These were agreed to by US Steel, pursued and then changed or dropped by US Steel. Most recently, after proposing a membrane-based water treatment system to treat tailings basin water, US Steel approached the Agency with a proposal to make reductions in both air and water pollutants by replacing the current wet air emissions controls with dry air emissions controls. This proposal was predicted to improve water quality in the tailings basin at a slower pace than the membrane treatment system, but due to the added air quality benefits, the Agency agreed to this path in a 2011 Schedule of Compliance (which US Steel signed).
>
> US Steel officially notified me of their decision to ignore their signed commitment to add the dry controls. The Agency requested, on more than one occasion, that US Steel propose an alternative that would result in equivalent environmental benefits within the same timeframe. The company's suggestions have been unresponsive and have not met those criteria.[99]

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[94] MPCA Fact Sheet, *supra*, Ex. 2, p. 37.
[95] *Id.*, p. 6.
[96] *Id.*, p. 20.
[97] MPCA, Compliance Status Minntac Tailings Basin (2010), attached as Exhibit 29.
[98] MPCA, Enforcement Action - Administrative Penalty Order $4,800, NPDES/SDS Permit No. MN0057207 (Mar, 1, 2016), attached as Exhibit 30. Note discharge concentrations in MPCA Fact Sheet, *supra*, Ex. 2 at p. 46.
[99] MPCA, Commissioner John Linc Stine letter to Iron Range Legislators, Nov. 15, 2016, attached as Exhibit 31.

Minntac's long-standing violations of schedules of compliance and failures to follow through on commitments to replace wet scrubbers and construct a water treatment system underscore the need for clear and enforceable requirements to reduce the tailings basin's discharge to groundwater that the MPCA agrees "has caused and is causing waters of the state (groundwater and surface water) to exceed applicable water quality criteria and numeric standards."[100] A mechanism for compliance based on reductions in Minntac Tailings Basin concentrations must be more comprehensive, specific and definite.

Recommendations:

- The final Minntac Tailings Basin Permit should include concentration limits on all tailings basin pollutants with the reasonable potential to exceed numeric and narrative surface water standards in groundwater and hydrologically connected surface water -- hardness, bicarbonates, chlorides, total dissolved salts, specific conductance and potentially manganese as well as sulfates.

- Final Minntac Tailings Basin Permit concentration limits for each parameter should be modeled based on realistic dilution given the existing levels of the parameter in tailings basin impacted groundwater.

- The final Minntac Tailings Basin Permit should set a date certain for each tailings basin concentration limit so that both interim and final limits must be met at the shortest reasonable time, not to exceed a specific identified date, stated so that the failure to attain the concentration limit is a permit violation.

- The final Minntac Tailings Basin Permit should include a provision stating that any revisions of permit limits, timing or other requirements shall require public notice and comment.

B. Inadequate Monitoring

The monitoring proposed in the Minntac Tailings Basin Draft Permit is inadequate to identify future direct discharge from tailings basin perimeter seepage to surface waters. The Draft Permit also provides insufficient monitoring to evaluate whether the proposed mechanism for compliance – reduction of concentrations of parameters in the Minntac Tailings Basin – is sufficient to result in compliance with water quality standards in impacted surface waters and groundwater.

The existing NPDES/SDS permit for the Minntac Tailings Basin requires monitoring at SD002, the direct surface discharge site on the east side of the tailings basin.[101] The Draft Permit proposes to remove this requirement,[102] despite clear evidence that the installation of a seepage collection and return system (SCRS) in 2010 hasn't obviated the need to monitor tailings perimeter surface seepage.

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[100] MPCA Fact Sheet, *supra*, Ex. 2. p. 35
[101] *Id.*, pp. 25, 46.
[102] See Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, pp. 10-21, no listing as monitoring location, no limits.

The MPCA's Fact Sheet discloses that there was discharge from the SD002 surface discharge point in June 2015 long after the SCRS system was operational.[103] This violation, which resulted in an MPCA enforcement action and Administrative Penalty Order,[104] would not have been detected if monitoring of SD002 had ceased.

The MPCA's Fact Sheet also acknowledges in discussing both SD002 on the Sand River side and SD001 on the Dark River side of the Minntac Tailings Basin that there are areas of unmonitored tailings basin surface seepage: "Air photos and seepage surveys by USS [permittee U.S. Steel] indicate that there are other areas of shallow seepage that do not report to the monitoring station."[105]

Comments from the Great Lakes Fish and Wildlife Commission (GLIFWC) on the December 2014 pre-public notice draft permit for the Minntac Tailings Basin emphasized that there are "many waters surrounding the basin" that meet the criteria set by the MPCA to require NPDES permit controls,[106] namely "seepage points along the exterior toe of the outer basin dykes" which "create ponded features with measurable flow" that would be subject to NPDES requirements.[107] GLIFWC's comments supplied MPCA with a Google Earth photo of a seep from the Tailings Basin just south of SD002 connected to Admiral Lake, noting that "other areas of ponded water at the toe of the basin are too numerous to list but are visible in aerial photos of the site. Most of these ponded areas are connected by visible channels to waters of the state and the U.S."[108]

Despite clear evidence of surface seepage and the MPCA's assertion that the Agency would regulate all such seepage under NPDES permit controls, the Minntac Tailings Basin Draft Permit requires neither identification nor monitoring of any ponded or measurable surface seepage at any location other than SD001, the existing discharge site on the Dark River side of the tailings basin.[109]

Minnesota Rules require effluent monitoring for multiple parameters (including biochemical oxygen demand, chemical oxygen demand, total organic carbon, nitrogen, chloride, sulfate, surfactants, bicarbonates, salinity, total dissolved solids, specific conductance, and a wide range of metals) as a condition for permit reissuance for an existing mining discharger. Minn. R. 7001.1060, Subp. 1. The Minntac Tailings Basin Draft Permit only applies this requirement at SD001 or the nearest downstream monitoring point on the Dark River and to a single sample that the permittee deems representative of the recirculating tailings pool water.[110] No similar broad analytical data is required at any site reflecting impacted surface waters on the east side of the Tailings Basin (Admiral Lake, Sandy Lake, Little Sandy Lake, Sand River) or in any location where effluent is discharged to groundwater.

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[103] MPCA Fact Sheet, *supra*, Ex. 2, p. 46.
[104] MPCA Enforcement Action Mar. 1, 2016, *supra*, Ex. 30.
[105] MPCA Fact Sheet, *supra*, Ex. 2, p. 11.
[106] GLIFWC, John Coleman email to MPCA, Suzanne Baumann re Pre-public notice review: US Steel Minntac tailings basin draft water permit reissuance, Dec. 19, 2014 and associated photo, p. 1, attached as Exhibit 32.
[107] *Id.*, referencing MPCA Draft Fact Sheet 2014, *supra*, Ex. 6, p.7. See also MPCA Fact Sheet, *supra*, Ex. 2, p. 7, "MPCA has regulated under NPDES permits all seepage that emerges either from the side of the basin dam, or within the vicinity of the toe of the dam, that creates surface flow or ponded features that would not exist in the absence of the tailings basin. That practice will continue under this permit."
[108] GLIFWC Review of Minntac pre-public notice draft permit, *supra*, Ex. 32, p. 1 and photo at p. 3.
[109] *See* Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, p. 8, monitoring sites.
[110] *Id.*, p. 31.

Finally, although the Draft Permit proposes that reduction in Minntac Tailings Basin concentrations will result in compliance with both surface water and groundwater standards, the monitoring proposed to evaluate the fate and transport of Tailings Basin pollutants is inadequate. Despite decades of failed schedules of compliance, rather than requiring a rigorous monitoring plan as a permit condition open to public and federal scrutiny, the Draft Permit suggests that the permittee will devise its own field data collection and analysis plan once a permit has already been issued.[111] The Draft Permit fails to specify the number, locations, or types of groundwater and surface water monitoring sites needed to evaluate Minntac Tailings Basin discharge impacts.

Recommendations:

- The final Minntac Tailings Basin Permit should retain monitoring at SD002 or the nearest measurable flow of surface seepage, and should require monitoring at multiple additional surface seepage points along the perimeter and in the vicinity of the toe of the dam to represent surface discharge on all sides of the Tailings Basin.

- The final Minntac Tailings Basin Permit should require collection of analytic data on the full range of effluent parameters required for permit reissuance[112] at several representative locations where effluent may discharge to surface waters and groundwater, which locations should be identified in the Permit.

- The final Minntac Tailings Basin Permit should require installation of multiple nested wells along the perimeter of the tailings basin (estimate of 30-40 additional wells) to assess background condition, fate and transport of Tailings Basin pollutants and the efficacy of mitigating tailings basin concentrations to achieve compliance with standards applicable to impacted surface and groundwater.[113]

C. Insufficient Evaluation and Testing of Toxicity

Neither the Minntac Tailings Basin Draft Permit nor the MPCA Fact Sheet accompanying the Draft Permit discusses whether Minntac chemical additives may be toxic to aquatic life.

U.S. Steel's 2011 Application for an NPDES/SDS permit provided a comprehensive analytical summary of water quality results for SD001.[114] Reliance on this testing data to reissue a permit is problematic. Since NPDES permits expire every five years, the regulatory regime does not contemplate reliance on data that is five or more years old. The MPCA Fact Sheet cites no current analytical results and provides no demonstration that Minntac processes and production have remained unchanged for the past five years.

In fact, the chemical products in use identified by U.S. Steel in its 2011 application do not appear to be similar either in composition or in usage rates to the millions of pounds per year of various

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[111] *Id.*, p. 23.
[112] See Minn. R. 7001.1060, Subp. 1 and parameters proposed to be monitored at SD001 for permit reissuance in the Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, p. 28.
[113] The MPCA Fact Sheet, *supra*, Ex. 2 notes at p. 37, "it is currently impossible to predict the time to compliance for a specific water body."
[114] U.S. Steel Corp. Minntac Tailings Basin NPDES/SDS Permit Application, Permit #MN0057207 (December 2011), Appendix B, autop. 57-61, attached as Exhibit 33.

flocculants and flotation reagents identified in the Draft Permit.[115] No information is provided in the MPCA Fact Sheet or the Draft Permit regarding potential aquatic toxicity of any of the chemical additives identified in the Draft Permit.

The Minntac Tailings Basin Draft Permit does not set a limit for whole effluent toxicity (WET) of Minntac Tailings Basin discharge,[116] so findings of toxicity to aquatic life would result in no permit violation or requirement for action.

WET testing results may also be affected by significant dilution. The only WET testing required on the Sand River side of the tailings basin would be done at SW005, a surface water sampling site on Little Sandy Lake, more than a mile from the Minntac Tailings Basin.[117] Should there be insufficient flow in SD001 for chronic toxicity testing, rather than requiring testing of effluent at the nearest location with sufficient surface flow for testing, the Draft Permit authorizes WET testing at the "next active downstream monitoring location."[118]

The methods proposed for whole effluent testing of Minntac Tailings Basin effluent are also insufficient to ascertain whether major anions and major cations and resulting elevated conductance in tailings basin discharge are toxic to aquatic life. The two organisms proposed for each test battery are the fathead minnow and Ceriodaphnia dubia, a water flea.[119] There is substantial peer-reviewed research suggesting that C. dubia is less sensitive to mining discharge and elevated specific conductance than invertebrates such as mayflies, stoneflies, and caddisflies (i.e., Ephemeroptera, Plecoptera, Trichoptera taxa),[120] which taxa are present in unimpacted Minnesota streams and are affected by elevated specific conductivity in Minnesota mining-impacted streams.[121] Toxicity testing conducted with C. dubia alone is likely to underrepresent the sensitivity of species present in receiving waters for Minntac Tailings Basin discharge.

Recommendations:

- Comprehensive analytic data on existing Minntac Tailings Basin effluent (Minn. R. 7001.0160) should be updated prior to issuance of the final Minntac Tailings Basin Permit.

- The final Minntac Tailings Basin Permit should reconcile and disclose the chemical composition, volume and aquatic toxicity of process additives, including flocculants and flotation reagents, the use of which is implicitly authorized in the permit.

- The final Minntac Tailings Basin Permit should set a whole effluent toxicity limit of 1.0, require toxicity testing of undiluted effluent from both the east and the west sides of the tailings basin and conduct testing using at least one invertebrate species in

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[115] Compare U.S. Steel Minntac 2011 Application, *supra*, Ex. 33, Appendix C-1 Minntac Chemical Products in Use and Approved Usage Rates autop. 63-64 with Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, p. 4.
[116] Minntac Tailings Basin Draft Permit, *supra*, Ex. 1, p. 33
[117] *Id.*, p. 33. Location of SW005 mapped *Id.*, p. 8.
[118] *Id.*, p 33. Location of the first monitoring location for the Dark River (SW008) mapped *Id.*, p. 8.
[119] *Id.*, p. 33.
[120] See, e.g. Kuntz et al., "Use of Reconstituted Waters to Evaluate Effects of Elevated Major Ions Associated with Mountaintop Coal Mining," *Env. Toxicol & Chem*, Vol. 32, No. 12, pp. 2833-34, attached as Exhibit 34. See also EPA 2011 Conductivity Benchmark, *supra*, Ex. 20, p. 2; EPA 2016 Conductivity Methods, *supra*, Ex. 21, pp. 2, 17, A-12 to A-13.
[121] Johnson & Johnson (2015), *supra*, pp. 10, 21-23, 25-29, 39-41.

Minnesota ecoregion streams known to be sensitive to conductivity and the major anions and cations in Minntac Tailing Basin discharge.

6. Monitoring and pollution reduction mechanisms in the Minntac Tailings Basin Draft Permit should be revised to reflect impacts of excessive sulfate discharge on mercury methylation and phosphorus release from sediments.

WaterLegacy is dismayed that neither the Minntac Tailings Basin Draft Permit nor the MPCA's accompanying Fact Sheet consider the effects of excessive sulfate discharge from the Minntac Tailings Basin on mercury methylation and resulting bioaccumulation or on phosphorus release and resulting eutrophication and turbidity. MPCA, thus, fails to consider that excessive sulfate from the Minntac Tailings Basin may be contributing to downstream impairments of water for aquatic life and the health of humans and wildlife consuming mercury contaminated fish.

MPCA's Fact Sheet acknowledges a plethora of impaired waters downstream of the Minntac Tailings Basin. Two reaches of the Sturgeon River, seven reaches of the Little Fork River, seven reaches of the Rainy River and a portion of the main lake of Lake of the Woods near the border with Canada are impaired due to mercury in fish tissue. Known impairments of Minntac Tailings Basin downstream waters also include four reaches of the Little Fork River impaired for turbidity and two reaches of the main lake of Lake of the Woods impaired for eutrophication.[122] The sole response to these impairments in the MPCA Fact Sheet is a statement that no waste load allocations have been set for Minntac tailings discharge.[123] The Minntac Tailings Basin Draft Permit doesn't even mention impairments of downstream receiving waters.

For at least ten years, the MPCA has recognized that excessive sulfate loading can increase methylmercury production and phosphorus mobilization, affecting impairments of state waters due to methylmercury in fish tissue and excessive nutrients.[124] In high-risk situations including areas where discharge impacts wetlands, lakes with organic sediment, rivers with slow-moving back waters, streams with fluctuating water levels and bordering wetlands, thermally stratified lakes or impoundments or low-sulfate waters (background below 40 parts per million), the MPCA recommended steps be taken in NPDES permitting to prevent impairments of downstream waters. These steps included: considering monitoring for methylmercury, reactive phosphorus and total phosphorus in effluent and/or receiving waters; evaluating treatment technologies and pollution prevention opportunities; and specifically working with MPCA mercury scientists to respond to the environmental risk from sulfate discharges.[125] MPCA also planned to develop more specific procedures by 2007 for NPDES permitting to address effects of elevated sulfate on methylmercury production and phosphorus availability.[126]

In the intervening ten years, the MPCA has failed to develop more specific procedures for NPDES permits to address elevated sulfate discharge. For the Minntac Tailings Basin Draft

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[122] MPCA Fact Sheet, *supra*, Ex. 2, p. 23.
[123] *Id.*
[124] MPCA, Strategy to Address Indirect Effects of Elevated Sulfate on Methylmercury Production and Phosphorus Availability, Oct. 19, 2006, pp. 1, 6-7, attached as Exhibit 35.
[125] *Id.*, p. 3.
[126] *Id.*, pp. 3-4.

Permit, the MPCA declined even to take the interim preliminary steps recommended in 2006 to protect downstream waters from impairment due to mercury methylation and bioaccumulation and phosphorus release from sediments.

The threat of excessive sulfate from the Minntac Tailings Basin to aquatic life, wildlife, human health and environmental justice highlights the need to revise the Draft Permit as specified in the five preceding sections of these comments. In addition, at a very minimum, the MPCA should follow through on its 2006 strategies to protect downstream waters of the state, waters of the United States, treaty resources of Bands of the Lake Superior Chippewa,[127] and potentially impacted international waters.

Recommendations:

- The final Minntac Tailings Basin Permit and Fact Sheet should include a comprehensive analysis of the multiple factors in receiving waters that make discharge of elevated sulfate to the Sand River and Dark River sub-watersheds and the Little Fork River and Rainy River watersheds a high-risk situation for mercury in fish tissue, eutrophication and turbidity impairments.

- The final Minntac Tailings Basin Permit should require monitoring for methylmercury, reactive phosphorus and total phosphorus in both effluent and receiving waters, with similar monitoring in unimpacted background waters.

- The final Fact Sheet and Minntac Tailings Basin Permit schedule of compliance should discuss whether proposed treatment technologies and pollution reduction requirements are appropriate and sufficient to reduce risks of mercury methylation and phosphorus release from sediments affecting receiving waters.

WaterLegacy has appreciated the chance to comment on the Minntac Tailings Basin Draft Permit. We would welcome the opportunity to discuss the issues raised and recommendations made in our comments, and we look forward to revisions of the Minntac Tailings Basin Permit to fully comply with applicable law and protect the beneficial uses of Minnesota waters.

Respectfully yours,

Paula Goodman Maccabee
Counsel/Advocacy Director for WaterLegacy

Exhibits Enclosed

cc: Barbara Wester, U.S. EPA Region 5 (with exhibits)

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[127] *See* Grand Portage and Fond du Lac Bands of Lake Superior Chippewa, Comments on pre-public notice draft for Minntac Tailings Basin Permit MN0057207, Dec. 19, 2014, p. 2, attached as Exhibit 36.

1854 Treaty Authority

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December 22, 2016

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Rd. North
St. Paul, MN 55155

Re: Public notice for U.S. Steel Minntac tailings basin National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) Permit MN0057207

Dear Mr. Smith,

The 1854 Treaty Authority would like to provide comments on the draft NPDES/SDS permit and fact sheet for the U.S. Steel Minntac tailings basin water permit reissuance. The 1854 Treaty Authority is an inter-tribal resource management agency governed by the Bois Forte Band of Chippewa and Grand Portage Band of Lake Superior Chippewa. The organization is charged to preserve, protect, and enhance treaty rights and resources in the 1854 Ceded Territory. The 1854 Treaty Authority submits these comments with the understanding that each band may submit comments on their own behalf.

It is our understanding that the current permit for the facility expired in 1992. Over the past approximately twelve years, we have remained interested and engaged in the process to update the permit to come into compliance with applicable water quality standards. Of primary interest to us are impacts to the resources of the 1854 Ceded Territory where the exercise of treaty rights occurs. Sandy and Little Sandy lakes (Twin Lakes) are located immediately downstream of the Minntac tailings basin. These lakes historically contained good wild rice crops, and were utilized by both tribal and non-tribal rice harvesters. Since the tailings basin began operations in the late 1960s, wild rice abundance has significantly declined in the lakes and only some individual plants have been found in recent surveys. Discharges from the tailings basin have likely impacted the lakes due to changes in water quality (sulfate and other constituents) and perhaps water quantity.

In addition to impacting the Twin Lakes, it should be noted that the Sand River system ultimately drains into Pike Bay of Lake Vermilion through the Pike River. This is an important fishery to the Bois Forte Band with high consumption rates of fish from this portion of the lake. Sulfate is thought to play a role in methylation of mercury, which may be a health concern for populations consuming diets high in fish.

The largest issue that stands out in reviewing the documents is the proposed schedule of compliance. The draft permit essentially talks about more evaluation, and little detail or timelines

are provided for implementation of activities and ultimately compliance with water quality standards. The schedule includes:

- Investigation Workplan (30 days after permit)
- Basin Treatment Methods Study Plan (within 13 months of permit issuance)
- Deep Seepage Final Compliance Plan (within 25 months of permit issuance)
- Final Plans and Specifications (within 37 months of permit issuance)
- begin to implement the mitigation plan and/or initiate construction (within 49 months of permit issuance)

A schedule of compliance should outline a period of time to comply with water quality standards, but the proposed timeline does not accomplish this. The draft permit indicates that the permittee (not MPCA as the regulating agency) is to specify by month 37 the dates by which final compliance limits will be met for all pollutants and how those limits will be met. Presumably, this would be a combination of further lowering basin pollutants and treatment technologies. Adding to the uncertainty of the permit, *beginning* implementation or *initiating* construction of any necessary water treatment within 49 months are not specific endpoints with a completion date. More detail and explicit outcomes (specific actions, compliance limits, completion dates, etc.) are needed in the permit and schedule of compliance. Other schedules of compliance (with revisions and extensions) have been in place at the facility for many years to further evaluate issues and determine solutions. The draft permit appears do to more of the same, lacking any "teeth" for implementation of strategies to comply with water quality standards. The proposed schedule begs the question if appropriate permitting will be any further ahead in five years or even in ten years, and the timeline for compliance continues to be unknown. Issues have been ongoing for decades and it is time to act and comply with standards.

The purpose of the additional evaluation is to identify feasible technologies for non-mechanical or mechanical treatment to reduce the concentration of sulfate within the tailings basin to 800 mg/L within five years of permit issuance, and 357 mg/L within ten years from permit issuance, or in the shortest reasonable period of time. However, this would only meet the sulfate drinking water standard (250 mg/L) at the property boundaries and does not address the existing wild rice sulfate standard (10 mg/L). Further, the language ("or in the shortest reasonable time") implies that ten years is not a hard deadline to meet this sulfate threshold in the tailings basin and it may be even longer. The proposed schedule of compliance does not get the facility in compliance with water quality standards.

No matter how discharge is defined, a discharge is occurring to both the Sand River and Dark River sides of the tailings basin. We disagree with the MPCA determination that seepage discharges are not subjected to NPDES permit requirements. It is acknowledged that seepage is occurring and causing exceedances of water quality standards in surface water and groundwater in a broad area surrounding the basin, but the draft permit does not address this discharge especially in relation to wild rice. On the Sand River side, wild rice has essentially been lost in the Twin Lakes as previously mentioned. The seep collection system installed in 2010 has not effectively stopped all discharges, with elevated levels of several constituents (hardness, total dissolved solids, specific conductance, sulfate) demonstrated in the system. Under a cooperative project between the Bois Forte Band and U.S. Steel, a monitoring program occurred in the Twin Lakes from 2010-2014. The 1854 Treaty Authority conducted the work on behalf of the Bois Forte Band under this agreement through 2014, and has continued monitoring work in 2015-

2016 on its own initiative when the cooperative project was not continued. A primary focus of the monitoring was to document water quality, with monthly sampling occurring May through October each year 2010-2014, and bimonthly (June, August, October) in that period in 2015-2016. A sampling point at the Sand River inlet to Little Sandy Lake is identified as Twin1. Average sulfate concentrations from this sampling, with ranges in parentheses, for each year at Twin1 are listed below:

- 483 mg/L (360-661) in 2010
- 357 mg/L (208-561) in 2011
- 207 mg/L (137-275) in 2012
- 355 mg/L (215-650) in 2013
- 301 mg/L (180-419) in 2014
- 460 mg/L (386-590) in 2015
- 289 mg/L (217-347) in 2016

A report entitled "Sandy Lake and Little Sandy Lake Monitoring (2010-2016)" has been shared with the MPCA and summarizes all monitoring information.

The sulfate levels in the Twin Lakes are elevated from the Minnesota water quality standard of *"10 mg/L, applicable to water used for production of wild rice during periods when the rice may be susceptible to damage by high sulfate levels"* (Minnesota Rules, part 7050.0224, subp. 2). The approach of the draft permit is to ignore this existing standard (a potential violation of the Clean Water Act), and deal with it if/when revisions to the standard are completed. The permit states that "if rulemaking designates any water body downstream from the tailings basin as a water to which the wild rice beneficial use applies, the Permittee shall submit an application for permit modification to conduct a reasonable potential analysis and incorporate any necessary effluent limit(s) to protect wild rice within 90 days of the rule being filed with the Secretary of State." Besides disregarding the existing standard, the permit calls for more evaluation and no timeline for compliance even when a revised standard is in place. The MPCA has made a preliminary determination that the wild rice standard will apply in the Twin Lakes (at the inlet to Little Sandy Lake), so the permit should address this water quality standard.

The draft permit includes limits and monitoring requirements in an interim period, which will be ongoing and is not defined since the schedule of compliance includes no date. In this indefinite period, no limits are imposed for sulfate and many other parameters and only monitoring is required. Limits and monitoring requirements in a final period, presumably if compliance with water quality standards is attained, are also not defined with a date. Surface water monitoring point SW001 (Sand River at Highway 53) includes monitoring only for sulfate. We would like to note that wild rice is found downstream of this point, and the sulfate water quality standard should apply. It is our understanding that this will theoretically be met if the upstream point SW005 (Sand River inlet to Little Sandy Lake) is in compliance with this standard. However, although the draft permit includes monitoring for sulfate at SW005 in the interim period, it does not include any mention of sulfate (a limit or monitoring only) at SW005 in the final period. This point, or even further upstream at SW007 at Admiral Lake, should be the point of compliance. Once again, the permit must address the wild rice water quality standard, and the concern is when or if compliance will occur given the lack of detail in the schedule of compliance.

To satisfy a Special Condition under a United States Army Corps of Engineers Wetland Permit (2011-00823-JCB), U.S. Steel must complete and implement a Twin Lakes Wild Rice Restoration Opportunities Plan. The permit states that the plan shall include: "The development of a five-year wild rice restoration and monitoring program for those areas of the Twin Lakes that show the greatest potential for restoration based on best information available in the time frame allowed for submitting its report." The first full year of the project was completed in 2014, and U.S. Steel submits annual reports summarizing activities to the Army Corps. Actions are needed in the Twin Lakes to restore conditions (water quality, sediment quality, water depth, etc.) favorable for wild rice growth. The restoration work should meet the requirements and intent outlined in the Army Corps permit, with the goal to restore wild rice in the Twin Lakes. However, the draft MPCA permit does not address or support this restoration work, specifically water quality and quantity requirements in relation to wild rice.

On the Dark River side of the tailings basin, the draft permit makes no mention of wild rice. However, wild rice has been reported in Dark Lake and the information has been previously shared with MPCA. Wild rice was identified in Dark Lake on 7/30/2012 during a survey by the Minnesota Biological Survey. Field crews from the University of Minnesota also identified wild rice during visits on 7/10/2013 and 9/5/2013. Under an effort coordinated by the Great Lakes Indian Fish & Wildlife Commission, wild rice was observed on 7/31/2016 and photos are available. The Minnesota Department of Natural Resources maintains a list of wild rice waters in the state, and Dark Lake has been included. Since Dark Lake supports wild rice, the appropriate sulfate standard should apply. The draft permit includes a surface water monitoring point SW003 (Dark River at County Road 668) upstream of Dark Lake with a final compliance level of 525 mg/L sulfate. This will not allow for compliance with the wild rice standard in Dark Lake, and we suggest that a compliance point for sulfate in the Dark River at its entrance to Dark Lake should apply.

The exercise of treaty rights is guaranteed by agreement with the United States. The federal government and its agencies have a trust responsibility to protect these rights and the resources on which they are based. Although the USEPA has delegated a NPDES water quality program to the MPCA, the USEPA retains oversight and still maintains its trust responsibility to the bands. This and other industrial projects can have significant impacts on treaty rights and related resources, and we will continue to look towards federal and state regulators to ensure compliance with environmental standards.

Thank you.

Sincerely,

Darren Vogt

Darren Vogt
Environmental Director

CC: Kevin Pierard, Krista McKim – USEPA

From Great Lakes Indian Fish & Wildlife Commission

Below are preliminary comments related to the draft permit. They are similar, but not identical, to the comments we submitted December 2014. Since that time, additional information has become available that casts further doubt on the PCA's approach to this permit.

1) Inconsistent identification of waters subject to NPDES permitting:

The PCA "fact sheet" identifies "ponded features" as subject to a NPDES permit (pg.7). Yet there are surface waters surrounding the basin that fit this description and are not proposed for regulation under a NPDES permit. For example:

a) a seep is circled in the attached aerial photo just to the south of SD002 that has a connection to Admiral Lake by a continuous channel visible in Google Earth. Additional ponded features touching the basin berm and stream channels leading from those "ponded features" are visible in attached aerial photos from 2015 (Basin_and_Sand_River_2015-08-13a&b.jpg) and 2013 (Basin_and_Sand_River_2013-05-22a&b.jpg)

b) seepage at SD002 is incompletely captured and escaped seepage is visible in the attached Google Earth photos. The pool at the foot of the berm appears to be receiving direct discharge from the "capture" system (Basin_and_Sand_River_2013-05-22a&b).

c) other areas of ponded water at the toe of the basin are too numerous to list but are visible in aerial photos of the site. Most of these ponded areas are connected by visible channels to waters of the state and the U.S. In particular, near-basin ponded areas are connected to the Sand River by visible stream channels (Basin_and_Sand_River_2015-08-13a&b.jpg).

d) the ponded feature abutting the berm withing a few feet of the capture system but outside the capture system (Basin_and_Sand_River_2013-05-22b.jpg) and the discolored ponded waters within 100 feet of the basin berm (Basin_and_Sand_River_2015-08-13b.jpg) are particularly troubling and must not be ignored.

2) Distinction between "Discharge(H)" and "Discharge(NPDES-CWA)" in order to avoid NPDES permitting for the basin's east side discharges is unsupported by the facts:

The logical gymnastics used in pages 7 and 8 of the fact sheet to justify not requiring a NPDES permit for the discharges from the basin's east side are difficult to follow and do not appear to be supported by the facts available. The CWA applies to water of the U.S. which include waters connected to navigable waters and wetlands connected to other waters the U.S. At the toe of the basins there are many wetlands, ponds and channels that are receiving water from the basin through the berm. It is difficult to find a rational for regulating some of the water passing through the berm (i.e. SD001) with a NPDES permit, yet not regulating other water that passes through the berm in an identical manner (e.g. uncaptured seepage at SD002 and seepage at other points along the toe that forms ponded features and stream channels).

3) Seepage emerging near the toe of the basin does not travel as "deep seepage":

The concept, proposed in the "fact sheet", that deep seepage travels substantial distances underground to receiving waters such as the Twin Lakes may have some validity, yet does nothing to address the fact that much seepage never travels any significant distance through the underlying aquifer but discharges to surface waters immediately adjacent to the basin berm and is not captured. Why would basin water remain trapped below the land surface in the relatively thin (<50 ft thick) surficial aquifer and travel to distant surface water features? Head pressures and the path of least resistance would quickly drive the water to the land surface where it can flow easily as surface water. The state recognizes that "basin-impacted groundwater is currently reaching surface waters and having an impact on those surface waters" (fact sheet pg.38), yet maintains the tenet that the

water travels over extensive distance before discharging to surface waters and therefore the discharge is not covered by the CWA. That tenet is not supported by observation or basic hydrogeology.

Furthermore, the "fact sheet" seems to imply that there is a deep reservoir of groundwater that the basin seepage water joins on it's path to Admiral Lake. Such a scenario is exceedingly unlikely. The basin sits on relatively shallow glacial material (0 to 50 feet) from which the head pressure of the basin has long ago displaced naturally occurring groundwater. This is supported in the "fact sheet" by a description of the elevated head created by the basin on page 11. Because of the high heads in the basin compared to the surrounding aquifer, any reasonable modeling of groundwater flow will show that virtually all the water in the aquifer in the vicinity of the basin has its origin in the tailings basin and is flowing from the basin to nearby receiving waters such as the headwater of the Sand River, Admiral Lake and the shallow ponds adjacent to the basin berm. The factual information on site hydrogeology in the "fact sheet" page 11 supports this. The "fact sheet" states "considerable emergent flow at and near the base of the dams is expected and has been observed". It is clear from the "fact sheet", from aerial photographs, from water quality measures and from basic concepts of hydrology, that basin water is emerging adjacent and in close proximity to the basin dam, ponding and then flowing in channels to headwaters of the Sand River and into Admiral Lake.

4) The draft permit overlooks existing water quality standards for the Sand River watershed:

The Fact Sheet clearly states that the tailings basin is causing an exceedance in downstream water quality standards (Fact Sheet: pg.17, pg.35), yet the draft permit ignores the current 10 mg/L surface water standard in the Twin Lakes. The exceedance of the 10 mg/L sulfate standard is extremely well documented, has been occurring for many years and has not been remedied by the attempted capture of seepage at SD002. While the draft permit considers some of the water quality standards in the Dark River when setting compliance goals for water quality in the tailings basin, it ignores the water quality standards in the Sand River and Twin Lakes. The permit and compliance schedule is written as if there is no existing sulfate wild rice standard nor any identified wild rice waters downstream of the basin. Neither of these is the case. The Fact Sheet explains that the state legislature barred any consideration of sulfate in setting permit requirements but state legislatures do not have the authority to override water quality regulations approved under the Clean Water Act.

5) The schedule of compliance appears to have no schedule for actual compliance with surface water standards in the Sand River watershed:

There appears to be no deadline or even interim targets for meeting surface water quality standards in the Sand River watershed. The permit has only requirements for research and descriptions of possible steps toward pollutant reduction. The rational seems to be the MN legislature's move to prevent enforcement of the state sulfate standard that clearly applies to the Twin Lakes. The applicant is being asked to repeat or simply polish past work rather than take real steps toward reducing contaminant load.

The compliance schedule described in the "fact sheet" under "SDS Schedule for Deep Seepage - Final Compliance Plan" (pg.40) makes no mention of the need to reduce sulfide load to meet downstream water quality standards in the Sand River. The only goal appears to be to meet the groundwater standards by reducing concentrations in the basin. Without identification of specific reductions within the permit period and with no requirement that standards be met within any defined period, this permit requires no concrete steps toward meeting surface water quality standards in the Sand River basin.

6) The NPDES permit for the headwaters of the Dark River overlooks important pollutants:

In 2015 and 2016 we cooperated in sampling of the upper reaches of the Dark River and found exceedances or near exceedances of multiple water quality parameters. For example: in July 2016, at the Sherwood Anderson Road (Co. Rd. 668) bridge, approximately 7 km downstream of the basin, the Dark River was high in **specific conductance (1490-1585 uS/cm)**, **TDS (1170 mg/l)**, alkalinity (415 mg/l), **sulfate (476 mg/l)**, Mg (152 mg/l),

P (84 ug/l), Ca (82 mg/l), **Se (4.1 ug/l)**, and moderately high in pH (8.0), fluoride (0.43 mg/l), chloride (45 mg/l), bromide (0.34 mg/l), Li (8.2 ug/l), B (143 ug/l), Na (34 mg/l), K (6.4 mg/l), **Mn (127 ug/l)**, Rb (5.4 ug/l), Sr (219 ug/l), Cs (0.11 ug/l), Ba (35 ug/l), and U (1.4 ug/l), and was low in DO (5.7 mg/l, 69%). The water at this site was in exceedance of the state specific conductance criterion of 1000 uS/cm, the TDS criterion of 700 mg/l, and the water hardness criterion (calculated from ICP-MS Ca and Mg concentrations as 831 mg/l as CaCO3 and compared to the category 3C criterion of 500 mg/l). The water was also in exceedance of the state phosphorus criterion (30 ug/l). In addition, the selenium concentration exceeded the 2016 EPA recommended criterion for streams and rivers (3.1 ug/l) and manganese exceeded the EPA human health criterion. For rice waters in the Dark River, the sulfate concentration far exceeded the state criterion of 10 mg/l. Sampling was conducted up and downstream on the Dark River and indicated that the concentration of several parameters increased as one sampled closer to the basin. A complete report of the sampling in the upper Dark River will be released in mid-2017.

The parameter list for monitoring and limits in the draft permit is inadequate and should be expanded to include those parameters identified above that may be exceeded during the 5-year permit period. Including those parameters in sampling requirements for "Application for Permit Reissuance" (pg. 31 of the draft permit) is inadequate, particularly since the state has not required renewal of permits in a timely manner in the past.

7) The NPDES permit for the headwaters of the Dark River overlooks wild rice water quality standards for Dark Lake:

Dark Lake is recorded to have wild rice and is on the list of rice waters in the MPCA Wild Rice Waters database of July 19, 2016. It was also part of the MPCA's field survey of rice waters in 2013. In multiple locations on Dark Lake, MPCA found wild rice in 2013. Measurements by us and the PCA of sulfate levels above and below Dark Lake exceed the wild rice sulfate standard. The NPDES and SDS permits for the Dark River discharge must prevent exceedence of the 10 mg/L rice standard in Dark Lake.

In summary, the draft permit is incomplete or inadequate for the reasons identified above. We look forward to a revised draft permit for review.

Sincerely,
John Coleman

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Google earth
Imagery Date: 5/22/2015
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Imagery ©2013 Google, Map data ©2016 Google Terms Send feedback 50 ft

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55155-4194

December 22, 2016

Re: Public notice for US Steel Minntac tailings basin water permit reissuance for NPDES MN0057207

Dear Mr. Smith:

Thank you for the opportunity to review and comment on the draft US Steel Minntac tailings basin water permit reissuance for NPDES MN0057207.

Statement of Interest

Both Grand Portage and Fond du Lac Bands are federally recognized Indian tribes, as two of the member bands of the Minnesota Chippewa Tribe "(MCT"). Along with other MCT Bands, the Bands retain hunting, fishing, and other usufructuary rights that extend throughout the

entire northeast portion of the state of Minnesota under the 1854 Treaty of LaPointe[1] (the "Ceded Territory"), which encompasses in the area of the Project. In the Ceded Territory, the Bands have a legal interest in protecting natural resources and all federal agencies share in the federal government's trust responsibility to the Bands to maintain those treaty resources.[2]

Moreover, the Bands both have Treatment-in-the-same-manner-As-a-State ("TAS") status under the Clean Water Act for purposes of administering Water Quality Standards, and are downstream regulators. To the extent that there is a dispute between the state and the Bands regarding the applicable water quality standards, the Bands may seek recourse to the EPA to act as mediator between the two agencies before issuance of any CWA permit.

As we review the current draft NPDES permit, we note that it has been well over twenty years since the prior permit expired (1992), yet this facility has been allowed to not only continue operations but also undertake multiple permitted expansions, extensions and progressions of its workings while simultaneously declining to fulfill critical environmental obligations defined in a series of schedules of compliance. It is long past time for the state to fulfill its regulatory responsibilities under the Clean Water Act through issuance and enforcement of a protective permit with clear limits that timely result in compliance with Minnesota water quality standards (MN WQS). This new permit should control both surface and groundwater discharges of pollutants to hydrologically connected waters, apply the existing federally approved sulfate criterion for the protection of all affected wild rice waters, limit specific conductance to protect aquatic life, consider the effects of elevated sulfate on mercury methylation in receiving waters, and provide stringent compliance procedures consistent with the Clean Water Act.

Statement of Action

I. Definition and Authorization of Discharge

The draft permit indicates that the only discharge that requires permitting under the Clean Water Act, and the only discharge that MPCA is authorizing, is to the Dark River. Although it

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[1] Treaty with the Chippewa, 1854, 10 Stat. 1109, in Charles J. Kappler, ed., *Indian Affairs: Laws and Treaties*, Vol. II (Washington: Government Printing Office, 1904), available on-line at http://digital.library.okstate.edu/kappler/Vol2/treaties/chi0648.htm (last visited March, 2014).

[2] *See, e.g.*, Exec. Order 13175—Consultation and Coordination With Indian Tribal Governments (Nov. 6, 2000) (stating "the United States has recognized Indian tribes as domestic dependent nations under its protection . . . .," there is a "trust relationship with Indian tribes," and "[a]gencies shall respect Indian tribal self-government and sovereignty, honor tribal treaty and other rights, and strive to meet the responsibilities that arise from the unique legal relationship between the Federal Government and Indian tribal governments."), available at http://ceq.hss.doe.gov/nepa/regs/eos/eo13175.html (last visited March, 2014)

has been demonstrated that the barrier and pump-back system installed along the eastern side of the tailings basin has reduced the discharge to the Sand River and Twin Lakes by 40-60%, *the discharge has not been eliminated.* Page 20 of the "fact sheet" however, states that there has been no discharge from SD002 (the surface discharge point on the east side of the tailings basin) after 2010 when the barrier and pump back system was installed. This is patently false and must be changed.

Emailed comments from the Great Lakes Indian Fish and Wildlife Commission (GLIFWC)[3] on the pre-public notice draft NPDES permit for the Minntac tailings basin, which was distributed to a limited number of interested parties in December 2014, identified numerous sites along the exterior toe of the tailings basin dikes that "create ponded features with measurable flow". These areas of clearly visible ponded water, as seen in an attached Google Earth aerial photo, south of SD002 and connected to Admiral Lake, are connected by continuous channels to waters of the state and the U.S., and certainly meet the MPCA's own stated criteria for requiring NPDES permit controls. Yet in spite of this indisputable evidence of surface seepage, this draft permit removes all monitoring requirements at SD002.

The evidence is clear that the Minntac tailings basin is in fact a point source discharging pollutants which are impacting hydrologically connected surface waters, including Sandy Lake, Little Sandy Lake, Dark Lake, Admiral Lake, Timber Creek, the Dark River and Sand River and their tributaries and adjacent wetlands. For example, The 1854 Treaty Authority, under an agreement between the Bois Forte Band and US Steel, has been monitoring multiple locations in Little Sandy and Sandy Lakes downstream of the tailings basin[4], where harvestable stands of wild rice have been destroyed since the basin was constructed. Based on the data collected, it is apparent that the seepage capture and return system (SRCS) installed on the east side and now proposed and permitted for the west side of the tailings basin alone will never be sufficient for the basin discharge to meet MN WQS.

Year	Mean Sulfate (mg/L)	Range Sulfate (mg/L)
2010	483	360-661
2011	357	208-561
2012	207	137-275
2013	355	215-650
2014	301	180-419
2015	460	386-590
2016	289	218-374

[3] John Coleman email to Suzanne Baumann, December 19, 2014
[4] *Sandy Lake and Little Sandy Lake Monitoring (2010-2016)*, 1854 Treaty Authority report, 2016

Monitoring data that has been collected by US Steel at the discharge (SD-002) and monitoring locations in the Sand River and the Twin Lakes demonstrate that hardness, total dissolved solids, specific conductance and sulfate exceed MN WQS by an order or more in magnitude. MPCA recognizes in both the draft permit and the Fact Sheet that seepage from the Minntac tailings basin causes exceedances of surface water quality standards through hydrologically connected groundwater[5]. However, the interim limits on pages 12-13 of the draft permit appear to guarantee that US Steel will not be required to follow through with installing any tailings basin wastewater treatment, and will be allowed to continue to discharge highly polluted water for as long as the company is in operation.

But, if in fact MPCA believes that the only tailings basin discharge is to the Dark River, then the permit should *only authorize a discharge to the Dark River*, thereby allowing for a legal remedy (discharging without a permit) for the known discharge to the Sand River and Twin Lakes. The convoluted description of discharge to the Sand River, and permit limits for the Sand River and the Twin Lakes, indicate that the real purpose is to offer "permit-as-a-shield" protection to the company without providing adequate protection for the receiving waters in the form of a water-quality based effluent limits (WQBELs) or a total maximum daily load (TMDL). The permit must be re-written to accurately describe the tailings basin discharges MPCA is authorizing. If MPCA is not authorizing a tailings basin discharge to the Sand River, it must be clearly articulated in the permit.

However, the Bands note that this determination is not consistent either with the Clean Water Act *or* EPA Region 5's specific interpretations for application of the Clean Water Act to the Minntac tailings basin discharge to surface waters through hydrologically connected groundwater. In comments on the Environmental Impact Assessment for the US Steel Minntac East Pit Extension submitted to the Army Corps[6], EPA Region 5 clarified their interpretation of the CWA applicability to "discharges of pollutants from a point source to surface water that occur via directly connected ground water." EPA acknowledged that "the need for a NPDES permit is highly dependent on the facts surrounding each situation"[7], and noted that US Steel "may have installed the seep collection and return system as an approach to eliminate the surface discharge." The agency expressed concern that "such systems may not capture all of the flow to surface waters, thus resulting in continued discharges to surface waters."

EPA Region 5 clearly informed the Corps that "Section 301 of the CWA prohibits point source discharges to surface waters, either directly or via directly connected ground water, unless the discharge is in compliance with an NPDES permit". Finally, the agency states that:

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[5] Minntac Tailings Basin Draft Permit, p. 22; MPCA Fact Sheet, p. 38
[6] Peter Swenson letter to Tamara Cameron, May 15, 2013
[7] 66 *Fed. Reg.* at 3,015; 63 *Fed. Reg.* at 7,881.

"To the extent that US Steel may only be converting the path through which pollutants are discharged to surface water or reducing the volume of the discharge, EPA expects that the discharges will continue to be subject to NPDES requirements. If a permit is terminated (or a discharger decides not to seek renewal of a permit) without permanent elimination of the entire discharge, the discharger would risk being found in violation of the CWA for discharge without a permit".

To further drive home this point, EPA Region 5 again clearly advised the MPCA, related to another nearby proposed mining project, that CWA Section 301 prohibits any point source discharge of pollutants to waters of the United States, either directly or via directly connected groundwater, unless the discharge complies with a NPDES permit[8].

Finally, EPA Region 5 provided comments to MPCA on the 2014 pre-public notice draft NPDES permit, expressing their concerns that:

"...this draft permit as written does not address, under MPCA's approved National Pollutant Discharge Elimination System (NPDES) program and in accordance with the Clean Water Act (CWA), all discharges to surface waters from this tailings basin. MPCA acknowledges in the fact sheet that discharges from this 8,000 acre tailings basin are causing exceedances of surface water quality standards. Based on this and facts supporting this conclusion, the CWA requires an NPDES permit for all such discharges to surface waters from the tailings basin. The original NPDES permit, which was issued in 1987, did not contemplate the full extent of the discharges to surface water from this facility. In the years between expiration of that permit and today the discharges to surface waters have continued and are better understood...[W]e are concerned that some of the statements in MPCA's draft fact sheet regarding EPA's interpretation of the scope of the NPDES program are incorrect and should be corrected prior to public notice of this draft permit.[9]

II. Wild Rice Existing Use and Applicable Criteria for Protecting Use

The state of Minnesota's existing water quality standard that limits sulfate in 'waters used for the production of wild rice'[10] to 10 mg/l was established under §303 of the CWA and approved by EPA Region 5 in 1973. When the Minnesota Legislature attempted to revise this standard in 2011, Region 5 unambiguously advised them that this was a federally approved standard that could only be changed through a federal review process, to ensure protection of the

[8] EPA NorthMet SDEIS Comment Letter 3-13-2014
[9] EPA Region 5, letter of Kevin Pierard, Chief, NPDES Programs Branch, to Ann Foss, Minnesota Pollution Control Agency (December 19, 2014)
[10] Minn. R. 7050.0224, Subp. 2

beneficial use of waters that support wild rice.[11] But the MPCA is specifically declining to apply this existing, approved water quality standard in the draft permit, citing a law passed by the Legislature during special session in 2015 that states "the agency shall not require permittees to expend money for design or implementation of sulfate treatment technologies or other forms of sulfate mitigation."[12] The MPCA is in violation of the federal Clean Water Act by neglecting to impose the sulfate standard to the Minntac tailings basin discharge.

The Fact Sheet does not reveal the known occurrence of wild rice in Dark Lake, although multiple state agency[13] and university field crews[14] have documented its presence – and therefore confirmed that it is an existing use - over the past several years. Water quality standards for protection of wild rice should be applicable to this watershed as well as the Twin Lakes, where it is well-established that both Sandy and Little Sandy Lakes are wild rice waters[15]. Wild rice has been confirmed by the 1854 Treaty Authority downstream of the surface water monitoring point SW001 (Sand River at Highway 53). Historic vegetation surveys by the MN DNR and more recent surveys by the 1854 Treaty Authority confirm the dramatic degradation of the wild rice populations in the Twin Lakes[16] in the decades since the Minntac tailings basin was constructed and began discharging pollutants into the surrounding waters.

The MPCA should revise the draft permit to require compliance with the existing federally-approved sulfate standard (10 mg/l) in Sandy and Little Sandy Lakes and the Sand River. The agency should affirm that wild rice production is an existing use in the Dark River watershed, and apply the wild rice sulfate standard here as well.

III. Permit and Schedule of Compliance Must Contain Interim Limits for all Pollutants that have the Potential to Exceed WQS

Under the federal Clean Water Act, impaired waters are defined as "lakes, river or stream segments with monitored violations of one or more numeric and/or narrative water-quality standards". Each NPDES permit must include those conditions necessary to "achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."[17] The permit limits must control all pollutants or parameters which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality

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[11] EPA Region 5, letter of Tinka Hyde, Water Division Director, to Senator Thomas Bakk and Representative David Dill (May 13, 2011)
[12] 2015 Minn. Laws 1st Sp. Sess. Ch. 4, Art. 4, Sec. 136.
[13] MPCA, Gerald Blaha emails to MPCA, Stephanie Handeland and Darren Vogt, 1854 Treaty Authority regarding Dark Lake wild rice, June 20, 2013- September 6, 2013
[14] Myrbo et al. Field Survey and Field Survey Excerpt of Sites Near Minntac Tailings Basin
[15] MPCA, Draft List of MPCA Wild Rice Waters – October 26, 2015; MDNR, Natural Wild Rice in Minnesota, a Wild Rice Study document submitted to the Minnesota Legislature, Feb. 15, 2008, Appendix B, pp. 80-81
[16] 1854 Treaty Authority Report , 2016
[17] 40 C.F.R. §§122.44(d)(1) 123.25(15).

standard.[18] Although both the draft permit and fact sheet discuss the reasonable potential for a discharge to cause or contribute to an excursion from water quality standards (WQS), the reasonable potential analysis is only applied to the Dark River, and only for WQS applicable to Class 3 and 4 (Industrial and Agricultural Uses). Neither the Fact Sheet or draft NPDES permit clearly state the applicable Class 2 (Aquatic Life Use) and trout stream (Class 2A) limits for the Dark River watershed.

Minnesota Rules for protecting Class 2 waters states:

> For all class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner . . . the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters.[19]

The draft permit provides no analysis of any impacts to aquatic life, and includes no water quality based effluent limitations (WQBELs) to protect fish or other aquatic biota in any of the Class 2 waters that are impacted by the discharge from the Minntac tailings basin. The MPCA applies only Class 1B drinking water standards and Class 4B agricultural standards (adult livestock drinking water) for sulfate (250; 1000 mg/l) and total dissolved solids (700 mg/l); Class 4A agricultural standards for bicarbonates (250 mg/l) and specific conductance (1000 µS/cm); and Class 3C industrial standards for calcium and magnesium as hardness (500 mg/l) and chlorides (250 mg/l).

In 2011, EPA published a report, *Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*, reviewed and approved by its Science Advisory Board, which concludes that high conductivities (mixtures of ions, dominated by calcium, magnesium, sulfates and bicarbonates) were associated with impaired aquatic communities[20]. Subsequent peer-reviewed studies examined the causal factors of this relationship, established threshold for protection of aquatic life, and demonstrated a link between mining in the watershed and elevated conductivity. A chronic aquatic life benchmark of 300 µS/cm for waters in Appalachian ecoregions was established, and further reviews concluded that the benchmark and the methodology used to derive it may be applicable in other ecoregions with appropriate validation.

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[18] 40 C.F.R. §122.44(d)(1)(i)

[19] Minn. R. 7050.0150, Subp. 3

[20] U.S. EPA, *A Field--Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*, Office of Research and Development, National Center for Environmental Assessment, Washington, DC., 2011 EPA/600/R-10/023F, p. viii,

Following up on that line of study, EPA published draft guidance this month to assist states and authorized tribes to derive numeric limits to protect aquatic life from the acute and chronic effects of elevated ionic concentration, measured as specific conductance.[21] The Conductivity Criteria Methods draft confirms that elevated specific conductance is causally related to reduced benthic macroinvertebrate (BMI) community metrics, and that aquatic life criteria should be calculated based upon survival of 95% of the BMI genera. EPA's Office of Research and Development reviewed an analysis performed by two retired Minnesota environmental regulatory staff, which applied the EPA methodology to large datasets from northeastern Minnesota ecoregions[22]. This analysis concluded that the 300 µS/cm benchmark established for Appalachian streams would likely result in extirpation of 5% or more of the BMI genera, and EPA's review validated their conclusions.[23] In summary, these analyses strongly suggest that a more restrictive specific conductance limit should be derived and applied in this permit to protect aquatic life in waters that are impacted by Minntac tailings basin discharges.

Many, if not all, of the "monitor only" pollutants in the draft NPDES permit have been measured to exceed MN WQS, as demonstrated in Minntac's own Data Monitoring Reports. These pollutants must have interim limits and final limits that comply with MN WQS. Discharge monitoring reports over a long period of record point to manganese as another constituent of concern for likelihood of exceedance of Minnesota's drinking water standard, yet there are no limits on manganese in Class 1 waters in this draft permit. The MPCA must include interim and final limits for manganese, iron, fluoride, specific conductance, chloride, and sulfate, because all of these pollutants have exceeded MN WQS as detailed in Minntac's own data monitoring reports and provided to MPCA.

IV. Compliance Schedule Exceeds One Year and Does Not Contain Final Compliance Date or Pollutant Concentrations

The schedule of compliance offered in this draft permit allows more than one year to develop a plan to reduce pollutants to surface water, and three years for groundwater. This is unacceptable because, as is plainly obvious when reviewing multiple previous schedules of compliance for this facility, beginning in 1989, US Steel has already been granted twenty-seven years to come up with a plan to reduce pollutants being released to surface and groundwater. And, during that period of time they have pilot-tested multiple treatment approaches. Yet, US Steel Minntac has never been required to install and use any of the treatment options they have been given time to study (and freedom from actual compliance) during the previous 27 years.

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[21] EPA, *Public Review Draft, Field-Based Methods for Developing Aquatic Life Criteria for Specific Conductivity*, December 2016

[22] Johnson & Johnson, *An Evaluation of a Field-Based Aquatic Life Benchmark for Specific Conductance in Northeast Minnesota* (November 2015) prepared for WaterLegacy

[23] EPA, Susan Cormier, Office of Research and Development, Review Memo "An Evaluation of a Field-Based Aquatic Benchmark for Specific Conductance in Northeast Minnesota," Feb. 2, 2016

As defined in CWA rules regarding Schedules of Compliance:

40 C.F.R. § 122.47. Schedules of compliance.
(a) *General (applicable to State programs, see § 123.25).* The permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA and regulations.

(1) *Time for compliance.* Any schedules of compliance under this section shall require compliance as soon as possible, but not later than the applicable statutory deadline under the CWA.

(2) The first NPDES permit issued to a new source or a new discharger shall contain a schedule of compliance only when necessary to allow a reasonable opportunity to attain compliance with requirements issued or revised after commencement of construction but less than three years before commencement of the relevant discharge. For recommencing dischargers, a schedule of compliance shall be available only when necessary to allow a reasonable opportunity to attain compliance with requirements issued or revised less than three years before recommencement of discharge.

(3) *Interim dates.* Except as provided in paragraph (b)(1)(ii) of this section, if a permit establishes a schedule of compliance which exceeds 1 year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement.

(i) **The time between interim dates shall not exceed 1 year,** except that in the case of a schedule for compliance with standards for sewage sludge use and disposal, the time between interim dates shall not exceed six months.

(ii) If the time necessary for completion of any interim requirement (such as the construction of a control facility) is more than 1 year and is not readily divisible into stages for completion, the permit shall specify interim dates for the submission of reports of progress toward completion of the interim requirements and indicate a projected completion date.

(4) *Reporting.* The permit shall be written to require that no later than 14 days following each interim date and the final date of compliance, the permittee shall notify the Director in writing of its compliance or noncompliance with the interim or final requirements, or submit progress reports if paragraph (a)(3)(ii) is applicable.

The first condition for the March 31, 1972 "Permit for Construction and Operation of Disposal System" (the original Minntac tailings basin permit) states: "No effluent shall be discharged from the system to surface waters of the State.[24]" It is not clear from our review of archived documents related to the US Steel Minntac facility when, and why, the tailings basin was first permitted to allow substantial volumes of polluted effluent to be discharged into the surrounding surface and ground waters. It is clear, however, that the state regulatory agencies have long been aware of the risk posed to downstream wild rice resources, and that US Steel has been enabled to avoid enforcement of applicable MN Water Quality Standards for decades by

[24] Permit WPC 7248, dated March 31, 1972.

simply being required to 'study' their discharge flows and pollutant concentrations[25]. Yet the Fact Sheet states:

> The Permittee has already conducted significant site investigation and research into treatment and remedial technologies under a series of SOCs since 2001. It is difficult to schedule a timeframe for implementation of a remedy when the nature and scale is unknown.[26]
>
> In March 2009 USS submitted an NPDES Permit Application that included plans to construct a 7000 gallon per minute Process Water Treatment System (PWTS), in part to satisfy a 2008 Stipulation Agreement for line 3 hardness issues. USS predicted the PWTS would lower the basin sulfate concentration from 900 to 350 mg/L in one permit cycle. USS then requested MPCA not act on the application while it investigated refinements to the proposed PWTS. Instead, USS proposed replacement of wet emissions scrubbers on the pelletizing furnaces with dry controls. This would remove a significant source of pollutants to the basin (as well as reduce air emissions) and was forecast to lower the basin sulfate concentration to 476 mg/L within 20 years. The phased installation of dry controls, beginning with line 6, was included in a June 9, 2011, Schedule of Compliance (SOC). In 2015, USS informed MPCA it did not intend to install dry controls.[27]

The Fact Sheet also documents multiple violations discovered during the most recent compliance inspection of the tailings basin, including violations of limits on sulfate and hardness deposited in the tailings basin[28]. Minntac's long history of violations of schedules of compliance, and rejection of commitments to construct a wastewater treatment system or replace wet scrubbers, is a compelling reason to ensure that this permit contains clear and enforceable limits to *timely* reduce the discharge of pollutants to surface and groundwater.

Chapter 1. (Compliance Schedule) of the draft permit provides five years to achieve a sulfate concentration of 800 milligrams per liter, a concentration approximately four times higher than the drinking water standard. In ten years, sulfate is supposed to be reduced to 357 milligrams per liter, about 30 percent higher than the 250 milligram per liter drinking water standard. Since the issuance of the very first NPDES permit for Minntac's tailings basin in 1987, the company has been required through multiple, successive Compliance Schedules to repeatedly study and determine the sources of sulfate and hardness. However, *none of the Compliance Schedules issued during the previous 27 years have required compliance with MN WQS, or have contained a date when compliance must be attained.* This Schedule of Compliance is no different. The Schedule of Compliance in this permit must require the company to select and install treatment technologies within one year of permit reissuance.

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[25] See, eg.: Jess Richards letter to Kevin Pierard re: Response to Comments on Draft Schedule of Compliance US Steel Minntac (Nov. 28, 2007); Minnesota DNR Status Report: *Sulfate Sampling in Waters Receiving Seepage from the USX Tailings Basin*, (1 March 1988); Minnesota DNR Final Report: *Sulfate Release from the USX Tailings Basin and Quantification of Sulfate Sources* (August 1991).
[26] MPCA Fact Sheet, p. 37
[27] *Id.*, p. 6
[28] MPCA, Compliance Status Minntac Tailings Basin (2010)

Summary of Statement of Action

1) The draft permit and fact sheet must plainly describe the discharge(s) MPCA is authorizing under this NPDES permit. 40 CFR § 122.44, "the reasonable potential for a discharge to cause or contribute to an excursion of WQS" must be applied to all of the surface waters where MPCA authorizes discharges.

2) "Monitor only" must be removed from the permit because most, if not all, of the pollutants that are listed as "monitor only" have exceeded MN Water Quality Standards as demonstrated in Minntac's data monitoring reports. These pollutants must have interim limits until compliance with MN WQS can be attained. A benchmark criterion for specific conductance to protect aquatic life should be applied in this permit.

3) The Compliance Schedule must require the selection and installation of wastewater treatment within one year of permit reissuance, and include dates when final effluent limits must be achieved.

4) Existing uses must be protected in all of the surface waters surrounding the Minntac tailings basin, not just the uses that MPCA has designated.

5) Wild rice waters must be protected by enforcing the existing standards, including the 10 milligrams per liter sulfate standard, unless and until MPCA and US EPA have approved and implemented new criteria.

Sincerely,

Margaret Watkins
Grand Portage Water Quality Specialist

Nancy Schuldt
Fond du Lac Water Projects Coordinator

Cc. Rebecca Flood, MPCA
Kevin Pierard, Chris Korleski - U.S. EPA
Chad Konickson, Tim Smith - U.S. Army Corps of Engineers
Constance Cummins - U.S. Forest Service
Jennifer Engstrom - MNDNR

Red Cliff Band of Lake Superior Chippewa Indians

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Bayfield, WI 54814

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December 22nd, 2016

VIA ELECTRONIC MAIL

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194
651-757-2719
erik.smith@state.mn.us

RE: Public Notice of Intent to Reissuance of Minntac NPDES/SDS Permit MN0057207

Boozhoo (Hello), Mr. Smith.

We have received an invitation to comment on the topic of the proposed reissuance of *Minntac NPDES/SDS Permit MN0057207*. Please accept our following comments regarding this topic.

Statement of Interest

As Gichigami Anishinaabe (Lake Superior people) we obey the sacred instruction from Nokomis (grandmother): Nibi (water) is life. Manoomin (wild rice) is a sacred gift from the Creator to the Gichigami Anishinaabe, therefore we speak for our sacred relatives and places, which cannot speak directly for themselves. Manoomin is a critical part of the vocabulary and names in our Ojibwemowin language. Any degradation or loss of Manoomin beds limits opportunities for our Tribes to use and pass on the sacred knowledge embodied within our language fluently to our future generations. We are committed to protecting the water, land and air of our ancestral homelands for the generations yet to come.

The Red Cliff Band of Lake Superior Chippewa (Red Cliff) is a signatory member of the 1854 Treaty at La Pointe. Red Cliff has retains usufructuary treaty rights (including hunting and fishing) throughout northeastern Minnesota (Ceded Territory) under the 1854 Treaty at La Pointe. The USS-Minntac Tailings Basin Area is within the Ceded Territory of the 1854 Treaty at La Pointe. Changes to water quality and hydrology originating from the USS-Minntac Tailings Basin Area are likely causes of impaired and diminished the legacy of harvestable wild rice beds immediately downstream of this area.

Statement of Action

Minnesota has an existing water quality standard for sulfate levels in wild rice waters (10 mg/L), which must be enforced. This draft permit must detail where nearest water bodies with wild rice are located downstream of the Minntac Tailings Basin Area. Reissuance of the NPDES/SDS permit for *Minntac NPDES/SDS Permit MN0057207* should not occur until either the existing wild rice sulfate standard has been reinstated or redefined by concurrent research. Exempting permitees from abiding by the standard is not acceptable as it degrades our usufructuary treaty rights.

This draft permit is for discharges to the Dark River watershed, but not the Sand River watershed. However, there is evidence of discharges degrading resources in the Sand River watershed, as supported below. The permit draft must be modified to include all watersheds immediately downstream of the Minntac Tailings Basin Area receiving discharges.

The proposed schedule of compliance in this draft permit does not define specific outcomes. It should define specific actions, compliance limits, completion dates, etc. As it is written, the schedule of compliance cannot be enforced in a meaningful way to protect water quality.

Supporting Evidence

The degradation of wild rice, as a harvestable resource, immediately downstream of the Minntac Tailings Basin Area is evident in the September 2013 report Identification of Historic Properties of Traditional Religious and Cultural Significance to The Bois Forte Band in the Minntac Progression Project Area of Potential Effect by William R. Latady and Marybelle Isham from the Bois Forte Tribal Historical Preservation Office, as prepared for the United States Steel Corporation. The most prominent wild rice resource identified in this report is Twin Lakes. Twin Lakes is also known as Little Sandy Lake (MN Department of Natural Resources # 69-0729) and Sandy Lake (MN Department of Natural Resources # 69-0730), as they are listed on the MCPA literature for reissuance of Minntac NPDES/SDS Permit MN0057207.

Sulfate levels recorded at the *"Twin1"* monitoring station are regularly above water quality standards. The impact that the Minntac Tailings Basin Area has had towards degrading and diminishing the wild rice resource on Twin Lakes is also documented in the December 2016 report Sandy Lake and Little Sandy Lake Monitoring (2010-2016) by Darren J. Vogt of the 1854 Treaty Authority.

> *"Sandy Lake and Little Sandy Lake, also known locally as the Twin Lakes, historically have produced good stands of wild rice. Wild rice harvesters utilized the lakes when suitable crops were present. A lake survey in 1966 indicated moderately dense to dense stands covering both lakes. Rice production generally declined through the 1970s and 1980s, with little or no rice found in the lakes during a 1987 survey. Rice production has since remained poor."*

The 1854 Treaty Authority report documents sparse populations of wild rice still appear on Twin Lakes, but are not abundant enough for a significant harvest even for one person, nor are they

consistent year after year. This indicates that wild rice may possibly be reestablished on Twin Lakes if the limiting factor(s) (such as pollution and variable water levels from the Minntac Tailings Basin Area) are limited in the future.

Summary

The fact that Minntac has been operating with an expired permit since 1992 is astounding. Red Cliff cannot tolerate MPCA's failure to issue meaningful NPDES permits despite the Joint Priority Agreement with the USEPA to correct out-of-date mining permits. The consequential impairment of water quality, which is evident in the current state of wild rice, fish, and macroinvertebrates due to ongoing discharges from Minnesota's mining facilities.

Please accept our comments on behalf of the Red Cliff Band of Lake Superior Chippewa. If the issues Red Cliff is concerned about are not adequately resolved, we reserve the right to petition for a contested case hearing on this matter (Minn. R. 7000.900, subp. 1). Thank you for valuing our input on this subject. Do not hesitate to follow up with any questions that you may have for us.

Sincerely,

Bryan J. Bainbridge
Red Cliff Tribal Chairman

Cc: Chad Abel, Red Cliff Treaty Natural Resources Division
Linda Nguyen, Red Cliff Environmental Department
Amorin Mello, Red Cliff Environmental Department

IRON MINING ASSOCIATION OF MINNESOTA

December 22, 2016

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Rd. North
Saint Paul, MN 55155

Dear Mr. Smith:

I am writing regarding the draft water quality permit for Minntac's tailings basin. Our association represents all of the iron mines in northeast Minnesota employing 4,500 miners, as well as 175 vendor members and their 13,000 employees.

Minntac and all of the other mines in northeast Minnesota have worked diligently to lead with environmental performance. Each facility has made significant investments in environmental improvements, including $94 million at Minntac. Due to the competitive nature of the market we are currently operating in, every dollar counts. Unfortunately the current draft permit would increase costs at a time when no one in the industry can afford it. Many of the operations in northeast Minnesota are still struggling to keep their doors open.

There are a few things I would like to see specifically related to the draft NPDES permit for the Minntac tailings basin:

- Reissue the permit.
- Use science and recent relevant data to protect the environment and lay out the permit conditions.
- Perform a Use and Attainability Analysis and establish site specific water quality standards for Minntac.
- Finalize the revisions of Class 3 and Class 4 designations and associated water quality standards, then reissue the permit.
- Consider the cost implications if Minnesota Pollution Control Agency were to issue the current draft permit.
- Mine closure requirements fall outside of the purview of the MPCA and are under the purview of the DNR, therefore those requirements should not be addressed in this permit draft.

The Minnesota Pollution Control Agency and the iron mining industry have worked together to protect our region's jobs while preserving our natural environment. I look forward to continuing this legacy in the coming weeks, months, and years.

Very Truly Yours,

Kelsey A. L. Johnson
President
Iron Mining Association of Minnesota

324 West Superior Street Suite 502 Duluth, Minnesota 55802 www.taconite.org Phone (218) 722-7724 Fax (218) 720-6707

W.J. McCABE (DULUTH) CHAPTER
IZAAK WALTON LEAGUE OF AMERICA
P. O. BOX 3063. • DULUTH, MN 55803

December 22, 2016

Erik Smith
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Rd. N.
St. Paul MN 55155
erik.smith@state.mn.us

Dear Mr. Smith,

The comments that follow represent the views of the W. J. McCabe (Duluth) Chapter of the Izaak Walton League of America (IWLA). The Izaak Walton League (aka Ikes) has a major interest in the protection and restoration of our nation's waters, and has a long history of action on matters pertaining to fishable and swimmable aquatic resources. Since 1922, the Ikes have been a national leader as a defender of our soil, air, woods, waters and wildlife.

The Duluth chapter has been engaged in a wide range of issues concerning public policy and natural resources in northeastern Minnesota dating back to the 1950s. That desire to protect our environmental quality continues to this day.

The Ikes are pleased that the MPCA has proposed a draft wastewater permit for the Minntac tailings basin. However, we are concerned that the proposed permit is not strong enough to adequately protect surface water quality downstream of Minntac. Specifically, it lacks specificity for compliance and a reasonable calendar for reaching compliance.

We believe there is too much responsibility placed with the permittee to set interim and final compliance dates, and the permit allows them to set the compliance standards that they believe they can accomplish. The word 'shall' is seldom if ever used, as one would expect to see in regulatory directives.

The draft permit does not mention or reference non-compliance penalties or failure-to-achieve thresholds. As an active operator, Minntac does not appear to be controlled by anything in the permit that would cause a plant shutdown. We wonder if this draft permit would actually control pollution and safeguard the water and air for Minnesotans. The permit does not seem to clearly identify how water pollution from the mines is to be controlled. The draft permit presents MPCA as acting in more of an advisory capacity, not in a strong regulatory capacity.

As an example, the present standards for sulfate are 10mg/L for the protection of wild rice, and 250 mg/L for groundwater drinking water supplies. This proposal fails to assure citizens that the discharge from Mnntac will meet these standards during this planning period, and lays out no reasonable time period for its achievement. In fact, for key downstream discharge points in the Dark (SW003 and SW008) and Sand Rivers (SW001, SW005, and SW007) the permit either lacks a monitoring standard or provides a standard that fails to meet the wild rice or groundwater drinking water standards. Considering that the adopted standards have been in place since the early 1970s, and that MPCA's data shows that the company has

been in violation of these limits for many years, we are skeptical that this proposal will move Minntac to compliance in the near future.

The Minntac containment basin is at best a filter, with polluted effluent leaking out of the basin. While we agree that it is too late to change the present engineering and materials used for the basin dikes, we feel steps should be taken to enhance monitoring and remediation of this leakage. Increasing the number of monitoring stations around the perimeter of the basin would enhance our understanding what is leaking out and where it's leaking from. Constructing an additional catchment system around the perimeter of the leaking dikes could capture and redirect this effluent back into the basin, or deliver it to a proper treatment facility, to better protect downstream water quality.

The schedule outlined in the draft document does not establish any monitoring of ground or surface water for traces of heavy metals that might be released during processing and disposal of tailings. Although finding these types of pollutants might be considered unusual for this mineral formation, the earth is not necessarily homogenous, so periodic monitoring should be added to the Limits and Monitoring Requirements during this permit renewal period just to make sure.

The use of the Investigation Work Plan seems to present an apparent conflict of interest, as the regulatory agency tasks Minntac with investigating their own shortcomings in permit compliance. Having the work done by an independent third party, hired by the MPCA and reportable to the MPCA, would provide the necessary information without the possibility of a conflict of interest.

As part of the Investigation Work Plan, a factor that needs consideration is the impact from changing rainfall patterns. The earth's warming atmosphere means that storms are carrying higher levels of moisture. Changes in the jet stream and tendencies for storms to stall for prolonged periods are resulting in increased storm severity, with more frequent severe rainfall events. These extreme rainfalls necessitate the development of models that can test if the containment structure is adequate for the new climatic reality.

Chapter 1 Compliance Schedule 1.27 pg 26. The SW03 limits (pg 19) do not meet current legal limits for sulfate, either for drinking water or the wild rice standard. In fact the limit stated is over twice the safe level for drinking water, and 52 times the current limit for wild rice waters. We are concerned that MPCA has proposed these as a limits, because it casts doubt on the State's ability to adequately regulate this discharge.

2.5 pg. 27. States that as new information becomes available it will become incorporated into the requirements of the permit. How does the regulatory agency propose to enforce this or know if this knowledge exists if the permittee fails to report it?

2.6 pg 27. The idea of now trying to add protections to "waters to which the wild rice beneficial use applies" after these stands of rice have been decimated by decades of unregulated mining discharge seems unlikely to happen during the life of this permit. Since the proposed Limits for sulfates are far in excess of the 10 mg/L standard, it is reasonable to assume the historical stands of wild rice in waters downstream of the mine basin will never have an opportunity to recover and will eventually disappear .

Chapter 4, 4.2 Pg 30. New Proposed De-watering of draft permit. The draft only references testing for turbidity and total suspended solids, but fails to require testing for toxins (mercury and other heavy metals) and sulfate. Shouldn't the permit include testing for all these toxic pollutants?

Chapter 5, 1, 1.1 pg 32. Is there a reason the seepage survey is done in October? This is a month of typically low rainfall. Shouldn't the survey be conducted during the wettest months, when the basin receives the greatest volume of precipitation and water pressure on the dikes?

Chapter 5, 1, 1.2 pg 32. Why is there no analysis of seepage for sulfates or other possible toxins?

Chapter 5, 1, 1.4 pg 32. Why is there no requirement to develop/implement a plan to prevent seepage, including a timeline for repairs?

Chapter 6, 1.3 pg 32. The permittee is given 180 days after reissuance of the permit to submit an MMP. The new MMP must be a requirement for reissuance, and is to include measurement maximums, identification of the sources of mercury effluent and their concentrations, an historical review of past cumulative mercury discharge, a summary of past implementation plans including those that are ongoing, and detailed plans that are needed today to bring the facility into compliance. Reissuance would then be contingent on submission of an acceptable new MMP. Since there is no mention of monitoring for mercury in either the groundwater or surface water discharge, shouldn't this be added to the Limits and Monitoring requirements, and incorporated into the MMP?

Chapter 6, 1.3, e. pg 32. There is no stated goal for mercury reduction. This needs a measurable goal because mercury is such a potent neurotoxin and a big problem with contamination of fish.

Chapter 7 pg 33 WET - chronic Whole Effluent Toxicity. In 1.5 it gives a limit of 1.0 TUc, and if it exceeds that limit, it will be retested. But there is no follow-up of required corrective action(s) if the retests continue to exceed limits. Shouldn't the permit require corrective action that will eliminate the toxic pollutants that exceed established legal limits and prevent the ongoing contamination of the environment?

4. Positive Toxicity Results for WET, pg 34 4.1 . After determining a positive test for toxicity, the permittee is instructed to develop a plan to treat the cause. While there is a requirement to provide a quarterly report, there is no established deadline for fully addressing the issue. Considering the potential serious results from discharging known toxic material into the environment, establishing a reasonable deadline for fully addressing the issue seems prudent and ought to be a requirement of this permit.

5. There is no stated penalty for failure to submit the data in a timely and complete fashion. Since this is testing for, and regulating toxic materials, some reasonable penalty needs to be specified as part of this permit when test indicate toxic substances are being released into the environment.

Chapter 8, pg 37, 7, 7.1. The MPCA should be immediately notified when capping is necessary to control pollutant discharge, and MPCA should authorize the source of the materials being used and their placement.

Chapter 8, pg 38, 8. Reporting 8.2. It states that upon request the permittee is to submit information and reports "within a reasonable time". Is this weeks, one month, three months? State what is considered reasonable.

Chapter 9, Ground Water Stations pg 40, 1.2. Asks that the permittee identify on a USGS Topo map where well monitoring stations are located. To this there should be add a GPS point reading to more closely and accurately identify the well location.

1.7. In addition to the tests listed in this draft, we feel that additional ground water monitoring stations should be part of the plan and that all of the ground water stations should also test for sulfates, mercury, and other toxic heavy metals that may be leaching from the basin into the surrounding ground water. If pollutant levels exceeding established legal limits are detected, it should be the permittee's responsibility to remediate the situation by whatever means are necessary to protect public health and the environment.

2.4. Include a GPS point for each well location in the cluster.

Chapter13, pg 43, 1. General Requirements, 1.7. Liability Exemption. At the end of the first sentence add, "unless said actions were known to the MPCA and this regulatory agency failed to take action to prevent and/or stop these actions." This statement should be added so that the agency is required to share responsibility for any inaction in responding to a known violation of this permit or of any existing or subsequent state or federal requirement.

1.8 . At the end of the sentence add "but MPCA shall report any know violation(s) of these local laws, rules, or plans to the appropriate local jurisdiction.

Sampling, pg 44, 1.19. At the end of the sentence add "or as often as needed based on observed damage, suspect sampling results, or any other reason based on the judgment of the person conducting the samples."

Chapter 13, 1.23 Typo . "explination" (2X) should be "explanation".

Chapter 13. pg 47 1.31 Effluent Violations. The reporting time of "within 24 hours of the discovery" is too long for a violation that presents a human health risk. It should be orally within the hour (everyone has a cell phone these days), with the written report by the end of the following business day. The language also doesn't specify which agency(s) to notify. At a minimum the oral report should go to the Commissioners of MN Dept. of Health and the MPCA. The written report should be to these two agencies, plus the Commissioner of the MNDNR.

1.51 Facility Closure, pg 50, 3rd para. The opening sentence regarding financial assurance says, "MPCA may require the Permittee to establish and maintain financial assurance…" when we feel it must say "shall" or "will" instead of "may".

1.52 pg 51, 2nd para. To prevent the MPCA from sitting on an expired permit for years, we offer the following suggested wording after the citation of "….(Minn. R. 7001.0040 and 7001.0160)" by adding, "and the MPCA shall act upon and complete the request for reissuance within 180 days following receipt of the requests so long as none of items a. – c. below exist. And that failure to correct any of the deficiencies listed in a. – c. within 180 days after notification of these deficiencies by MPCA shall be grounds for immediate permit cancellation."

Thank you for considering these comments.

Craig Sterle, Conservation Issues Chairmen
W. J. McCabe Chapter, IWLA

Rich Staffon, President
W. J. McCabe Chapter, IWLA
218-879-3186 rcstaffon@msn.com

Comments by Bruce Johnson and Maureen Johnson, Stacy, Minnesota on
NPDES/SDS Draft Permit for U.S. Steel – Minntac Tailings Basin Area (draft permit)
Submitted to Erik Smith, erik.smith@state.mn.us on December 23, 2016

Our interest in the permit application (application) and the draft permit:

Bruce L. Johnson is a biologist/chemist with 30 years of experience, advising in these comments based on his time as mining permit enforcement team leader with Minnesota Pollution Control Agency, water quality research with the U.S. Environmental Protection Agency, mining research with Minnesota Department of Natural Resources, and supervisory NPDES and hazardous waste permits compliance and research with Minnesota Department of Transportation. Among other responsibilities, Bruce served as the field chemist in charge of the metal pathways portion of the Environmental Quality Boards, Minnesota Regional Copper-Nickel Study. He has authored and co-authored a number of publications and recently he has co-authored *An Evaluation of a Field-Based Aquatic Life Benchmark For Specific Conductance In Northeast Minnesota*, Nov. 2015.

Maureen K. Johnson is a biologist with 30 years of scientific experience, which includes managing cleanups of hazardous waste sites for the Minnesota Pollution Control Agency, and water quality analysis, water quality data verification, and implementation of cooperative agreements for both U.S. Environmental Protection Agency and U.S. Forest Service. She is a co-author of *An Evaluation of a Field-Based Aquatic Life Benchmark For Specific Conductance In Northeast Minnesota* , Nov. 2015.

We and our family own 110 acres in St. Louis County since 1935.

We are encouraged by the additional steps being taken in the Minntac draft permit, but are disappointed in the lack of recognition of the potential effects of violations of drinking water standards and water quality criteria, continuing lack of effluent limits, and missing levels of quality detail for the 8,700 acre (10.4 sections) tailing basin.

MPCA's mining permits have been written so weakly in the past and present that they mostly have not been enforceable, because they have few enforceable effluent limits that would control the permittee's pollution from affecting the Minn. Rules Ch. 7050.0140 uses. Even the monitoring has been inadequate to identify toxic pollutants and their levels. As a result violations and excursions over Minnesota standards and definitive effects on the uses have occurred without MPCA's or anyone else's ability to correct the problems as soon as reasonably possible. This gives no incentive to the Minntac (company) to comply. We have provided advice on another mine permit, we were told to wait until the draft permit was public noticed, but a draft permit has not been public noticed since 2010. So we understand the importance of MPCA's writing this Minntac permit "right" at this time. Minn.Rule Ch.7053 has a rule for Minntac's longstanding existing discharge:

> 7053.0205 Subp. 3. Inadequate treatment. Existing discharges of inadequately treated sewage, industrial waste, or other wastes shall be abated, treated, or controlled so as to comply with the applicable limits.

MPCA must better identify pollutants and toxic pollutants, establish applicable effluent limits, and enforce the permit and rules.

General Comments

Where are the changes:

Permit, p. 1 Receiving water

What are the changes: The receiving water is mischaracterized in the permit and must be corrected to include the Dark River 2B, 3C, 4A, 4B, 5, 6; trout reach 1B,2A,3B and Sand River 2B, 3C, 4A, 4B, 5, 6.
Why are the changes needed:
Both the Dark River and Sand River are receiving waters. If SD002 ceases discharge Admiral Lake, Sand River and its lakes will still receive contamination even after surface flow is mitigated, ground water inflow will continue to daylight to these lakes and river

To properly identify the classes, the Dark River is specified as (Minn. Rules Ch.7050.0470), *not only* 2A, 3B.

Class 1B is a DRINKING WATER CLASS and this must be addressed in many places in the permit as such.

Draft permit edits

Where: p. 42. "1.2 To protect the class 3.."
Action: apparently should be "2.1. To protect…"
Reason: This appears to be a typing error.

Where are the changes:
The permit requires all data sources available must be used for making decisions on preparing the permit.
What are the changes needed:
Use current data and all of the available data to evaluate the statistics e.g. range, maximums, minimums, standard deviation, variance etc. to understand the conditions of the TB pollution, and to conduct reasonable potential analyses.
Why are the changes needed: After 29 years of Minntac holding the permit clearly there must be more data on the discharges and wells than what was used. Many of the data source documents including EPA form 2C, fact sheet, and application use data that is from the 2009 application and EPA form 2C does not indicate the date of the data provided. Old data or single analysis data promotes distrust of the data being *used to avoid performing* reasonable potential analyses and effluent limits.

Organic Chemicals (Including Priority Pollutants)

Priority Pollutants
Where are the changes:
Limits applicable in the final period, Page 18.
Where are the changes:
The Permit Application (United States Steel Corporation Minnesota Ore Operations-Minntac Tailings Bain NPDES/SDS Permit Application Permit #MN0057207, 2011, contains Table 2 –SD001 (West Seep) Comprehensive Analytical Summary (permit application).Table 2 of the permit application analyzed for priority pollutants. The results demonstrated elevated levels of some contaminants

> Minn. Rules Ch. 7001.1090 states: GENERAL CONDITIONS OF NATIONAL POLLUT ANT DISCHARGE ELIMINATION SYSTEM PERMITS.
> Subpart 1. Conditions for all permits. National pollutant discharge elimination system permits issued by the agency must contain the general conditions set forth in part 7001.0150 and the general conditions as follows:
> A. Notwithstanding the absence in this permit of an effluent limitation for any toxic pollutant,

> the permittee shall not discharge a toxic pollutant except according to Code of Federal Regulations, title 40, parts 400 to 460 and parts 7050.0100 to 7050.0220 and 7055.0010 to 7055.0120 and any other applicable agency rules.

The rational for requiring priority pollutants scan is to check all industries for the potential presence of these pollutants. If this Table 2 data represents one sample which is not statistically significant, it indicates one of three possibilities: 1. The sample was contaminated. 2. A laboratory quality assurance quality control problem 3. These compounds are present in the SD001 discharge.

MPCA should be concerned about the elevated GCMS acid and acid base neutral detections Minntac reported whether one sample was taken or many in their permit application Table 2, for SD001, indicated as data from the 2009 application. The sampling demonstrated elevated levels on many priority pollutants. Comparing the results with other data from both the Agency for Toxic Substance and Disease Registry (ASTDR) and the National Medical Library the values appear to indicate concentrations above what would be anticipated from unimpacted sites. Given the amount of organic chemicals used in processing, of which many have benzene bases and proprietary ingredients, the presence of organic priority pollutants cannot be ignored. Below the recommendations we have included the water descriptions for four of the many elevated priority pollutants Minntac reported above 5 ug/l. We have highlighted in red the areas that demonstrate Minntac's results are higher than normal background nationwide. ATSDR Toxic Profiles provide much more information than we can give here, including federal and state regulations about the toxic pollutant, always in Chapter 8, as of the date of the document.

Health Risk Limits (HRLs) are applicable because the state definition of Toxic Pollutant <u>is defined by the following Regulation and Statute:</u>

> Minn. Rules Ch. 7001.1030
> Subp. 30. Toxic pollutant. "Toxic pollutant" means a pollutant listed as toxic under section 307(a)(1) of the Clean Water Act, United States Code, title 33, section 1317(b)(1), or as defined by Minnesota Statutes, section 115.01, subdivision 20.
>
> Minn. Statute Ch. 115.01 Subd. 20. Toxic pollutants. "Toxic pollutants" means those pollutants, or combinations of
> pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the agency , cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformation, in such organisms or their offspring.

Below is important information that requires action. These are examples of the type of work that MPCA/Minntac must complete when assessing the risk of organic chemicals.

Bis(2-ETHYLHEXYL)PHTHALATE= Di(2-ethylhexyl)phthalate (DEHP)
Minntac Detection Reported = 100 ug/l

From Agency for Toxic Substances and Disease Registry (ATSDR) This is part of the center for Disease Control (CDC):
NTP:Reasonably Anticipated to be a Human Carcinogen

USEPA drinking water standard: 6 ug/l
MCL: 6 ug/l
MCLG (Maximum contaminate level goal): 0 [zero means there is no safe level known]
Water quality criteria—human health for consumption of:
Water and organism: 1.8 µg/L
Organism only: 5.9 µg/L
Minnesota Department of Health, [human] Health Risk Level (HRL) Acute 20 ug/l
Short-term 20 ug/l
Subchronic 20 ug/l

DI (2-ETHYLHEXYL)PHTHALATE (DEPH)
Minntac Detection Reported = 100 ug/l
Source ATSDR:
DEHP was detected in 13% of 86 samples of urban storm water runoff evaluated for the National Urban Runoff Program, at concentrations ranging from 7 to 39 ppb (Cole et al. 1984)... For example, Stubin et al. (1996) reported that DEHP was present in 48% of the influent and 12% of the effluent samples taken from New York City sewage treatment plants during 1989–1993. Thus, storm water runoff, even when it goes through a sewage treatment plant, might enter the environment. In addition, DEHP also appears to be present in the treatment plant influent whether or not it receives storm water. DEHP has also been reported in wastewater from a petrochemical plant (Castillo et al. 1998), leachate from industrial and municipal landfills (Brown and Donnelly 1988; Castillo et al. 1998; Ghassemi et al. 1984; Roy 1994), and sewage sludge (O'Connor 1996). It is anticipated that water from all these sources enters the environment and might contain DEHP.

Chlorophenol
Minntac Detection reported = 10 ug/l
Source: ATSDR: 5.2.2 Water
According to the Toxic Chemical Release Inventory (TRI), in 1996, releases of chlorophenols to the water from three large processing facilities were 6 kg (13 pounds) (TR196 1998). There were no releases of chlorophenols into publicly owned treatment works (POTWs) in 1996 (TR196 1998). Table 5-l lists amounts released from these facilities. The TRI data should be used with caution because only certain types of facilities are required to report. This is not an exhaustive list.

The majority (85%) of known environmental releases of three chlorophenols (2-CP, 2,4-DCP, and 2,4,6-TCP) were to surface water (Scow et al. 1982). The estimated 1977 water emissions of 2,4-DCP were 741,000 pounds from U.S. production facilities (Scow et al. 1982). Industrial waste discharge is a major point source of water pollution by mono- and dichlorophenols (Krijgsheld and Van der Gen 1986). Monochlorophenol concentrations of between 10-20 µg/L have been released in waste water produced during the manufacture of specialty chemicals (Buikema et al. 1979; Hites et al. 1979), and 5.3 µg/L of 4-CP was detected in a bleaching effluent released to surface water from a straw mill (Folke and Lindgaard-Jorgensen 1985). 2,4-DCP or 2,4,6- TCP were also detected in effluents discharged from industries that manufacture iron and steel, electrical components, photographic equipment/supplies, pharmaceuticals, and organic chemicals/plastics and

from paper pulp and paperboard mills (EPA 1981; Paasivirta et al. 1985). Oikari et al. (1985) reported that concentrations of 2,4,6-TCP and 2,3,4,6-TeCP were higher downstream from a pulp and paper mill than upstream from the facility. Free chlorophenols were still present in water 11 km downstream from the mill.

Other sources of discharge of chlorophenols into aquatic systems include sewage treatment plants and drinking water treatment, which can result in the chlorination of phenol. In a study of 40 Canadian potable water treatment facilities, 4-CP, 2,4-DCP, and 2,4,6-TCP are the three halogenated phenols found most frequently in samples taken from chlorinated water supplies (Sithole and Williams 1986). The frequency of detection ranged from 1 to 12 out of 40 samples. Mean values were <7 Ng/L and the maximum values <130 Ng/L. 2-CP has also been detected in treated drinking water in the Netherlands (1 μg/L) (Buikema et al. POTENTIAL FOR HUMAN EXPOSURE 1979). The maximum monochlorophenol concentrations measured in river water range from 2-6 μg/L (Krijgsheld and van der Gen 1986)

4-BROMOPHENYL PHENYL ETHER
Minntac Detection Reported = 5 ug/l
Source: National Medical Library:
Environmental Water Concentrations:
SURFACE WATER: In an analysis of the US EPA STORET Data Base, 4-bromophenyl phenyl ether was positively detected in 0.1% of 840 water observation points at a median concentration below 10 ppb (1). 4-Bromophenyl phenyl ether has been qualitatively detected in raw water taken from the Mississippi River (in LA) in 1970(2).
[(1) Staples CA et al; Environ Toxicol Chem 4: 131-42 (1985) (2) Shackelford WM, Keith LH; Frequency of Organic Compounds Identified in Water. USEPA-600/4-76-062. p. 125-6 (1976)] **PEER REVIEWED**
DRINKING WATER: 4-Bromophenyl phenyl ether has been qualitatively detected in raw and finished drinking water taken from the Mississippi R (in LA) in 1970, in finished drinking water collected in Cincinnati, OH in Jan 1976, and in unspecified finished drinking water (from the USA) collected in July 1975(1).[(1) Shackelford WM, Keith LH; Frequency of Organic Compounds Identified in Water. USEPA-600/4-76-062. p. 125-6 (1976)] **PEER REVIEWED**
GROUNDWATER: 4-Bromophenyl phenyl ether was detected in 1% of groundwater samples collected in EPA Region 9 but not in EPA Region 1-8 or 10 from a total of 500 disposal investigation sites in the U.S.(1).
[(1) Plumb RH Jr; in Environ Sci Pollut Control Ser 4(Groundwater contamination and analysis at hazardous waste sites): 173-97 (1992)] **PEER REVIEWED**

Phenol
Minntac Detection Reported: 10 ug/l
Source: ATSDR
6.4.2 Water
Phenol has been detected in surface waters, rainwater, sediments, drinking water, groundwater, industrial effluents, urban runoff, and at hazardous waste sites. Background levels of phenol from relatively pristine sites can be as high as 1 ppb for unpolluted groundwater and have been reported to range from 0.01 to 1 ppb in unpolluted rivers (Thurman 1985). Phenol has been detected in Lake Huron water at 3–24 ppb (Konasewich

et al. 1978) and industrial rivers in the United States at 0–5 ppb (Sheldon and Hites 1978, 1979). The annual mean concentration of phenol in water from the lower Mississippi River was 1.5 ppb (EPA 1980). River water in an unspecified location in the United States was reported to contain 10– 100 ppb of phenol (Jungclaus et al. 1978). Phenol was detected, but not quantified, in a Niagara River watershed (Elder et al. 1981) and in 2 of 110 raw water samples analyzed during the National Organic Monitoring Survey (EPA 1980).

6. POTENTIAL FOR HUMAN EXPOSURE In a study of 95 organic waste components from 139 streams in 30 states from 1999 to 2000, phenol was detected in 85 samples with a median concentration of 0.7 μg/L (Kolpin et al. 2002). Phenol has been detected in China in water samples taken near the Huanchao River water factory, in the Tanking River, and near the Tanking River water factory at concentrations of 0.053, 0.044, and 0.033 μg/L, respectively (Huang et al. 2003).

Each year about 30 million gallons of mine water is pumped into the Samara River in the Ukraine. Phenol was detected in the surface water in the Samara River from 1987 to 1990 with concentrations ranging from 1.5 to 8.3 μg/L (Goncharuk and Milyukin 1999). In a study of organic contaminants in the groundwater from creosote contaminated sites in Denmark, phenol was detected in all 11 sites tested with concentrations ranging from 11 to 249 μg/L (Johansen et al. 1997).

In general, higher levels of phenol appear to be found in lakes and rivers that serve as water sources and discharge receivers for industrial and population centers, probably as a result of industrial activity and commercial use of phenol-containing products. For example, the presence of higher levels of phenol in the Delaware River near Philadelphia is the result of industrial effluents discharged into the sewer system (Sheldon and Hites 1979). Phenol was detected in 23% of samples of influent of wastewater from New York City during 1989 to 1993 at concentrations ranging from 8 to 490 g/L; phenol was detected in 2% of effluent samples at concentrations ranging from 6 to 310 g/L during the same period (Stubin et al. 1996).

The presence of phenol in drinking water probably results from using contaminated surface water or groundwater as a source. Its presence in groundwater is probably the result of release to soil, often industrial releases or leachate from waste dumps, and the subsequent leaching of phenol through the soil to the groundwater. Phenol has been detected, but not quantified, in drinking water from 5 of 14 drinking water treatment plants between July 1977 and June 1979 in one of three sites (groundwater source), in three out of ten (surface water source) as well as water source used after distribution (Fielding et al. 1981). Phenol levels in tap water, spring water, and mineral water in Italy were 0.58, 0.051, and 0.161 μg/L, respectively (Achilli et al. 1995). Phenol was detected at a maximum concentration of 1,130 ppm in nine wells in Wisconsin after a spill, and was detected for at least 1.5 years after the spill (Delfino and Dube 1976). It was found at concentrations up to 10.4 ppm in groundwater from a sand aquifer adjacent to waste ponds at a wood-preserving facility in Florida (Goerlitz et al. 1985), and was detected at 6.510,000 ppb in two aquifers 15 months after the completion of a coal gasification project (Stuermer et al. 1982). Phenol was detected at a maximum concentration of 1.9 ppm in

leachates from landfill sites in Illinois (Clark and Piskin 1977). Near a landfill in central Florida, phenol was found in groundwater and surface water at about 17and 15 ppb, respectively (Chen and Zoltek 1995). Phenol was detected, but not quantified, in the groundwater at 13.6% of 178 Comprehensive Environmental Response Liability Act (CERCLA) hazardous waste sites (Plumb 1987).

Phenol was detected during seven rain events in Portland, Oregon, between February and April of 1984. Concentrations in rain ranged from >75 to 1,200 ppt, and averaged above 280 ppt. Gas-phase concentrations ranged from 220 (56.1 ppt) to 410 ng/m105 ppt) and averaged 32082 ppt) (Leuenberger et al. 1985). Phenol can also be transported in snow and rain. In Germany, phenol has also been detected in clouds at Mount Brocken in June 1994 and during April to May in Great Dun Fell with mean concentrations of 3.0 µg/L and 5.4 µg/L, respectively (Lüttke 1999). Snow from Neulaniemi, Muonio, and Levi, Finland, contained phenol in concentrations of 0.16, 0.04, and 0.02 µg/kg, respectively (Poliakova et al. 2000). In Russia, phenol was detected in snow samples at concentrations of 0.02, 0.21, and 1.3 µg/kg in Butovo, Moscow State University, and Shosse Entuzoastov (a heavily industrial district in Moscow), respectively (Poliakova et al. 2000).

Phenol has been detected in the effluent discharges of a variety of industries. It was found in petroleum refinery waste water at concentrations of 33.5 ppm (Pfeffer 1979) and 100 ppb (Paterson et al. 1996), in the treated and untreated effluent from a coal conversion plant at 4 and 4,780 ppm, respectively (Parkhurst et al. 1979), and in shale oil waste water at a maximum of 4.5 ppm (Hawthorne and Sievers 1984). It has also been detected in the effluent from a chemical specialties manufacturing plant at 0.01– 0.30 ppm (Jungclaus et al. 1978), in effluent from paper mills at 5–8 ppb (Keith 1976; Paterson et al. 1996), and at 0.3 ppm in a 24-hour composite sample from a plant on the Delaware River, 2 and 4 miles downriver from a sewage treatment plant (Sheldon and Hites 1979).

A study of the seasonal effects on the concentration of pesticides as well as other contaminants in Gulf of Gdansk in the Baltic Sea from autumn 2001 to spring 2003 showed only 1 out of 14 samples taken in autumn to have a detectable level of phenol with a concentration of 2.3 µg/L (Kot-Wasik et al. 2004). In the spring, phenol was detected in 11 of the 14 samples at concentrations ranging from 0.3 to 0.8 µg/L (Kot-Wasik et al. 2004).

Phenol has also been found in the primary and secondary effluent from the Los Angeles City Treatment Plant at concentrations of 32 and <10 ppb, respectively (Young et al. 1983). It was found in 3 of 86 samples of runoff from 2 of 15 cities at 3–10 ppb by the U.S. Nationwide Urban Runoff Program as of July of 1982 (Cole et al. 1984).

Clearly Minn. Rules Ch. 7001.1090 Subp. 1. A. states that no discharge of toxic pollutants is allowed, and this above information would point to the fact that numerous chemicals with detection require further testing to determine the validity of the results. Our understanding of Minn. Rules Ch. 7001.1090 above, is that without effluent limits no discharge of toxic pollutants is allowed in any quantity.

Non Priority Pollutant Organic Chemicals

Where are the changes:
Monitoring of source, receiving waters, and ground waters pages 12 thru 21.
What are the Changes :
Monitor and identify reasonable potential for effluent limits on Minntac's organic pollutants.
Why are the Changes Needed: Minntac uses many additive chemicals. The draft permit is clear (draft permit, p. 4.) that organic chemicals are used in processing. Using the draft permit data in the 24-hour 365-day/year operation, a total of 6,386,040 lbs. additive chemicals plus unknown chemicals and volumes are used (Source: draft permit. p. 4). However, the chemicals listed in the draft permit were entirely different from those listed in the permit application. The application indicated a 24/365 operation would use a total of 14,493,943 pounds/yr.

The draft permit p. 4-5 describes the waste water and rate inputs to the TB. Those inputs with unknown characteristics should be sampled a statistically significant number of times for organics and toxicity to assure that the constituents in those inputs are part of the analytical suite at other locations, the TB, surface water seeps, SD001, the new MW 11 nest, and other locations to be added elsewhere as described in these comments.

Minntac's Permit application dated 2011 listed all the chemicals used at that time. This list included: Flotation Chemicals (Amines/Collectors, Frothers, Antifoams, Flocculants, as well as Scrubber Blowdown Treatment, Descalers, Dust suppressants, Freeze Conditioners, Slag inhibitors, Microbiosides, Wetting agents, Cleaners, and Miscellaneous (2011 permit application, Table C-1). Included in the permit application were use rates and Material Safety Data Sheets (MSDS) for each chemical.

The MPCA Permit application form (P2) requires: "Chemical Additives 20. List below all chemical additives that are used or proposed to be used at the facility ... Product Name, Location of chemical addition, Frequency of addition, Average rate of use (weight or volume per year) Attach the Material Safety Data Sheets, complete product labels and any other information on chemical composition, aquatic toxicity, human health, and environmental fate for each chemical additive." The names, rate of use and the Materials Data Safety Sheets (MSDS) for the 2011 application are included in the Application's Appendix C, but product labels, and other information on chemical composition, aquatic toxicity, human health, and environmental fate are missing. Since this information is not required in the MSDS some manufacturers provide this limited information in the MSDS's and many do not. Where they did not, the information sometimes may be found elsewhere, but Minntac did not provide the remainder of the required information on Form P2. Large discrepancies exist between the Draft permit page 4 chemicals used, and Minntac's 2011 permit application and the approvals since January 2011 (7 chemical additives approved by MPCA since January 2011). For example:
The Draft permit specifies only ten of the additive chemicals that are stated to be used in the operation. The application Table C-1 lists 71 chemicals.
On Dec 12, 2016 we contacted Erik Smith of the MPCA, by telephone and e-mail regarding these discrepancies requesting any updates to the permit application that may exist. Eric responded, stating that the permit application chemicals on table C-1 were accurate and added the approved chemical additives since January 2011, including 3 collectors, 1 flocculant , 2 antiscalants, 1 biocide, and 1 corrosion control chemical. MSDS sheet for these chemicals were also supplied. At rates approved by MPCA, the total discharge of all these chemicals is 14,493,943 lbs./year (Liquid amounts that were reported in gallons we converted to Lbs., assuming that the weight per gallon is close to or equal to the weight of water @ 8 lbs./gal).

After used, the chemicals are discharged with the tailing into the tailing basin at different locations depending on where the settling pond(s) located at that time. Seepage can then go in any direction depending on the geographical location of the pond and undefined flow paths within the basin. This would be a major factor accounting for part of the variation in the chemistry measured only in the known discharges to receiving waters both surface and ground water. It is likely there are other releases point that are yet to be identified.

Although priority pollutants are analyzed for (above), they fail to also analyze for the 14,493,943 lbs. of organic chemicals reported in the Draft permit, residuals of which the company discharges to the tailing basin annually.

MSDS's are legally required to protect workers that handle chemicals from a direct human toxicity exposure and related health effects. They also can supply ingestion information, e.g. rat ingestion toxicity, as well as spill cleanup information etc. Over the years, some manufacturers have voluntarily included limited ecological toxicity information such as ecological toxicity, chemical mobility, biconcentration, and decomposition. We find this information a starting point for evaluating potential water related impacts. In this evaluation we are using MSDS data to decide if a product should be further analyzed chemically and biologically onsite. This is not a replacement for an ecological risk assessment. Some manufacturers choose not to provide ecological information in the MSDS and others do provide limited information. For example below is the list of reported chemicals used for collectors, frothers, antifoams, and flocculants, from the Application, Table C-1, that have MPCA- approved rate of use and what is known about their ecological effects from the MSDSs. They are all organic chemicals (chemicals containing carbon). It is unclear if more than one approved chemical can be used simultaneously or only separately. For this discussion we will assume single use. Many other organic chemicals are approved for use and are discharged in the tailing basin.

1.Arosurf MG 82/DA-16.5 425 lbs./hr.
Toxic to fish;

2. Air Products M30-3 425 lbs./hr.
No data on toxicity; mobility, degradation, bioaccumulation;

3.Air Products M100-7 425 lbs./hr.
No data toxicity, mobility, degradation, or bioaccumulation

Frothers

3. Nalco 9843 101 lbs./hr.
No toxicity has been conducted. Mobility =Env. Fate (fugacity) 5-10% air, 30-50% water, 50-70% soil/sediment (adheres to water, soils and sediments). Based on our hazard characterization, Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate. If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Flocculants

4.Ciba Zetag 7122 300 lbs./hr.
Toxicity: Rainbow Trout LC50- 0.42 mg/l, fathead minnow/Bluegill sunfish- LC50 0.42-1.28 mg/Daphnia magna- LC50 92 mg/l; Acute Algae (unnamed test species) from polymer- EC50 - NOEC=0.065 mg/l; polymers, BOD =44,000mg/l, COD 250,000 mg/l

5. Ciba MagFloc 1011 300 lbs./hr.
Toxicity: algae –ND, trout 18 mg/l LC50; Daphnia magna LC50 50 mg/l with humic acid; BOD-ND; COD-ND; Total O2 –ND Biodegradability-ND; Additional env. data –ND.

6. Chem Treat P-817E 2,200 gal/yr.
Toxicity: Fathead Minnow LC50 >1000 mg/l; (Algae (unnamed test species)-EC50 > 1,000 mg/l; Daphnia magna LC50 15 mg/l
The above list demonstrates that millions of pounds of just these organic chemicals are discharged to the tailing basin each year. From this data in this table we can conclude the following: Nothing is presented in the MSDS as to degradation products; Bioaccumlative effects; chemical mobility; synergistic effects of the chemical or its degradation products. Some MSDS's provide bioassays showing low-level (mg/l & ug/l) toxic effects on invertebrates, vertebrates (fish), and algae.

In conclusion, there are roughly fourteen million pounds of organic chemicals proposed by the 2011 Application into the seeping tailing basin per year with MPCA approval of the chemicals and rates use. However there is no data presented in the permit application to allow relevant permit decisions to be made regarding these chemicals' environmental impacts. In order to submit a complete NPDES permit application for an individual permit, the applicant must present data to properly characterize its discharge to enable a reasonable potential analysis to be completed by the permit writer at the time of permit issuance (40 C.F.R. § 122.44(g)(7)). The draft permit has no required chemical monitoring for the organic chemicals' presence and effects in the discharges, surface water, ground water or sediments. The draft permit requires insufficient, organic chemical testing.

Where the changes:
Effluent Limits pages 11 thru 21
What are the changes:
All parameters that are limited by rule in the surface or ground water must be limited in this permit. "No Monitor Only" parameters should be allowed unless they have no numerical standard in the applicable rules.
Why are the changes needed: 40 CFR 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see §123.25). (d) Water quality standards and State requirements: any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301, 304, 306, 307, 318 and 405 of CWA necessary to:

> *(1) Achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality.*
> *(i) Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*
> *40 CFR 122, "Appendix A to Part 122—NPDES Primary Industry Categories*
> *Any permit issued after June 30, 1981 to dischargers in the following categories shall include effluent limitations and a compliance schedule to meet the requirements of section 301(b)(2)(A), (C), (D), (E) and (F) of CWA, whether or not applicable effluent limitations guidelines have been promulgated. See §§122.44 and 122.46." [applicable to ore mining].*

Minntac's permit was written so weakly in the past and present that they have not been enforceable, because they have few enforceable effluent limits that would control the permittee's pollution from affecting the Minn. Rules Ch. 7050.0140 uses. The monitoring

has been non-existent to identify toxic pollutants and their levels since EPA toxics guidance was promulgated. As a result violations and excursions over Minnesota standards and definitive effects on the uses have occurred for 29 years without MPCA's or the public's ability to correct the impacts. "Monitor only" requirements gives no incentive to Minntac to comply. Minntac is a multi-national corporation, it has responsibility to understand the regulations that apply to them and act within them. In other words parameters exceeding standards should not be a "surprise". After 29 years of operation Minntac should be provided no extra time through "Monitor only" provisions in the permit.
MPCA must establish effluent limits, and enforce the permit and State and federal rules.

Inorganic Chemicals:

Where are the changes:
Draft Permit: Pages 12,13,14,15,16 SD001, SW001, SW003, SW005, SW006, SW007, SW008.

What are the changes needed:
Effluent limits must be required for all parameters that are found currently or in the future to have significant potential. To date this would include, but not be limited to, specific conductivity, sulfate, bicarbonates, total suspended solids, total mercury. The MPCA can still implement compliance schedules, but these schedules must not exceed the life of the existing permit as this permit proposes.

In the future if new exceedances of a standard are found, MPCA must make permit modification that places additional effluent limitations in the permit, and necessary compliance schedules not to exceed the life of the existing permit could be added.

Why are the Changes Needed:
Minntac is currently in non-compliance with surface water standards. The monitoring has been inadequate to identify chemical and toxic pollutants.
The use of interim limits and "monitoring only requirements" allows the company, public and the courts to assume the permit is in compliance with the regulatory standards, when the company is in compliance with the permit, but it has no effluent standards. Using effluent limits based on standards enables enforcement if the company does not comply with the permit, fines would be based on the entire period of non-compliance with the standard-based effluent limits. This would also allow the public and the courts to understand the extent of exceedance of the standards. Using discharge limits puts the company on formal notice that they are in noncompliance. It also informs the USEPA and public the company is in a non-compliant status with the rules.

Specifically, the first Minntac NPDES permit was issued in September 30, 1987 (MPCA Fact Sheet). Since that date permit renewals are required every 5 years. Only one permit has been issued in 29 years. Thus, volumes of chemical parameters and their concentrations should have been collected on Minntac's discharges for over 29 years. Over these years there likely has been changes in both beneficiation chemical uses, operations, tailing basin size that have been approved by MPCA. Yet, this draft permit apparently has insufficient chemical data to apply surface water effluent limits other than that MPCA is required to apply by federal regulations for generic iron mining, or chemicals that the Agency has sufficient data for that demonstrates that the company can comply.

Lack of surface water effluent limits will not control violations and excursions over Minnesota standards The lack of scientifically valid effluent standards in permits effectively removes the public's ability to participate and correct the problems under the Clean Water Act (Section 505) through the Courts. This draft permit gives no incentive for a company to comply. This permit must identify all pollutants and toxic pollutants, establish effluent limits, and must be drafted to allow MPCA or the public to enforce the permit and rules through legal processes.

Where are the changes:
Summary of stations, pages 10-21
What are the changes needed:
Add the following inorganic chemicals to all surface water and drinking water sites with effluent limits: Cadmium, Silver, Thallium,.
Why are the changes needed:
The Minntac Permit Application, Table 2 reported chemicals at the following concentrations:
Cadmium Max. =3 ug/l, Ave. 3 ug/l, N=34,
Chronic 2B standard (assume hardness of 200 mg/l is background) = 2.0 ug/l;
Silver max =1 ug/l Ave.= 1 ug/l, N=34;
2B standard= (assume hardness of 200 mg/l is background) Chronic 0.12 ug/l;
Thallium Max=4 ug/l, Ave=4 ug/l, n=33;
2B Chronic standard=0.56 ug/l.
These three metals are above both 2B and 2A the chronic water quality standards. Thallium is a human health based contaminate, the other two are toxicity based toxicants.

Cyanide Max= 4 ug/l, N=1
2B Chronic standard=5.2 ug/l
Only one sample exists for this parameter, and that sample is 77% of the numeric In-stream limit. At minimum 10 samples must be taken at all surface water sites to verify its presence or absence.

Mercury is not reported in Table 2. It is well known that mercury is a human health problem in fish in Minnesota. Currently the 2B standard is 6.9 ng/l and human health based. Mercury must be monitored and limited in all surface water sampling sampling sites.

Where are the Changes:
Summary of Stations, page 18, SDOO1 and any newly identified surface water seepages not in the permit.
What are the Changes needed:
Mass loading calculations for mercury must be added to this site and any other seepage locations identified in the future.
Why are the Changes needed:

Mercury is a major concern in the NE Minnesota. It is important to know point source loadings to understand past, present and future loadings to receiving waters and ground waters.

Where the changes:
Summary of stations, page 18, SDOO1, Page 16, WS009
What are the changes:
Unionized ammonia must be sampled during the warm weather at SD001 and any new seepages that are identified during this permit. Do reasonable potential for limits.
Why are the changes needed:
4A and 4B standards apply to wildlife and public use benefits (Minn. Rule Ch. 7050.0224, Subp. 1. The rule limits unionized ammonia at 5 milliequlivants per liter (Minn. Rule Ch. 7050.0224, Subp. 2.) Unionized ammonia is highly toxic. Some of the beneficiation reagents contain amines, significant amounts are discharge to the tailing basin, the MPCA tests for amines. Testing for amines alone assumes that it does not decompose into its base elements, nitrogen or what form the nitrogen will take e.g. nitrate, nitrite, or ammonia. Blasting agents are also used. These are comprised of ammonium nitrate fuel oil (ANFO). It is documented that ANFO residues adhere to both waste rock and tailing. And are found in both waste rock seeps and tailing wastewater (Morin et al, 2009). No requirements for testing or limits are applied in the draft permit. Considering the Draft permit states that wastewater flow into the tailing basin amounts to 22,000 g/min or 31,680,000 gallons per day (permit application page 2.) it is important to verify if unionized ammonia is present in the surface water discharges.

Biological Monitoring

Where the changes:
Ch.7, Sec.2 Para. 2.2
What are the changes:
The permit fails to require the algae bioassay when they use WET testing. SD001 and all other WET testing in the permit must add WET testing that includes the algae, *Selenastrum capapricornutum*), (USEPA Method 1003.0).

Why are the changes needed:
USEPA guidance establishing Test Procedures for the Analysis of Pollutants; Whole Effluent Toxicity Test Methods; Final Rule for 40 CFR Part 136 EPA explains in the Technical Support Document for Water Quality-Based Toxics Control (TSD) (USEPA, 1991) "The TSD recommends that WET tests using the most sensitive of at least three test species from different phyla be used for monitoring the toxicity of effluents." In other words, the draft permit must also require a plant species to be tested. In this case the likely species is the fresh water algae *Selenastrum capricornutum*. The EPA test method is described in: USEPA Wet Methods, Section 14 Test Method Green Alga, Selenastrum capricornutum, Growth Test Method 1003.0, 2007. It is well documented that many plants are sensitive to elevated ion concentrations that upset their internal osmotic balances and impact them by reducing populations due to chronic toxicity or by populations being extirpated entirely.

Where the changes:
Ch. 7, Sec1, Para1.1
What are the changes:
At minimum, tests must be performed in spring, summer, fall, and winter. A minimum 10 samples per seepage must be aquired.
Why are the changes needed:
In order to perform a reasonable potential analysis to expedite any correction efforts from non-compliance.

Where are the changes:
Ch. 7 section 1.2
What are the changes needed: One sample of the quarterly sample each year must be during the frozen winter months (Dec, Jan, Feb.).
Why are the changes needed:
Low flows are predictable in winter months, since they lack dilution influences from precipitation (Lapakko, 2015). Lacking dilution, the concentration of contaminants increases. The lack of dilution water can extirpate benthic invertebrates and other organisms during the most stressful time of the year.

Where the changes:
Ch7, Para.1, sec.1
What are the changes:
All newly located daylighting seepages must require WET testing. The tests must be taken. A minimum 10 of samples per seepage.
Why are the changes needed:
The unidentified daylighting seepages from the 8,700 acre basin that buried both the Dark River and Sand River watersheds are only partially defined. Due to the fact that internal basin water courses cannot be defined as to internal contact time, or past chemistry (beneficiation chemicals or waste minerals), the WET testing must be added in order to perform a reasonable potential analysis, and also to expedite the correction of any non-compliance.

Where the changes:
Ch.7, sec. 1 para. 1
What are the changes needed:
Add WET Sampling to the Dark River at SW003.
Why are the changes needed:
The Dark River from SD001downstream becomes a Class 1B, 2A, 3B, trout water (this appears to be left out in the heading on the first page of the permit under "receiving waters"). Known inorganic parameters from the outfall SD001 and the wastewater in the ground water is daylighting from along the Dark River estimated to be as far down river as SW003. Chronic WET testing must be added to this site to help determine synergistic effects from the tailing basin. Additionally since this area is above a trout stream it must be compared with the USEPA laboratory chronic testing data for trout bioassays, to determine if rainbow trout bioassays should be added to SD001 and SW003 measurements.

Where the changes:
Ch.7.Sec 1 Para. Sec. 1.1;
What are the changes needed:
All WET testing results must be limited at the issuance of this permit not as a "monitor only".
Why are the changes needed:
Language reflecting the effluent limit to protect surface waters from toxic pollutants pursuant to Minn. Rules Ch. 7050.0217 OBJECTIVES FOR PROTECTION OF SURFACE WATERS FROM TOXIC POLLUTANTS. Subp. 2. Objectives. "Protection of the aquatic community from the toxic effects of pollutants means the protection of no less than 95 percent of all the species in any aquatic community." Effluent limits must be applied on all surface waters in the area of Minntac to comply with this Rule.

If a sample site is found to be over the limit, the test is required to re-run (Ch. 7, Sec 1, Para. 1.5) and if it remains positive, the MPCA can require a corrective action, to last <u>for only the duration of the current permit</u>.

Where are the changes: Draft permit Chapter 7
What are the changes needed: Increase Whole Effluent testing program should changes be: WS009, SD001. This sampling should consist of two sample per month, similar to chemical sampling, to help to define differences between seasonal fluctuations and fluctuations in tailing slurry organic constituents.
Why are the changes needed? The draft permit states the tailing basin covers 8,700 acres on top the headwaters of two watersheds. It further states that underground seepages discharge into both the Dark River and Sand River, and that organic chemicals are used in large amounts and are discharged to the tailing basin (see organics comments). Thus given the sheer size of the basin covering two headwater watersheds, and the size of the seepages, four sample per year is inadequate to test for the discharge of chronic toxics (see: Appendix, Introduction Whole Effluent Testing). This sampling should consist of two sample per month, similar to chemical sampling, to help to define differences between seasonal fluctuations and fluctuations in tailing slurry organic constituents.

There are no contingencies for requiring Chronic Whole Effluent Tests on SW002, if it begins to flow, nor is there requirements to test with Chronic Whole Effluent Tests new seepages (such as Timber creek on page 15 of the draft permit) once discovered, as required in Ch. 5, page 32. This must be added to the draft permit. The benefit of testing in even low SC seepage water is that it would be used to help determine whether additional organics or their degraded forms that do not show up in inorganic tests are causing toxicity.

The tailing basin has been identified, by the draft permit, to release wastewater into the groundwater under the basin, some of which discharges (day-lighting) to surface waters. The surface waters closest to the basin (Admiral Lake and Little Sandy Lake, Dark Lake) must also have Whole Effluent Testing performed on a monthly basis.
It is documented that streams and mine pit lakes in the area (Strudell, et al., 1984; Pierce, R., et al., , November 1989), with high specific conductivity from major ions can have a currents or chemoclines of concentrated ions on the bottom of streams and lakes which will concentrate contaminants in these areas. Grab samples as described (Chapter 7 Section 2. Item 2.4) are inadequate to evaluate this effect. Thus each site must have discrete samples, not composite, from

bottom, mid-depth, and surface. Surface runoff (usually unimpacted dilution water) is at the lowest during late January and February, so samples should be taken in both months to estimate a worse case condition for the presence of a toxic density current. After 10 samples are acquired and analyzed a determination should be made regarding further sampling.

Where the changes:
Ch. 7.
What are the changes needed:
The chapter must address long-term impacts on benthic invertebrate population in both the Dark and Sandy Rivers.
Why are the changes needed:
Whole Effluent Toxicity and Chemistry tests are not the only tests required by EPA. It has been the USEPA position for years in their guidance to the States that sufficient testing includes Benchmark testing, as well as other newly developed guidance that must be used when permitting or evaluating contamination. The US EPA *NPDES Permit Writers Manual* states:

> *The control of toxic discharges to waters of the United States in an important objective of the CWA. To effectively accomplish this objective, EPA recommends an integrated approach to implementing water quality standards and developing WQBELs. This integrated approach includes three elements: a chemical-specific approach, a whole effluent toxicity (WET) approach, and a biological criteria or bioassessment approach.*

Where is the change: pp. 13-15
What is the change: Add effluent limits:
Specific Conductance, 320 uS/cm, calendar month maximum, Jan-Dec, Grab 1 x Mo.
Specific Conductance, 320 uS/cm, calendar month maximum, Jan-Dec, above-bottom sample, 1 x Mo.
Why are the changes needed:
The draft permit identifies Specific Conductivity as one parameter that exceeds the existing surface water standard of 1,000 uS/cm2 (SD001). Data from fact sheet (table 5) demonstrates the major ions that are a cause of the high SC are calcium, magnesium, sulfates and bicarbonates. pH data from the SD001 is 7.11 from Fact Sheet, p. 30, and the waters in twin lakes and the well around the basin are also circumneutral. Unimpacted waters in Minnesota's (Figure 1) 50 are low in SC. An example is Sand Lake at 100 uS/cm SC (Application, p. 14), although we cannot be certain this water is unaffected by Minntac. When calculating metals, the permit has used a hardness of 50, which is low (Fact sheet, p.29).

USEPA has completed a study in the eastern Appalachians under similar ion and water conditions, in which the impacts to benthic invertebrates by genus are extrapolated from elevated SC and population loss. (US EPA, A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams, March 2011) . The report was peer reviewed and accepted by the EPA Science Advisory Board (Stoner, 2011). Narrative standards were applied for the sub-ecoregions. EPA methods were challenged and subsequently upheld by the 4th Circuit Court of Appeals (United States Court of Appeals for the District of Columbia Circuit, *National Mining Association, et al., Appellees v. Gina McCarty, Sued in her Official Capacity, Administrator, US. Environmental Protection Agency, et al., appellants,*
EPA has provided a guidance letter that when conditions are similar, the method is acceptable to use in other areas. (Stoner, 2011). We produced a report (Johnson and Johnson report) that applied these methods to mining waste in Minnesota ecoregions 50n, the northern portion of 50p,

and 50t, the northeast portion of Minnesota Ecoregion 50. The report conclusion recommended that SC discharges should not exceed 300 uS/cm2 in these sub-ecoregions (Johnson and Johnson, November 2015).
The report was forwarded to MPCA and EPA Region 5. EPA Region 5 forwarded the report to the National Center for Environmental Assessment Office of Research and Development, Cincinnati, OH for peer review. In validating the Johnson and Johnson report, EPA Cincinnati looked for a paired data set not used by the Johnson and Johnson report, and acquired data from MPCA for 40,585 chemical samples from 2000 sites, and 734 invertebrate samples from 596 sites in Minnesota Ecoregion 50. Ecoregion 50 includes the Minntac mine. USEPA confirmed the Johnson and Johnson report conclusions and "estimated that more than 5% of genera would be extirpated in streams greater than 320 S/cm. However, additional analyses are needed to evaluate the effect of seasonal collection."(Cormier, Feb. 4, 2016).

Where: Draft Permit location: pp. 18-20, 42
Action: The permit must identify the mixing zone allowed, assuring 25% passage for aquatic life, and apply the EPA benchmark of 320 uS/cm2 for the narrative criteria for aquatic species outside of the mixing zone in surface waters. The EPA benchmark of 320 uS/cm2 specific conductance to (Eco)Region 50 should be an effluent limit in all surface waters impacted by the Minntac TB (see Map below of EPA's Region 50, provide appropriate language on p. 42 and add effluent limits to all surface water stations on pp. 18-20.
Reason: Add 2.2. language reflecting the effluent limit to protect surface waters from toxic pollutants pursuant to 7050.0217 OBJECTIVES FOR PROTECTION OF SURFACE W ATERS FROM TOXICPOLLUT ANTS. Subp. 2. Objectives. "Protection of the aquatic community from the toxic effects of pollutants means the protection of no less than 95 percent of all the species in any aquatic community ."

Given the data from the above documents, the current Class 4A conductivity standard of 1000 uS/cm2 for this Eco Region is not applicable to aquatic toxicity, and would not be sufficiently protective of the class 2 resource uses including aquatic life (Minnesota Rules Ch. 7050.0150 Subp. 3, Subp. 4, B, D, F, M, Subp. 6, and Subp. 6, E.). The permit must provide an effluent limit reflecting the 2B narrative rules for aquatic life and benchmarks recommended by both Johnson and Johnson and EPA Office of Research and Development, to be adjusted by the effect of seasonal collection upon additional analyses results. The adjustment will result from the determination of whether 320 uS/cm is strict enough to protect intolerant species, because spring sampling is more likely to detect intolerant species than the fall sampling that MPCA conducted.

The following document from EPA makes important statements.
Stoner, Nancy K, *Improving EPA Review of Appalachian Surface Coal Mining Operations Under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order*, memo, US Environmental Protection Agency, July 21, 2011.
p. 14
D. Determining the Need for a Water Quality-Based Effluent Limit: Reasonable Potential Analysis
The procedure for determining the need for WQBELs is called a "reasonable potential" analysis. Under EPA's regulations at 40 C.F.R. § 122.44(d)(1)(i), WQBELs are required for all pollutants that the permitting authority determines "are or may be discharged at a level [that] will cause, have the reasonable potential to cause, or contribute to an excursion above any [applicable] water quality standard, including State narrative criteria for water quality." Thus, if a pollutant discharge has the reasonable potential to cause or contribute to an excursion above any applicable water quality standard – including narrative criteria – the discharger's NPDES

permit must contain a WQBEL for that pollutant. 40 C.F.R. § 122.44(d)(1)(iii)-(vi).
In conducting a reasonable potential analysis, all valid representative qualitative and quantitative information regarding the effluent and receiving water should be used, as described above. To ensure that limitations are as stringent as necessary to meet water quality standards, consistent with 40 C.F.R. § 122.44(d)(1), permitting authorities should not defer reasonable potential analyses until after permit issuance. Under the CWA and its implementing regulations, an NPDES permit must contain limits as stringent as necessary to meet applicable water quality standards. CWA § 301(b)(1)(C); 40 C.F.R. § 122.44(d)(1). EPA recommends that the administrative record for a permit include evidence of a parameter-specific reasonable potential analysis in order to ensure compliance with these provisions.

p. 15
For existing discharges, permitting authorities should use all valid and representative facility-specific data as well as ambient data and any associated Total Maximum Daily Loads (TMDLs) to determine whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion above numeric and/or narrative water quality standards...

There are numerous tools that the permitting authority may use to determine whether a discharge will cause or has a reasonable potential to cause or contribute to an in-stream excursion above an applicable narrative water quality criterion, consistent with 40 C.F.R. § 122.44(d)(1)(ii) and EPA's TSD. These include State bioassessment methodologies; whole effluent toxicity testing; consideration of the effect on in-stream conditions from nearby, similar discharges; and consideration of best-available science related to the effects of similar discharges.
p. 17
E. Developing and Incorporating Protective Water Quality-Based Effluent Limits and Other Conditions
When developing WQBELs, the permitting authority must ensure that the limits are as stringent as "necessary to ... achieve water quality standards," and that the level of water quality achieved by such limits is "derived from and complies with all applicable water quality standards." 40 C.F.R. § 122.44(d)(1); CWA § 301(b)(1)(C).
Where there is reasonable potential for a pollutant to exceed a narrative criterion, and the state has not adopted chemical-specific criteria for such pollutant, then the permitting authority must establish a WQBEL based on one of the methods specified in the regulation. 40 C.F.R. § 122.44(d)(1)(vi). WQBELs are generally expressed as chemical-specific numeric limitations on the quantity or concentration of the pollutant or pollutant parameter that may be discharged. Additionally, WQBELs may be numerically expressed in terms of Whole Effluent Toxicity (WET). WQBELs may also be expressed in narrative form, such as BMPs or pollutant minimization measures, when it is infeasible to derive a numeric limit. 40 C.F.R. §122.44(k)(3). Any such WQBEL must be set at a level that is as stringent as necessary to meet water quality standards. CWA § 301(b)(1)(C); 40 C.F.R § 122.44(d)(1).
p.18
A permit that fails to include limits where necessary to meet applicable water quality standards is not consistent with the requirements of the CWA. 40 C.F.R. § 122.44(d)(1).

p. 20, footnote 25
In particular, the SAB noted that traditional laboratory surrogates are not suitable for testing the effect of changing major ion concentrations and that such organisms employ a different approach to osmoregulation that makes them much less vulnerable to high concentrations of major ions. Therefore, WET testing based on C. dubia or other currently employed laboratory surrogates would be

underprotective.

Ground Water

Drinking Water Standards in Ground Water and Surface Water (1B trout reach of Dark River)

Where are the Changes:
Chapter 10, p. 40 and Chapter 11 Surface water, p.41
What Are the Changes Needed:
Establish effluent limits for ground water (1C) and Dark River trout reach (1B) and include requirements in corresponding plans to assess private wells that may be affected by Minntac TB's contaminated ground water with a full suite of drinking water analyses to identify Manganese, Sulfate, and other potential TB pollutants such as organic pollutants and their degradates.
Why are the changes needed:
Manganese (Mn) and sulfate exceed drinking water MDH guidance and secondary drinking water standards, and the extent of shallow and deep ground water contamination is known to likely contribute to the Dark River for miles. The potential to affect nearby private wells is high; some are within a mile of the TB. Understanding that Mn and sulfate occur naturally in ground water, Minntac may be contributing to the exceedance of Manganese secondary standard and MDH guidance, and of sulfate secondary drinking water standard in the ground water.

The domestic consumption (DC) standard for Manganese in Class 1B surface waters and Class 1C waters (Class 1C is groundwaters in aquifers not considered to afford adequate protection against contamination from surface or other sources of pollution) is the same for both: 7050.0220 Subpart 3a. and 4a. (15) Manganese, total, µg/L; 50(S).

Too much manganese in drinking water may affect learning and behavior in infants. In older children and adults, consuming high amounts of manganese in drinking water over time may cause neurological problems… The current guidance value for manganese in drinking water is 100 parts per billion (ppb) for formula-fed infants and infants that drink tap water. The manganese guidance value for children and adults (including nursing mothers) is 300 ppb."
http://www.health.state.mn.us/divs/eh/risk/guidance/gw/mninfosheet.pdf.

Sulfate has a secondary standard of 250 mg/l because "sulfate can give water a bitter or astringent taste and can have laxative effects."
(http://www.health.state.mn.us/divs/eh/wells/waterquality/sulfate.html).

- Minntac, and if not Minntac then MPCA or MDH, should assess private wells.
  - Notify private well owners of potential contamination present and future.
  - Sample all private wells adjacent to Minntac property.
    - ID Well construction,
      - plastic, steel, other
    - depth in feet,
      - intake elevation
      - relative to Minntac: shallow, high mid, low mid, deep, above aquifer bottom,
      - formation contact: Biwabik Iron Formation, any argillite formation
    - Sample for
      - Mn
      - Sulfate
      - Drinking water parameters
      - Toxic parameters (GCMS scans)

Sample all private wells beyond the closest ring until non-detect for TB parameters in each.
Implement bottled water where applicable standards are exceeded.
Arrange sampling on regular basis at non-detect wells since ground water contamination is still spreading and will likely continue, even long after Minntac is gone.
Certified hydrogeologist should calculate rate and speed of plume in
shallow GW (to surface waters, rivers, wells)
mid (to ? and/or wells
deep GW to wells and formations.
As appropriate, provide or recommend bottled water by MDH, MPCA, or Minntac until Minntac is determined responsible or not.

Where the changes are needed?
Ch.9, Sec. 1
What are the changes?
The well requirements do not specify the types of casing and screen to be used (Plastic, Steel, Stainless Steel or other materials.)
Why are the changes needed?
This is critical for the analytical samples intended to be studied. For example, plastic wells are not recommended for organic samples. However, manganese concentrations will be affected by steel well casings. Manganese concentrations in plastic-cased wells were twice as high as those in steel-cased wells. This finding is consistent with a manganese-removal mechanism specific to steel-cased wells. (Lundy et al, Minnesota Department of Health). Therefore the type of casings and well screens must be specified so the screens and casing do not interfere will the chemicals to be analyzed.

Where the changes are needed?
Chapter 9
What are the changes?
Sample all private wells beyond the closest ring until non-detect in each, implement bottled water where applicable standards are exceeded
Arrange sampling on regular basis at non-detect wells since ground water contamination is still spreading and will likely continue, even long after Minntac is closed.
Why are the changes needed?
Using an Earth map (examples in Figures 2 and 3) it is clear private residences surround the tailing basin, some as close as approximately 1 mile from the basin. On the west side of the basin the fact sheet states: "*Insufficient information exists regarding the groundwater flow patterns and groundwater-surface water interactions along the Dark River to know at what point the river has ceased receiving tailings-impacted baseflow. Determining this would likely require a significant study in terms of time and expenditure. The existing SOC sampling point D-1 at the County Road 668 (CR668) crossing is 4.4 river miles downstream from its origin at the basin and 2.3 miles linearly distant from the nearest portion of the basin. It is very likely that this location is far enough from the basin that there is not any significant loading to the river downstream of this point, and it is the first downstream point on the river that has existing maintained access.*" Since MPCA is aware of the likely maximum effect of contaminated groundwater on the river 2.3 miles away, MPCA must address private wells that are in the range of one mile from the TB.

Where the changes are needed?
Chapter 9
What are the changes?

A certified hydro geologist should calculate rate and speed of plume in:

Shallow Groundwater (to surface water, rivers, wells);

Mid-depth (to groundwater and or wells);

Deep GW to wells and geologic formations e.g. Biwabic Iron Formation which is a drinking water source.

Why are the changes needed?

Because we know there are potential human receptors within 1 mile of the basin, and the trout reach is also a drinking water class.

Where the changes are needed:

Chapter 9

W**hat are the changes:** The existing wells to monitor the TB discharge are insufficient.

Why are the changes needed? The tailing basin covers 8,700 acre (10.4 sections) on the top of the Dark River and Sand River watersheds. The perimeter is approximate 12-15 miles. Considering the unknown distribution of TB discharge and the variety of contaminant movement characteristics, the existing wells cannot be representative of the entire perimeter discharges.

Where the changes are needed:

p. 22, 32, 42

W**hat are the changes:**

Plans should be improved to identify the changing nature of Minntac TB discharges, the extent of Minntac contamination, and a plan must be added to address protection of drinking water and potential users of groundwater and the trout reach.

Why are the changes needed?

In Chapter 5. Metallic Mining, 1. Mine Tailings Basin, 1.2, p. 32, monitoring of the seeps and seepage zones of the basin is required. The monitoring is minimal and does not reflect complete and important content of the discharges. These are discharges that may or may not be different from the data of the only current surface discharge SD001 being monitored. Over time, Minntac has changed their chemicals and volumes of chemicals discharged into the basin, the geochemistry of the ore and host rock could change in the mine, the locations of the discharge pipe into the 8,700-acre basin has changed, and the slimes, fine tailings, and course tailings depositions patterns have resulted in unpredictable flows within the tailings of the basin. Seepage could go in any direction depending on the geographical location of the pond and undefined flow paths within the basin. These would be major factors accounting for part of the variation in the chemistry measured in the receiving waters, both surface and ground water. For these reasons, each different seep and seep zone should be sampled at least three times including a seasonal low flow (winter) and a seasonal high flow (spring) to identify which adjacent areas are similar enough to be represented by one sampling point, with final sampling points likely in the range of a half mile apart, over the dam perimeter of about 12-15 miles.

The permit identifies other monitoring wells with various purposes. The MPCA has stated the importance of data on the deep ground water to the Dark River. It is also important to the Sandy River, as evidenced by the requirement for nested wells at Monitoring Well 11. And it is also important to determine threats to nearby drinking water wells, which is not and must be stated in the permit.

These approximately 30-50 proposed wells on the dam perimeter are also points where nested wells should be placed for the ground water and deep ground water sampling plan(s), with proper construction for the chemicals being analyzed. For example, Manganese results will be lower by about half if stainless steel wells are used (Lundy, J. and Soule, R, Minnesota Department of Health,

Initial Assessment of Manganese in Minnesota Groundwater Memo, September 5, 2012, p. 5). Organics should not be sampled from plastic wells.

We recommend all wells be nested. Nested wells are screened at differing levels, shallow, mid-depth level(s), and toward the bottom of the aquifer where the more dense chemicals will settle (this addresses the chemical floaters, generally well-mixed chemicals, and sinkers). For example, specific conductance and sulfates have been documented on the Mesabi and Vermilion iron ranges in abandoned mine pits and leachates in streams. These chemicals are found at much higher concentrations in chemoclines or density currents at lower lake levels and at the bottom of flowing waters. For organic chemicals such as flotation reagents, they may float, be well mixed or settle when they leave the TB and move in the groundwater. A certified hydrologist with advanced training should be able to provide guidance for well planning.
The well locations must be at the foot of the tailing basin in order to identify the specific chemicals at their highest concentrations. Because the extent of contaminated ground water is unknown, at least two nests should be placed in an adjacent equivalent watershed to serve as background (unimpacted) ground water. Additional wells should be placed to determine the extent of the contamination.

Chemicals to be analyzed: The analytical profile should include at least the Priority Pollutant (Toxic) list, additive chemicals and their degradation products past and present, and chemicals that are in the waste rock and in the ore.

Minn. Rules 7050.0217, OBJECTIVES FOR PROTECTION OF SURFACE WATERS FROM TOXIC POLLUTANTS, and 7050.0218 protect Class 2 and Class 7 uses, and establish methods for developing site-specific water quality criteria for toxic pollutants in the absence of numeric standards listed in Minn. Rules Ch. parts 7050.0220, 7050.0222, and 7050.0227, to include protections from toxic effects on aquatic organisms, adverse effects for humans, and protection for the most sensitive wildlife species that eat aquatic organisms. Toxic pollutant is defined as:

> *a pollutant listed as toxic under section 307(a)(1) of the Clean Water Act, United States Code, title 33, section 1317(a)(1), or as defined by Minnesota Statutes, section 115.01, subdivision 20.*
> *which is:*
> *Toxic pollutants. "Toxic pollutants" means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the agency, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformation, in such organisms or their offspring.*

All of these actions are advised on the basis of:

> Minn. Rules Ch. 7053.0155 DETERMINATION OF COMPLIANCE.
> *In making tests or analyses of the waters of the state, sewage, industrial wastes, or other wastes to determine water quality condition and compliance with effluent limits and nonpoint source reduction measures, samples must be collected in a manner and place, and of such type, number, and frequency, as may be considered necessary by the agency to adequately reflect the condition of the waters, the composition of the effluents, and the effects of the pollutants upon the uses specified in part 7050.0140.*
> *The extent of dilution allowed regarding any specific discharge as specified in subpart 7 must not violate the applicable water quality standards in chapters 7050.*

Where the changes are needed:
Draft Permit p. 10, and plan

What are the changes:
A new ground water background location in a parallel watershed should have nested wells for depth comparisons to TB ground water issues. Use the natural background as the standard for underground waters if its quality is better than drinking water standards.
Why are the changes needed?
"GW010 is located roughly 1200 feet east of the southeast corner of the basin and appears to be cross-gradient, but monitoring results are variable and may reflect impact from the basin."(Fact Sheet p. 18).With the depths and extent of the ground water plume unknown, and the existing background in question, it is imperative that an appropriate background location be selected.

Minn. Rules Ch. 7060 requires control of the plume pollutants so as not to allow it to expand, not only drinking water controls.

> *7060.0600 Subp. 3. Control measures. Treatment, safeguards, or other control measures shall be provided by the person responsible for any sewage, industrial waste, other waste, or other pollutants which are to be or have been discharged to the unsaturated zone or deposited there, or which have been discharged to the zone of saturation, to the extent necessary to ensure that the same will not constitute or continue to be a source of pollution of the underground waters or impair the natural quality thereof.*

If the natural background characteristic exceeds potable water standards, the natural background should be the appropriate standard for which to establish interim and compliance points.

> *7060 Subp. 8. Natural state of groundwater. The groundwater may in its natural state have some characteristics or properties exceeding the standards for potable water supplies. Where the background level of natural origin is reasonably definable and is higher than the accepted standard for potable water*
> *and the hydrology and extent of the aquifer are known, the natural level may be used as the standard.*

These 7060 rules were updated in 2007 and supercede any policy allowing drinking water standards at the property boundary.

Where the changes are needed:
Where: Permit p. 22, c. final compliance limits for groundwater at the property boundary to protect its use as a potential drinking water source.
What are the changes:
Redesignate final compliance points to points where the permittee can take the most efficient and cost effective action to control the discharge. Designate interim compliance points as warning stations requiring action.
Why are the changes needed?
The concept of property line as the compliance point is unreasonable when applied to all situations. If the line is far from the discharge, control of the contaminants there is unlikely and the contaminants will continue to migrate. In all situations, the compliance boundary should be located at a distance within which the permittee can take the most efficient and cost effective action to control the discharge.
In addition, designating the property boundary as the compliance limit places unreasonable controls on adjacent property owners with regard to placement of their own wells. Minn. Rules Ch. 4725.4450 WATER-SUPPLY WELL DISTANCES FROM CONTAMINATION is a Health Department rule. It appears to regulate all drinking water wells (water supply wells).

> *4725.4450 Subp. 2. Increased isolation distances for sensitive water-supply wells. The distances in items A*
> *to F are exceptions to the isolation distances in subpart 1. The isolation distances in subpart 1 are doubled*
> *between a sensitive water-supply well and a contamination source directly entering the soil. A sensitive*

water-supply well must be located at least:
A. 600 feet from the absorption area of a soil dispersal system with an average design flow greater than 10,000 gallons per day,

The MPCA commissioner applies a compliance boundary at the property line. Health would not allow the land within 600 feet of the plume to have drinking water wells, making the properties involved worthless for future wells. In the case of open pit taconite mine tailing basins this could amount to square miles of land. Thus MPCA's inequitable policy encourages new industry to purchase more land than needed and enables them to contaminate more GW without treatment. A strict interpretation by the commissioner of property line compliance point could be considered capricious and arbitrary especially when square miles of ground water is involved, and this would not be in the best public interest. There is no rule that says the compliance boundary is the property boundary, in fact, *potential degradation* of ground water is the reason for a compliance point.

Minn. Rule Ch. 7035.2565 GROUNDWATER QUALITY, SURFACE WATER QUALITY, AND AIR QUALITY AND SOIL PROTECTION. Subp. 2. Designation of compliance boundaries, standards, intervention limits ...The commissioner shall designate compliance boundaries, standards, and intervention limits for other solid waste facilities, including demolition debris land disposal facilities and compost facilities, if a release could pollute or degrade ground water or surface water.

In addition, Minn. Rules 7060 requires control of the plume pollutants so as not to allow it to expand, not only drinking water controls.

Minn.Rules Ch. 7060.0600 Subp. 3. Control measures. Treatment, safeguards, or other control measures shall be provided by the person responsible for any sewage, industrial waste, other waste, or other pollutants which are to be or have been discharged to the unsaturated zone or deposited there, or which have been discharged to the zone of saturation, to the extent necessary to ensure that the same will not constitute or continue to be a source of pollution of the underground waters or impair the natural quality thereof.

If the natural background characteristic exceeds potable water standards, the natural background should be the appropriate standard for which to establish interim and compliance points.

Minn. Rule Ch. 7060 Subp. 8. Natural state of groundwater. The groundwater may in its natural state have some characteristics or properties exceeding the standards for potable water supplies. Where the background level of natural origin is reasonably definable and is higher than the accepted standard for potable water and the hydrology and extent of the aquifer are known, the natural level may be used as the standard.

These Minn. Rule Ch. 7060 rules were updated in 2007 and supersede any policy allowing compliance with drinking water standards only at the property boundary.

Sediments

Where: Draft permit plans
Action: Evaluate sediments for contamination by Minntac's TB pollutants and effects of those pollutants and take appropriate action per rules.
Reason: The permit includes no mention of sediments, but this is a concern that should be addressed, according to:.

EPA's National Hardrock Mining Framework, U.S. Environmental Protection Agency Office of Water (4203),401 M Street, SW Washington, DC 20460 , September 1997. APPENDIX B POTENTIAL ENVIRONMENTAL IMPACTS OF HARDROCK Mining, Page B-9

> *"Dissolved pollutants discharged to surface waters can partition to sediments. Specifically, some toxic constituents (e.g., lead and mercury) associated with discharges from mining operations are often found at elevated levels in sediments, while undetected in the water column. Sediment contamination may affect human health through consumption of fish that bioaccumulate toxic pollutants. Furthermore, elevated levels of toxic pollutants in sediments can have direct acute and chronic impacts on macroinvertebrates and other aquatic life. Finally, sediment contamination provides a long-term source of pollutants through potential redissolution in the water column."*

Where the changes are needed?
A section needs to be added.
What are the changes?
The sediments in the receiving waters streams and small lakes such as Admiral Lake must be sampled for GC/MS (peaks identified) organic beneficiation reagents, their degradates, unespected chemicals, and mercury.
Why are the changes needed?
Sediments can adsorb numerous organic contaminants or degradation products, for example see MSDS for Nalco 9843.
Adsorption is not a permanent bonding. Some organics and inorganics can be held tightly, others are not. Changes in redox or other internal conditions, or other water chemistry can release chemicals, causing toxic releases from the sediments. One example, of this is inorganic phosphorous. Under anoxic conditions it is stored in the sediment; when a lake turns over, the bottom water is oxygenated and the phosphorus is released. One of numerous tailing basin chemicals is the Frother -Nalco 9843 used at a rate of 884,760 lbs./year; the MSDS states it adheres to soils and sediments, its degradation products are unknown, whether they bioaccumulate, whether these products concentrate in sediments. The draft permit does not and must address these chemicals in the sediment.

Since mercury in the sediments is not permanently bonded, the permit must include studies comparing background sediments with sediments potentially contaminated by tailing basin effluent.

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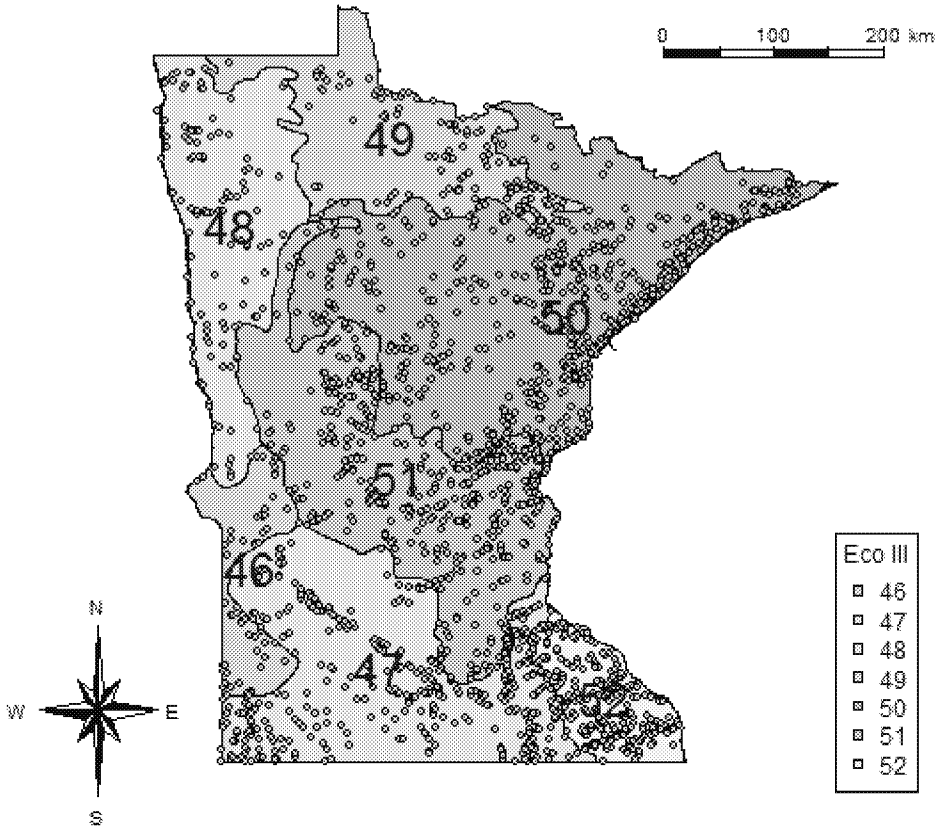

Figure 1. This map shows the EPA Region 50 for which 320 uS/cm should be applied with followup spring sampling to see whether the 320 ug/l should be lowered to protect more intolerant species which show up better in spring sampling.

Figure 2. West side of Minntac Tailing Basin showing residences.

Figure 3. East, Northeast side of Minntac Tailing Basin, showing nearby residences.

Environmental Science & Engineering

December 22, 2016

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Road North
Saint Paul, MN 55155

Dear Mr. Smith:

NTS is an environmental science and engineering firm with one office in Virginia, Minnesota. We do not have significant business interests outside of Northeast Minnesota. As result we have a very high stake in the competiveness and financial health of our clients in the taconite industry while at the same time generating our revenue from the environmental compliance efforts of the mines. This results in our firm having a refined understanding of how to pursue both these apparently conflicting interests.

The context of our comments is framed by the following: When to regulate and to what extent to regulate are moral and ethical questions that need to consider the consequences of inaction compared to taking action. We do not suggest that standing rules and water quality standards should not be applied, but that the consequences are completely understood.

Here are our specific comments on the draft NPDES permit for the Minntac Tailings Basin Area:

- The ecological impacts of receiving waters around the tailings basin should be more stringently understood, perhaps though a Tiered Aquatic Life approach. Similarly, a use attainability study should be conducted to establish site specific water quality standards. The permit should allow for an interim period to accomplish this.
- Class 3 (industrial consumption) and Class 4 (agricultural and wildlife) designations and their water quality standards misapply the water use around the tailings basin resulting in a risk estimation that is artificially high. The MPCA needs to complete the revision for these standards prior to using them in this permit.
- This draft permit has additional sampling locations in remote areas with difficult access. The MPCA needs to address how existing wells and surface water sample points can be used for permit conditions instead of adding unnecessary cost and safe access concerns.
- Mine closure requirements are regulated by the DNR and do not belong in an NPDES permit.
- Similarly, financial assurance is part of the permit to mine, the CWA does not provide a basis for financial assurance in an NPDES permit.

NTS appreciates the ability to respond to the MPCA's draft permit for the Minntac Tailings Basin Area.

Sincerely,

Richard Crum
President

526 Chestnut Street • Virginia, Minnesota 55792 • (218) 741-4290 • FAX (218) 741-4291
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SEH

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December 22, 2016

RE: Minnesota Pollution Control Agency
Tailings Basin Water Permit Reissuance
(MN0057207)
Public Notice dated November 15, 2016

Mr. Erik Smith
Hydrologist 3
Minnesota Pollution Control Agency
520 Lafayette Rd North
St. Paul, MN 55155

SENT VIA ELECTRONIC MAIL to erik.smith@state.mn.us

Dear Mr. Smith:

Thank you for this opportunity to review and provide comments on the Draft United States Steel - Minntac Tailings Basin Water Permit Reissuance (MN0057207). We have reviewed the draft permit and respectfully request this letter from Short Elliott Hendrickson Inc. (SEH®) be accepted for the public record and considered as it relates to the draft permit.

STATEMENT OF INTEREST

SEH comments are provided based on our experiences in providing professional services consulting, including providing compliance assistance to both public and private industrial clients related to National Pollutant Discharge Elimination System (NPDES)/State Disposal Systems (SDS) permits. Our comments, upon the review of the draft permit, are specific to the reasonableness of the compliance schedule as it relates to the deep seepage investigation and compliance plan.

Our comments have been prepared by our staff having expertise in delivering wastewater engineering, groundwater, hydrology, and permitting services to our public and private clients in Minnesota. We have summarized our comments citing references from the draft permit and fact sheet.

SEH COMMENTS

SDS Compliance Schedule -Deep Seepage Investigation and Compliance Plan *(Page 36 of the fact sheet; and paragraphs 1.6 through 1.21 of the draft permit)*

Action Requested is that the state modify the compliance schedule to allow for:

- At a minimum, 180 days for Investigation Work Plan development;
- 13 months for completion of the Basin Treatment Methods Study to begin following completion of the Investigation Work Plan; and;
- 13 months for completion of the Deep Seepage Final Compliance Plan to begin following completion of the Basin Treatment Methods Study.

Supporting Position: As described in the draft permit and fact sheet, there are four sequential activities leading to compliance with water quality limits in waters downstream of the Minntac basin. Our comments specifically relate to the reasonableness of the compliance schedule. Based on our professional experiences in providing permit compliance assistance on other wastewater permits in Minnesota, we believe there is not sufficient time allowed for each of the activities identified in the compliance schedule (see specific comments below). Furthermore, there is no requirement that the MPCA approve or accept the findings prior to initiating the next step in the progression. Because water quality limits are being identified in this research, it is necessary for the MPCA to approve of the work plan and that this happen before proceeding to the next activity.

Activity	Purpose	Issue
"Investigation Work Plan" due 30 days after permit issuance; Completion of Investigation Work Plan within 13 months after permit issuance	The investigation is intended to evaluate site conditions critical to the selection and implementation of treatment, mitigation efforts and/or other activities to meet final compliance limits. The study will be the basis for establishing a final limit for the basin pollutants including sulfate.	The 30-day milestone for the work plan submittal is not a reasonable requirement considering the complexity of requirements for this work plan listed in sections 1.7 – 1.8 of the draft permit, and the importance of this work plan in providing the foundation for future decisions. We recommend a minimum of 180 days to allow for development of and approval for the work plan. The Investigation that proceeds from this work plan will have seasonal considerations warranting at least 13 months after MPCA approval of work plan.
Basin Treatment Methods Study Plan due 13 months after permit issuance.	The study is to identify and scope feasible technologies to reduce the concentration of sulfate within the tailings basin.	This study timeline overlaps with the Investigation Work Plan. In order to identify the appropriate treatment technologies, the proper treatment level must be identified. Therefore, this plan should be initiated after the "Investigation Work Plan" is complete. We recommend that the Basin Treatment Methods Study Plan due date be at a minimum 13 months after MPCA accepts the results of the "Investigation Work Plan".
Deep Seepage Final Compliance Plan due 25 months after permit issuance	This plan is intended to outline the specific improvements selected to achieve compliance. It would consist of detailed plans, specifications and timelines for implementation.	Because the detailed design must meet specific limits identified in previous compliance activities, we recommend that the "Deep Seepage Final Compliance Plan" be due 13 months after MPCA accepts the Basin Treatment Methods Study Plan.

Thank you for this opportunity to provide public comment on the Draft United States Steel - Minntac Tailings Basin Water Permit Reissuance (MN0057207). We look forward to your response.

Respectfully submitted,

SHORT ELLIOTT HENDRICKSON INC.

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United States Department of Agriculture | **Forest Service** | **Superior National Forest Supervisor's Office** | **8901 Grand Avenue Place Duluth, MN 55808 218-626-4300**

File Code: 2500; 2800
Date: December 23, 2016

Mr. Erik Smith
Hydrologist - Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St Paul, MN 55155

Dear Mr. Smith

The Minntac tailings basin is the headwaters of the Dark River and Sand River. Both of these rivers flow through land managed by the Superior National Forest (SNF) as shown below in Figure 1.

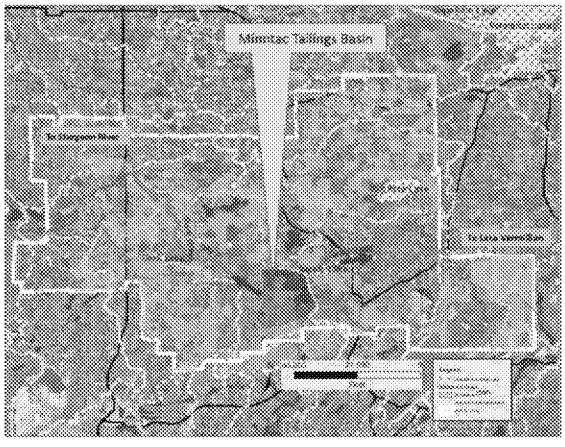

Figure 1. Location of Mintac Tailings Basin Related to SNF Lands

The SNF is the adjacent landowner on a portion of the west, north, and east boundaries of Minntac as shown below in Figure 2.

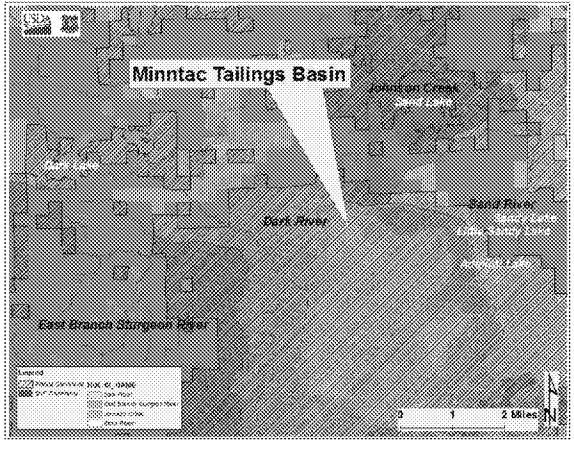

Figure 2. Minntac Tailings Basin / SNF Ownership Interface and Watershed Boundaries

Unfortunately, the SNF was not directly notified about the proposed action by the Minnesota Pollution Control Agency (MPCA) regarding Permit National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit MN0057207. We found out about the proposed action on December 19th, 2016 (after the original expiration date to make comments and only 4 working days prior to the extension deadline to December 23, 2016). Hence, there was not time for an in-depth review of the proposed action. However, we offer the following comments for consideration:

1. The proposed action by the MPCA can impact the management of SNF lands. The SNF would appreciate being notified by the MPCA when considering permit actions for this facility. Ideally, this would occur prior to the draft permit process to ensure we have the opportunity to provide cogent comments. Information and solicitation of input should be directed to the SNF Forest Supervisor.

2. There are numerous reports, studies, and proposed action plans (*Investigation Work Plan, Basin Treatment Methods Study Plan, Plan of Action, Final Compliance Plan, Dam Seepage Survey Report, Dark River Seepage Collection and Return System, and Mercury Pollutant Minimization Plan (MMP), etc*). The SNF would like to be sent copies of these plans and reports by the MPCA when they become available. The design and implementation of these actions may directly or indirectly impact SNF lands. Hence, the SNF would like the opportunity to review these documents and offer comments prior to their formal approval by the MPCA.

3. It is unclear how actions derived from the permit(s) will impact the flow magnitude and timing of discharge to the Dark River and Sand River. How will the actions integrate the Minnesota Department of Natural Resources Appropriations Permit and as noted above, how will downstream property owners be notified and informed about the proposed changes to flow and loading to downstream resources established in forthcoming plans and implementation with opportunities to offer comment?

4. It is unclear *when* the attainment of water quality standards will be met and the language used (such as in the shortest reasonable time) may be considered unenforceable as the definition of 'reasonable' is open for markedly different interpretation.

5. Well GW-0014 appears to be the only installation to consider groundwater flow to the north (through SNF lands and eventually to Sand Lake) as shown in Figure 3 below (adapted from the MPCA draft permit application) and Figure 2 above. The construct of this well to evaluate flow to the north is unknown and consideration should be given to additional monitoring of potential northerly flow.

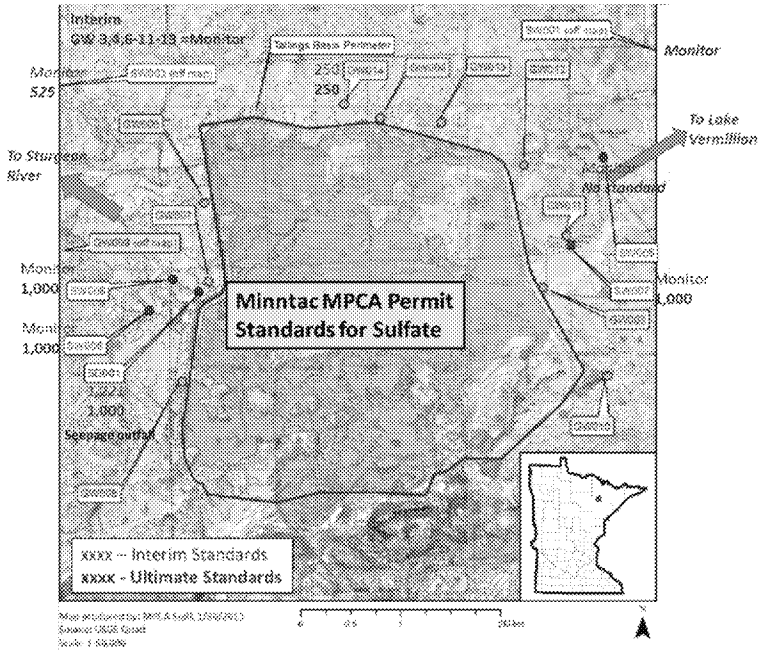

Figure 3. Proposed MPCA Sulfate Standards

6. It is noted in the draft permit that "*1.3 The MPCA recognizes that basin-impacted groundwater is currently reaching surface waters and having an impact on those surface waters.*" However, it is unclear if this recognized contribution to surface waters will be regulated by the MPCA. The effect of elevated sulfate concentrations within the groundwater may extend beyond the property limits as they become mixed with surficial systems and the standards applied may deserve more scrutiny. Has the MPCA performed an evaluation of the potential impacts of elevated groundwater sulfate concentrations on downstream surficial resources beyond the property boundaries to justify the proposed standards at the property limits?

Thank you for the opportunity to provide comments. If you have any questions regarding the comments provided herein, please contact SNF Forest Hydrologist Marty Rye at (218) 626-4390 or mrye@fs.fed.us

Sincerely,

Stephen C Popkowski
for CONSTANCE CUMMINS
Forest Supervisor

United States Department of the Interior

NATIONAL PARK SERVICE
Voyageurs National Park
360 Highway 11 East
International Falls, MN 56649

IN REPLY REFER TO:
1.A.1 (Perm)

December 22, 2016

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Rd N.
St. Paul, Minnesota 55155-4194

Re: Public notice for U.S. Steel Minntac tailings basin National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) Permit MN0057207

Dear Mr. Smith:

The National Park Service (NPS) appreciates the opportunity to comment on the National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit reissuance (MN0057207) for the U.S. Steel Corp Minntac Tailings Basin Area (facility) to construct and/or operate wastewater treatment facilities and to discharge into waters of the State of Minnesota.

Voyageurs National Park (NP) is a place of scenic landscapes and waterways, and is rich in human history. Located in sparsely populated northern Minnesota and sharing 55 miles of international border with Canada, the park's 218,000 acres is part of a larger ecosystem that includes the Boundary Waters Canoe Area Wilderness (BWCA) and Quetico Provincial Park. Voyageurs NP was legislated by Congress in 1971 and established in 1975, "*to preserve, for the inspiration and enjoyment of present and future generations, that outstanding scenery, geological conditions, and waterway system which constituted a part of that historic route of the Voyageurs who contributed significantly to the opening of the Northwestern United States.*" The park contains waters that are designated by the State of Minnesota as Outstanding Resource Value Waters, for which new or expanded discharges to these waters are prohibited. The park is located downstream of the proposed permitted area and is concerned with protection of the water resources within its management area.

The U.S. Steel Corp Minntac Tailings Basin Area has been operating under an expired permit since 1992. During that time the Minnesota Pollution Control Agency (MPCA) and the facility have conducted studies that have revealed "significant seepage escaping the basin over its 8000+ acre footprint and that this seepage is causing exceedances of water quality standards in surface water and groundwater in a broad area surrounding the basin." A summary of conditions in the draft permit include surface water monitoring and toxicity testing; however, the facility has

failed to act on prior proposals to address basin water quality, despite violating the Schedule of Compliance as agreed upon with MPCA.

The National Park Service requests specific consideration of the following concerns with respect to issuing the proposed permit:

- The lakes of Voyageurs and the BWCA have been designated by the State of Minnesota as Outstanding Resource Value Waters. Subpart 9 of Statute 7050.0180 (Nondegradation for Outstanding Resource Value Waters) addresses impacts from upstream discharges:

  Subpart 9 (Impacts from upstream discharges) states that "(t)he agency shall require new or expanded discharges to waters that flow into outstanding resource value waters be controlled so as to assure no deterioration in the quality of the downstream outstanding resource value water."

- Modeling has shown potential impacts of proposed mining operations within this watershed on waters of Voyageurs National Park (Meyers, 2014/Rev. 2015) through contaminated groundwater discharge to surface waters, and the impacts of contaminated groundwater related to the proposed permit are unknown and are upstream of Voyageurs National Park.

- The lakes of Voyageurs National Park are 303d listed by the U.S. EPA for mercury impairment. Sulfate, one of the principal contaminants in the tailings pond water which would be released through the proposed permit, is important in the conversion of mercury to toxic and biologically-available methylmercury and is, at times, the limiting factor in that conversion. Thus, increased sulfate in the tributaries and waters leading to Voyageurs National Park could result in increased methylmercury concentrations in park lakes, which would exacerbate the current mercury impairment of these waters.

- The purpose of the additional evaluation in the NPDES permit is to identify feasible technologies to reduce the concentration of sulfate within the tailings basin to 800 mg/L within five years of permit issuance, and 357 mg/L within ten years from permit issuance, or in the shortest reasonable period of time. Sulfate targets should be lowered, as possible, to correspond with wild rice standards in review by MPCA.

- The potential impacts of a discharge from the Minntac tailings pond should be considered along with the potential impacts of other mining activities in the waters that drain toward Voyageurs NP. Contaminants originating from mining within the Rainy Lake and Namakan watersheds may flow through Voyageurs (Meyers, 2014/Rev. 2015) and cumulative impacts within the affected watershed need to be considered.

- The U.S. Department of Interior and Department of Agriculture recently (December 15, 2016) took actions that denied an application for renewal of two hard rock mineral leases in the Boundary Waters Canoe Area Wilderness, as well as initiated steps to withdraw key portions of the watershed from new mineral permits and leases. These actions are

indicative of the level of concern present regarding potential contamination of the area's water resources.

The NPS recommends development of a current NPDES/SDS permit for U.S. Steel Minntac facility. We believe this should be an effective tool for water quality improvement at the facility if the permit adheres to strict targets and definitive timeline for bringing discharge waters into compliance with all applicable standards for receiving waters.

We appreciate your consideration of our comments. If you have questions or would like to request additional information, you may contact me at 218-283-6674 or mary_graves@nps.gov.

Sincerely,

Mary Graves

Mary Graves
Acting Superintendent

Attachment:

Technical Memorandum: Potential Metals Mining and the Voyageurs National Park Risk Assessment for Upstream Metals Mining Prepared for: Voyageurs National Park Association, Minneapolis MN National Parks Conservation Association, Washington DC By: Tom Myers, Ph.D.; Hydrologic Consultant, Reno, NV October 30, 2014; Revisions January 8, 2015

Technical Memorandum: Potential Metals Mining and the Voyageurs National Park
Risk Assessment for Upstream Metals Mining

Prepared for: Voyageurs National Park Association, Minneapolis MN
National Parks Conservation Association, Washington DC

By: Tom Myers, Ph.D.; Hydrologic Consultant, Reno, NV

October 30, 2014

Revisions January 8, 2015

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SUMMARY

This technical memorandum considers the risks to Voyageurs National Park (VNP) from the development of mining leases in the watersheds draining to and through it, including the Rainy Headwaters, Vermilion Lake, and Rainy River-Rainy Lake watersheds. There are copper-nickel and gold leases in the headwaters of the first two watersheds, with those held by Twin Metals near Birch Lake the most advanced. The Northshore Mine and Peter Mitchell Pit currently operate partly in the Rainy Headwaters watershed.

The water flow through the Rainy Lake watershed is primarily northwestward along the International Boundary from headwaters in the United States in the Rainy Headwaters and Vermilion Lake watersheds. The total flow averages 6.75 million acre-feet/year. The Namakan reservoir system, consisting of Kabetogama, Namakan, Sand Point, Crane, and Little Vermilion Lakes, discharges into Rainy Lake through dams at Squirrel Narrows and Kettle Falls, at Bear Portage, and Gold Portage. Rainy Lake receives runoff from 14,900 square miles, with about 54% of the area above Namakan Reservoir and 6% of the area draining to the system below Namakan Reservoir being in Minnesota. The total average flow from the Namakan Reservoir system is 5150 cubic feet per second (cfs), or 51% of the total flow from Rainy Lake. Rainy Lake provides 70% of the flow to Lake of the Woods, although the flow is highly variable. Flows are most variable during early summer due to snowmelt and least variable during late winter when much of the watershed and precipitation is frozen.

Operating rules for the reservoirs, which changed in 2000 to implement a more natural flow regime, increased and decreased high and low flows, respectively. The reservoirs also spilled more during the post-2000 period although the post-2000 climate was more variable, with generally higher average precipitation and temperature.

There are two aquifers over the study area – a crystalline rock bedrock aquifer and glacial till or sand/gravel surficial aquifer. The bedrock type varies from gneiss and granite north of the mineralized areas to more volcanic sources such as basalt further south. The surficial aquifer is less than 100 feet thick over most of the study area and some areas have bedrock outcrops. Glaciation over the past 50,000 years has removed the most weathered rock near the surface, so that the fracture density is low even in the upper portion of the bedrock, except in the Biwabik formation, most conductive formation in the bedrock aquifer. Well yields throughout the Kawishiwi watershed, considered representative of the study area, are less than 10 gpm which reflects the very thin to nonexistent surficial aquifers and the low permeability bedrock, which transmits very little groundwater except in fractures.

Precipitation generally does not infiltrate deeply into the shallow soils of the northern two-thirds of the watersheds but rather becomes interflow or causes the water table to rise and may discharge to the surface becoming overland flow. Surface storage may be important, especially in the areas with substantial wetlands. However, in the headwaters of the watersheds where the mineral deposits are, the soils are deeper and allow deeper infiltration.

Baseflow was estimated for all US Geological Survey gaging stations in the area by determining the recession index and then back calculating a baseflow hydrograph from under the peak of each runoff peak. Assuming baseflow is recharge, the average recharge for the basin above each gage was determined. Total and baseflow yield ranges from 9.5 to 12.3 and from 6.5 to 9.5 in/y, respectively, for gages in the Rainy Headwaters, with gages on smaller watershed having the most extreme values. The total and baseflow yield in the Little Fork and Vermilion River watersheds is less than 9.8 and 7.3 in/y, respectively.

Baseflow as a proportion of total runoff varies from about 0.65 to 0.79, with a few outliers, the lowest of which are for streams with very small watersheds. Baseflow yield is smaller as one moves west from the Rainy Headwaters, along with a decrease in average rainfall. Average recharge for the Little Fork watershed is 5.6 in/y, for the Vermilion River watershed is 7.1 in/y, and for the Rainy Headwaters ranges from 7.5 to 8.2 in/y. These recharge estimates are less by from 0.5 to about 2.5 in/y than the values determined using a common US Geological Survey method.

Low flow conditions occur during baseflow but represent the extreme, and most critical ecologically and economically, lower flows. Groundwater is the primary source of flow, but during low flow is occurring from only a portion of the watershed due to the dry conditions. Low flows can be a very small proportion of baseflow, which reflects that only a small portion of the aquifers in the area are contributing to flow during low flows. Most watersheds in the study area have low flows less than 10% of the baseflow.

The watersheds draining to VNP contain many lakes of many different sizes and morphometric characteristics). Rainy Lake is by far the largest but it is also mostly within and downstream of VNP, lying on the north boundary with a majority within Ontario; contaminants will not flow through it on a pathway to VNP. Contaminants from the Rainy Headwaters would pass through seven lakes while contaminants from the gold deposits in the Vermilion River watershed would pass through the very large Vermilion Lake before reaching VNP. VNP contains 26 interior lakes, although all quite small, with just one of the interior lakes exceeding 247 acres in area.

Groundwater in shallow sand and gravel aquifers is a magnesium bicarbonate type typical of groundwater that has either a short residence time or has been collected in a recharge zone. In till, the groundwater is either calcium magnesium bicarbonate or calcium magnesium sulfate.

Concentrations of copper, cobalt, and nickel can exceed 100 ug/l in surficial material above mineralized areas. This indicates an exchange of groundwater between the surficial and bedrock aquifers or an upward flow gradient. In the bedrock, concentrations are highly variable because they reflect localized concentrations in fracture zones and sometimes increase with depth.

The USGS has commenced a study on two headwaters watersheds, Filson Creek and Keeley Creek near Birch Lake and near the copper-nickel deposits currently being explored by Twin Metals. The surface water is generally very dilute with pH generally mildly acidic, likely due to mineralization as well as the effect of bogs in the watershed. The concentration of Ni and Cu was generally less than 10 ug/l but is highest in watersheds with Cu-Ni deposits. Buffering capacity in the watershed was very low.

Electrical conductivity (EC), a surrogate for total dissolved solids, generally is lower when river flow includes surface runoff, which has less salt because it has less contact time with the surficial aquifer during which salts would be dissolved. Streams and lakes throughout the study area generally have very low EC; the exception is the Ash River which enters VNP from the west. EC is highest during baseflow because most flow is groundwater that has a higher salt content. Rivers entering the Rainy River system from Ontario also have extremely low EC and effectively dilute the already very low salinity in the river system. Carbonate is nondetect at the South Kawishiwi River above White Iron Lake and alkalinity in the Rainy Lake and Namakan Lakes in VNP is very low. Both findings additionally reflect the cumulative lack of buffering.

Mercury contamination is a current issue in all watersheds draining to VNP, with impairment being due to "mercury in fish tissue" rather than in the water column. This reflects the tendency for mercury to be bound in sediment and the tendency for methylation to occur due to bacterial activity. Methyl mercury is soluble in water and it can be incorporated into the body tissues of organisms in the aquatic environment. Mercury works its way up the food chain as larger fish prey on smaller fish and organisms which in turn may have obtained it from the sediments.

The climate has been changing in northern Minnesota. Since 1895, the average temperature increase in the Midwest has been 1.5 degrees F and by mid-century, the temperature in northern Minnesota is projected to increase by up to 5°F. Average precipitation has increased from 5 to 15%. The percent change in very heavy precipitation is 45%. By mid-century, annual precipitation will increase from 1.4 to 1.6 inches, there will be at least one more day with heavy precipitation per year, the wettest annual 5-day total precipitation will increase by up to 0.4 inches, and number of dry days will decrease by up to six days. These observations and

projected trends all point to a wetter future with more heavy rainfall which of course means more large floods.

Waste from proposed mining from any of the underground deposits in the Rainy Headwaters could generate acid mine drainage with metals including arsenic, copper, nickel, lead, zinc, and possibly mercury. The low buffering capacity of the rivers could allow contamination to be transported a long distance downstream, including to VNP; the sensitivity to acid precipitation that has been observed in the past exemplifies the problems that would be caused by AMD. Seepage may require decades to transport from the underground sources to the river, but once it reaches the river there would be little chance of preventing it from reaching VNP. AMD seepage over a long time period would likely exacerbate an existing problem in the VNP – methyl mercury contamination because a decrease in pH would increase the methylation rate and concentration in the lakes.

Tailings impoundments could generate AMD or leak other process chemicals. Although they are designed not to leak, liner failures are common. If the leakage is either not detected or not containable, it could reach the surface water system and flow toward VNP. Streams draining toward VNP have high water quality and would be affected by small amounts of contamination for a long time. Once started, a leaky tailings impoundment is very difficult to remediate. The following metals are predicted to be present in the tails at the nearby Polymet Mine: arsenic, boron, calcium, cobalt, copper, iron, magnesium, manganese, mercury, molybdenum, nickel, potassium, and sodium. Other parameters of concern are alkalinity, chloride, fluoride, sulfate and total dissolved solids. Additional mercury reaching the VNP would add to the problems discussed above; in combination with AMD or sulfate loading, the methylmercury problem could be substantially increased.

Increased precipitation due to climate change would increase the moisture accessing the unsaturated zone, including the unsaturated zone in above-ground waste or tailings impoundments.

Immense water resources damage could be caused by a tailings failure. Tailings impoundments fail as a result of a string of incidents, each of which may be trivial and within the bounds of normal events, but when taken together, constitute an event so unusual that it lies outside of the bound of normal occurrence and experience. There have been over 146 tailings impoundment failures (over an unspecified time period), with the majority occurring in the United States. Thirty-six of the failures were due to high rainfall, and the run-out distance for tailings dam failures has been as high as 100 km, with the maximum distance occurring when the failure is into a river system.

The recent failure of the Mt Polley Mine in British Columbia apparently resulted from a failure to manage the tailings impoundment properly. Simply, it appears the mining company stored too much saturated tails waste above the dam and it failed. The failure released more than 10 million cubic meters (350 million cubic feet) of water and 4.5 million cubic meters (150 million cubic feet) of sand into downstream Polley and Quesnel Lake. That is enough water to fill 4,000 Olympic-sized pools. Approximately 2600 tonnes of mercury had been stored in the impoundment since 2009, so the potential contamination is quite large.

The effect of a large spill in a watershed that contains many large lakes is complicated. Water leaving Quesnel Lake, downstream of the Mt Polley spill, was relatively clean for several weeks after the spill. Much sediment was trapped in the lake. It is likely however that the sediment will be a source of heavy metals to the waters flows through the lake for decades. This is similar to the results found for a simulated spill into Birch Lake. A spill in the Vermilion Watershed, if mines are ever developed there, may be more critical. If the waste short circuits through Vermilion Lake rather than mixing, the effects could be much worse at VNP.

The recent occurrence of extreme flooding in northern Minnesota accentuates the concerns raised by the potential for large flooding on tailings impoundments. Global warming and the consequent increase in extreme events will affect mines in many ways, but with increasing flood runoff and climate change, the proximity of any potential tailings impoundment to the river system, the fact that a tailings impoundment must not fail forever, and the connectivity of surface waters in the watershed, development of tailings impoundments presents a large risk to VNP.

A third long-term water quality threat of mining in the study area is the discharge of high sulfate pit water or high salinity dewatering water. Deep groundwater has been shown to have very high, almost brine level, salt concentrations. If this were leaked or discharged during mine dewatering to surface water, the current dilute concentrations in the study area streams would be ruined. Additionally, the expected overflow of pits at the Steep Rock Mine on the Seine River in Ontario will cause very high sulfate inflows to Rainy Lake and VNP.

Voyageurs National Park is in a unique position with regard to the threat of mining development. There are substantial mineral deposits and mining leases in the headwaters of the watersheds that drain toward VNP. Contaminants could be diluted by flow or removed in the lakes between the mines and VNP. However, the watershed has very poor buffering capacity meaning that AMD which reaches surface water draining to the park will make it to the park. Acid could increase the methylation of mercury. Mine seepage could exacerbate the high metals content of some VNP lakes and the general mercury problem throughout the watershed. Large scale spills could flow directly through to the park under the proper

hydrologic conditions. Development of mining leases in Rainy River watershed presents a significant long-term risk to VNP.

INTRODUCTION

This technical memorandum analyzes and discusses the risks to Voyageurs National Park (VNP) from the development of mining leases in its watershed. VNP lies in the middle of the Rainy River watershed, which eventually flows to the Lake of the Woods and beyond. Water and contaminants originating in the Rainy Headwaters, Rainy River-Rainy Lakes, or Vermilion River watersheds drain into the Rainy River and through VNP (Figure 1). VNP contains three major reservoirs, Rainy, Namakan, and Kabetogama Lakes, the operation of which are the "most significant" natural resource management issue at VNP (http://www.nature.nps.gov/water/homepage/WorldWaterDay_VOYA.cfm, site visited 7/24/14). Changing the operating rules has sparked several research papers on the effect of water levels on stream and lake chemistry and biota (Luce and Metcalfe 2014, Christensen et al 2013, 2004). The Little Fork River watershed lies to the west of the Vermilion River watershed and drains through the Little Fork River into Rainy River downstream from VNP (Figure 1). The study area watersheds are part of the greater Winnipeg River watershed, a general outline of which is Attachment 1. The Winnipeg River watershed ultimately drains to Hudson Bay. Seventy percent of the basin draining to VNP is in Canada (Kallemeyn et al 2003), but this assessment does not account for Canadian mining operations.

There are leases for potential mines at ore deposits in both the Rainy Headwaters and Vermilion River watersheds (Figure 1). The deposits most likely to be developed first are those held by Twin Metals, Inc., which includes Duluth Metals, Franconia, and Beaver Bay (Barber et al. 2014). Contaminants originating from the mining of any of these ore bodies would flow through VNP.

This technical memorandum qualitatively assesses the risks of developing a sulfide nickel/copper (Ni-CU) mine or a gold mine within the watersheds draining toward VNP. It describes a conceptual model of flow and transport in the watershed, the likely potential mining of the ore deposits, and describes the risks to be expected from that mining. The focus herein is on contaminants that either leak from conceptual tailings or waste impoundments or transport due to spills. Leaks are generally considered long-term problems because they may not be detected for a long time and they require years to be remediated. A spill is a short-term event in which a contaminant load reaches a water source in a few days or weeks. For the purposes of this report, long- and short-term generally refers to more than a year and less than a few weeks, respectively. The transport pathways to and through VNP are qualitatively outlined herein.

A conceptual flow model (CFM) describes the flow paths through a watershed from precipitation to runoff, and from recharge to discharge in the aquifer. The CFM developed herein includes groundwater and surface water, including runoff processes, recharge (and seepage of waste), groundwater flow, and discharge to surface water. It discusses the relative magnitudes of flow and estimates baseflow and recharge, but does not develop a detailed water budget. The CFM then imposes the potential mining into the flow model to consider the risks to the watershed.

There is no plan of operations for any potential new mining, so the description of the probable mining would be based on information from relevant reports (Parker and Eggleston 2014). Twin Metals is moving forward with pre-feasibility plans, filing various technical reports on reserves and financial aspects of their potential mine plans (Barber et al. 2014). Other mine plans are less well developed so discussions are based strictly on online or geologic literature sources. Part of the Northshore Mine and Peter Mitchell Pit also lie within the Vermilion watershed. Other sources are hydrology studies completed by the US Geological Survey (USGS) and State of Minnesota.

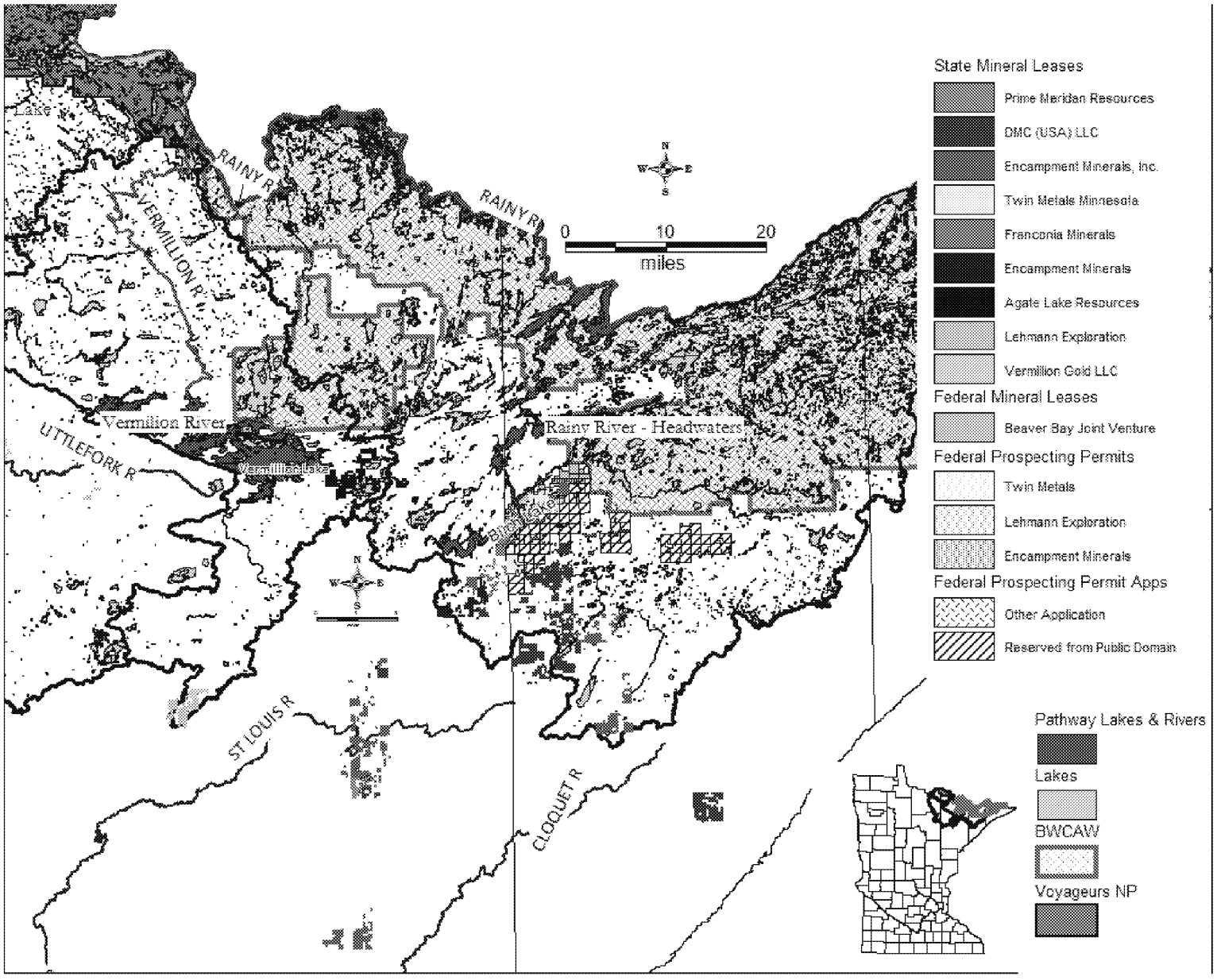

Figure 1: Map of Study Area, including major watersheds, mine Leases and primary surface water pathways from the leases to Voyageurs National Park (VNP). Pathways from the Rainy River Headwaters and from the Vermilion River watershed to VNP are shown. See Figure 2 for an expanded view of the leases in the Rainy Headwaters. Watersheds, lakes, streams from http://www.mngeo.state.mn.us/chouse/metalong.html, leases from http://mcc.mn.gov/gis.html

Summary of Mining and Mining Leases in the Watershed

Minnesota Department of Natural Resources (MDNR) publishes GIS map layers for active mining leases issued by the state and the U.S. Forest Service published GIS maps for federal mining leases, prospecting permits, and prospecting applications. Figure 1 shows the leases for the entire study area, with leases in the Rainy Headwaters and Vermilion Lake watershed. Leases further west in the Little Fork River watersheds would drain to the Rainy River downstream of VNP. Figure 2 shows the leases in Rainy Headwaters watershed, in both the Birch Lake and Stony River watersheds. The leases in the Vermilion River watershed are for gold and the others are for Ni-Cu.

MDNR lists three projects in the Rainy Headwaters in their Index for Advanced Projects for Metallic Minerals – Twin Metals Minnesota Maturi Deposit, Encampment Minerals Serpentine Deposit, and the Tech American Inc Mesabi Deposit (http://files.dnr.state.mn.us/lands_minerals/mpes_projects/minnesota_mine_sites_and_advanced_minerals_projects_winter2014.pdf). The index includes projects considered to be at the advanced stage, including active mines. Twin Metals current plans are also found at http://www.duluthmetals.com/s/NewsReleases.asp?ReportID=677352&_Type=News-Releases&_Title=Duluth-Metals-Files-NI-43-101-Pre-feasibility-Study-Technical-Report-on-the. The list includes the PolyMet NorthMet Deposit, which is west of the divide in the St Louis River basin and the Cliffs Natural Resources Northshore Mine, which is located in the middle of the Rainy Headwaters near the Encampment Minerals deposits (Id.). The Northshore Iron Mine also lies in the northeast end of the Mesabi Range on the divide between the St. Louis and Rainy Headwaters watershed (Northshore Mining Company 2014). Current mine dewatering discharge is to either of the two watersheds. After the Northshore Mine closes, the entire Peter Mitchell Pit will lie within the Rainy Headwaters, and any pit discharge will be to the Dunka River (Id.).

Lehman Exploration Management has leases in the Vermilion and Little Fork watershed, but they have not been very active. The last active drilling occurred in 2010 (http://www.dnr.state.mn.us/lands_minerals/exploration.html#2, site visited 7/24/14), although their leases remain up to date (Figure 1). The location of the leases appears to be in Ely Greenstone, north of the Giants Range granite (Morey et al 1970). The MinnTac taconite mine also lies in the Little Fork watershed.

The Vermilion River watershed contains one of four areas with active exploration for gold in the LOW watershed, including International Falls, Bigfork West, Bigfork East, Linden Grove, and

Vermilion (http://files.dnr.state.mn.us/lands_minerals/mpes_projects/ mn_min_goldexplore_map_0214.pdf). The Vermilion River watershed drains to VNP although the leases are above Vermilion Lake (Figure 1). This is the site of the first gold rush in Minnesota (Walker 1974). Vermilion Gold (2014) has leases in greenstone deposits in either free gold or arsenopyrite minerals, which does contain sulfide. They consider the deposits to be high grade at open pit mining depths (Id.). They project spending $2,000,000 during 2014 on exploration activities (Id.).

The most active mining copper-nickel proposal appears to be that of Twin Metals at four mineral deposits – Nokomis, Maturi, Spruce Road, and Birch Lake - located 10 miles east of Babbitt, MN and 15 miles southeast of Ely MN in the Birch Lake watershed, in the headwaters of the Rainy Headwaters watershed (Figure 2) (Barber et al. 2014). These deposits are hosted in the Duluth Complex, a composite intrusion, in the basal portion of the South Kawishiwi intrusion. The mineralized zone is as much as 1000 feet thick in locations. All deposits are magmatic nickel-copper-platinum group element deposits which are mostly considered sulfide deposits (Parker and Eggleston 2014). They occur in localized areas along the basal zone of the South Kawishiwi at the contact (Miller et al. 2002, p 167). The sulfide content of the Spruce Road deposit is 2 to 5% by volume and 3 to 4% by weight, with chalcopyrite being the primary copper sulfide; it is the only deposit with sulfide content specified. Each deposit would be accessed with underground methods (Parker and Eggleston 2014) and Twin Metals suggests that some tailings could be deposited underground and has also stated that tailings would be stored south of the divide out of the Rainy Headwaters watershed.

The Maturi deposit extends to as much as 4500 feet below the ground surface. The depth of the Spruce Road deposit ranges from the ground surface to about 1500 feet bgs. The Birch Lake deposit ranges to about 4000 feet below ground surface[1]. The Birch Lake deposit contains up to eight possible significant faults, which are identified as significant issues which will potentially affect the underground mining operations and the location of high grades of mineralization.

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[1] The source for this information is Figure 7-7 in Parker and Eggleston (2012) which does not have units specified on the vertical axis. The ground surface shows at a little less than 500 which if meters would be near 1500 feet, the ground surface elevation. The depth ranges to about 900 below ground surface, which if meters would be near 3000 feet.

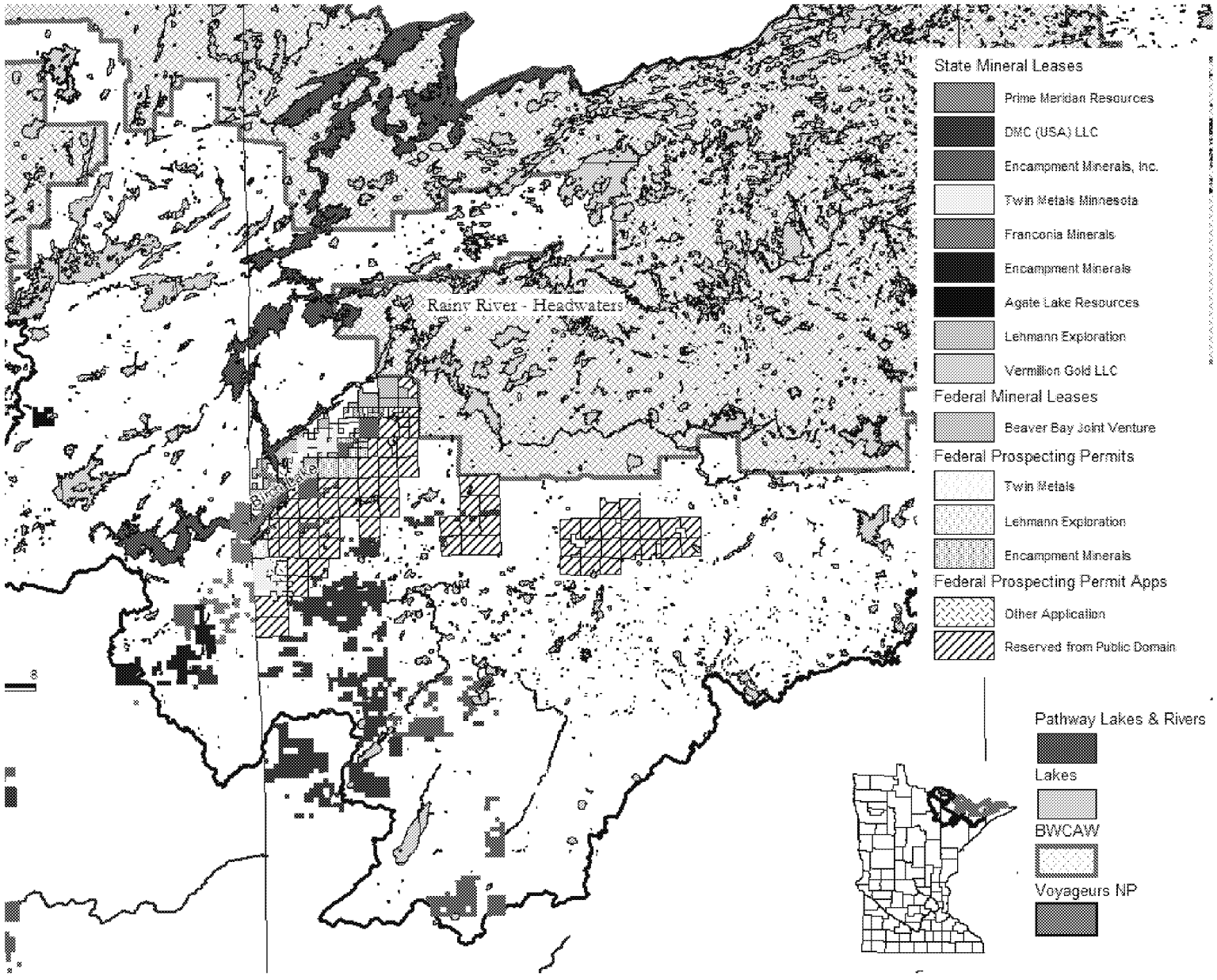

Figure 2: Expanded view of Figure 1 showing more detail around the mining leases in the headwaters of the Rainy River Headwaters watersheds. Watersheds, lakes, streams from http://www.mngeo.state.mn.us/chouse/metalong.htm; leases from http://mcc.mn.gov/gis.html

Conceptual Flow Model

The study area includes the watershed draining to VNP, as shown in Figure 1 for the portion of the watershed in the United States; Attachment 1 shows an outline of the entire Winnipeg River watershed of which the study area is part. A conceptual flow model (CFM) is a description of the flows through a watershed and/or aquifer. The CFM includes a description of the flow from precipitation through recharge to discharge, a description of the geologic formations through which the groundwater flows and from which runoff commences, the soils and other surface conditions, and in this area the lakes. Baseflow and recharge rates are estimated. The large-scale river and lake system upstream of VNP originates and controls the flows to and through the park. This section begins with a summary of the large-scale flows from throughout the watershed, based primarily on Kallemeyn et al. (2003), and then discusses the details controlling runoff, such as hydrogeology, soils, recharge, and baseflow. The lakes are discussed after the general CFM because they play a particular role in contaminant transport.

Rainy Lake Flow System

The water flow through the Rainy Lake watershed is primarily northwestward along the International Boundary (Attachment 1), with headwaters in the United States being in the Rainy Headwaters and Vermilion Lake watersheds (Figure 1). Water commencing in the headwaters drops about 443 feet in 21 days before it reaches the outlet of Rainy Lake; the total flow is about 2.2trillion gallons per year, or about 6.75 million acre-feet/year (af/y). The Namakan Reservoir system consists of five lakes, Kabetogama, Namakan, Sand Point, Crane, and Little Vermilion (Christenson et al. 2013). The Namakan reservoir system discharges into Rainy Lake through three outlets: (1) through dams at Squirrel Narrows and Kettle Falls at the northwest end of Namakan Lake, (2) at Bear Portage on the north-central side of Namakan Lake and (3) Gold Portage at the west end of Kabetogama Lake.

Namakan Reservoir controls a drainage area of 7440 square miles (mi^2) and an additional 7460 mi^2 drain directly into Rainy Lake. About 54% of the area above Namakan Reservoir is in Minnesota, but below Kettle Falls only about 6% of the Rainy Lake drainage is in Minnesota. The total average flow from the Namakan Reservoir system is 5150 cubic feet per second (cfs), or 51% of the total flow from Rainy Lake. Most of the additional flow from Rainy originates in Canada, including the Turtle River (1310 cfs) and Seine River (1700 cfs). Rainy Lake then is 70% of the flow to Lake of the Woods. The flow from the Rainy Lake watershed had been highly

variable with coefficient of variation of 33%. Figure 7 in Kallemeyn et al. (2003) shows that discharge from Rainy Lake has varied from less than 100 to greater than 600 cms since 1923[2].

Attachments 2 and 3 show the average and extreme inflows and outflows from and water levels for Namakan and Rainy Lakes, respectively. Flows are most variable during early summer because they are affected by snowmelt and least variable during late winter when much of the watershed and precipitation is frozen. The lake levels fluctuate by just a few feet. The large volumes of Namakan and Rainy Lakes (see Table 5 below) help even out the flows.

Operating rules for the major reservoirs in VNP (and the system above Lake of the Woods) were changed in 2000 to instill more natural level fluctuations to rivers and reservoirs (Luce and Metcalfe 2014; Kallemeyn et al. 2003). Operating rules are basically upper and lower reservoir water level limits for each reservoir. The limits, targets the operators strive for, vary seasonally. Generally the targets are higher in the summer than at the end of the winter, which correspond to the observed flows discussed in the previous paragraph. The maximum and minimum levels changed very little but the rules allowed the reservoir levels to rise and fall more gradually through the runoff period. Luce and Metcalfe (2014) found that the rule change led to levels in the Lake of the Woods being an average one meter higher.

Luce and Metcalfe (2014) compared reservoir levels and river flows for the pre- and post-rule change periods. They found that high and low flows during the post-rule period are higher and lower than during the pre-rule period, but the reservoirs still fluctuate less than they would in a natural system. The reservoirs likely spilled more during the post-period although the post-2000 climate was more variable, with generally higher average precipitation and temperature.

The next sections focus on the processes that lead to surface and groundwater flow from the headwaters watersheds. The discussion is limited to the Minnesota portions of the watershed.

Hydrogeology

Precambrian rocks underlie most of the study area, the three major watersheds that drain to VNP. The oldest rocks, of early Precambrian, or Archaen age, outcrop in the northwestern portion of the area (Ojakangas and Matsch 1982). VNP mostly consists of granite, biotite schist, and migmatite (Agm) with a belt of greenstone (volcanic-sedimentary rock) in the northwest portion of VNP (AMV, Figure 3). The greenstone hosts the potential gold deposits. Except for the greenstone, this is part of the Vermilion Granitic Complex. The granitic complex covers much of the southern portion of the Rainy Lake Rainy River watershed and the northern two-thirds of the Vermilion River watershed. Further south lies the iron ranges of Middle

[2] The figure would be added to this report except the pdf version secure which disables the snapshot function in Adobe Acrobat.

Precambrian age, including the Vermilion Range and the Mesabi Range (Figure 3, Peif, the iron formation (Figure 4, Table 1)), which is just south of the Vermilion River watershed boundary. Forming the headwaters of the Vermilion River watershed is Giants Range granite (Agr). North of the Agr the geology is complex with a number of intrusions (Agd).

East of the Vermilion River watershed lies the Rainy Headwaters and the bedrock geology is an eastern continuation of the bedrock in the Vermilion River watershed. The southern two-fifths of the watershed is the Duluth Complex which hosts most of the Cu-Ni deposits. The Duluth Complex is "composed of multiple discrete intrusions of mafic to felsic tholeiitic magmas that were episodically emplaced into the base of a comagmatic volcanic edifice between 1108 and 1098 Ma" (Miller et al. 2002, p 109). The complex dips southeastward with basement rock of Archaen age. The Duluth Complex has not been significantly deformed, but displacements due to reactivated basement faults and some cross faults have affected it (Miller et al. 2002). Faults trend north-northeasterly with the maximum offset being 400 feet. Hydrogeologically, the Duluth Complex is a low-permeability intrusive formation with a very low conductivity except possibly near some of the infrequent faults. There is little data available concerning the hydrogeology of the faults.

There are two aquifers over the study area – a crystalline rock bedrock aquifer and glacial till or sand/gravel surficial aquifer (Mast and Turk 1999; Olcott 1992). The bedrock type varies from gneiss and granite north of the mineralized areas to more volcanic sources such as basalt further south (Figure 4). The surficial aquifer is less than 100 feet thick over most of the study area and some areas have bedrock outcrops.

The Rainy River watershed including VNP was glaciated from 10,000 to 50,000 years ago, scouring from which formed most of the natural lakes in northern Minnesota (Kallemeyn et al 2003). This removed the most weathered rock near the surface, so that there is not a high density of fractures in the upper portion of the bedrock. The transition from the surficial to bedrock aquifer often is a zone of rapid decrease in conductivity.

Well yields throughout the Kawishiwi watershed are less than 10 gpm (Siegel and Ericson 1981) which reflects the very thin to nonexistent surficial aquifers and the low permeability bedrock, which transmits very little groundwater except in fractures. The aquifer along the river is not a target for production water pumping because it is too thin (Siegel and Ericson 1981). The Duluth Formation is relatively fractured for the upper two to three hundred feet, but the well yields range from 5 to 15 gpm, especially in the South Kawishiwi intrusion which hosts the nickel/copper ore body (Cox et al. 2009; Siegel and Ericson 1981). The most conductive bedrock aquifer, because of fracturing, of the province is the Biwabik formation, in which most of the area iron mines were developed.

Table 1: Description of map units in Figure 3. Adapted from Morey and Meintz (2000)

Adg	Gabbro, diorite, peridotite, and associated komatiitic flows of the the upper part of the Newton Lake Formation in Lake and St. Louis counties
Agd	Multiphase intrusions of hornblende-pyroxene-bearing and biotite-bearing monzonite, monzodiorite, diorite, syenite, and granodiorite—Typically postdates regional metamorphism and deformation associated with the Algoman orogen
Agm	Granite-rich migmatite—Granitic gneiss, paragneiss, schist, and migmatite in the Vermilion Granitic Complex and other parts of extreme northern Minnesota. Grades into granitoid rocks.
Agr	Syntectonic to pretectonic granitoid rocks—Granite and granodiorite of the Vermilion Granitic Complex, the Giants Range and Bemidji batholiths, as well as smaller intrusions of tonalite and monzonite of the Algoman orogen in northern Minnesota.
Amm	Mixed metavolcanic rocks—Mafic to felsic volcanic sequences that have variable amounts of felsic volcanogenic and volcaniclastic rocks and lean iron-formation. Includes parts of the Ely Greenstone and the Soudan Iron Formation (shown in red) in northeastern Minnesota
Amv	Mafic metavolcanic rocks—Dominantly basalt that contains thin sedimentary units, including iron-formation (shown in red). Includes parts of the Ely Greenstone and the Newton Lake Formation in northeastern Minnesota
Aps	Paragneiss, schist, and amphibolite—Amphibolite-facies equivalent of units Amv and Ams; locally includes abundant intrusions of unit Agr.
Asm	Paragneiss and schist-rich migmatite—Grades into undivided metasedimentary rocks (unit Ams).
Ast	Saganaga Tonalite of northeastern Minnesota—Emplaced more-or-less contemporaneously with deposition of metasedimentary and metavolcanic rocks
Kc	Coleraine Formation—Jasper-pebble conglomerate, sandstone, and shale of diverse origin on the Mesabi range of northern Minnesota
Peg	Shale, siltstone, feldspathic graywacke, and associated volcaniclastic rocks—Includes the Virginia Formation in St Louis, Itasca, and Lake counties
Peif	Iron-formation—Includes the Biwabik Iron Formation and subjacent units of arenite and conglomerate assigned to the Pokegama Quartzite in Itasca, St. Louis, and Lake Counties.
Pma	Anorthositic series—Plagioclase-rich gabbroic cumulates and related rocks
Pmbg	Selected granophyric and leuco-granitic phases of troctolitic-gabbroic intrusions in the Beaver Bay Complex.
Pmbu	Beaver Bay Complex and other named and unnamed gabbroic-troctolitic intrusions—Includes a number of other intrusions in a variety of dikes and sills such as the Endion sill and the Pigeon River Intrusions
Pmdg	Felsic series—Granophyric granite and related felsic rocks.
Pmg	Early gabbros—Gabbro and related rocks in northeastern Minnesota that have petrologic affinities to the Logan Intrusions
Pml	Logan Intrusions—Diabase, porphyritic diabase, gabbro, and related felsic sills and dikes
Pmnn	Normally polarized volcanic rocks, undivided—Basalt, andesitic basalt, rhyolite, and related volcanogenic interflow sedimentary rocks along and inland from the North Shore of Lake Superior
Pmnr	Reversely polarized volcanic rocks, undivided—Mixed tholeiitic diabasic and porphyritic basalt, trachybasalt, and rhyolite in far northeastern Minnesota
Pmt	Troctolitic and gabbroic cumulate rocks—Constitute at least nine named and several unnamed intrusions

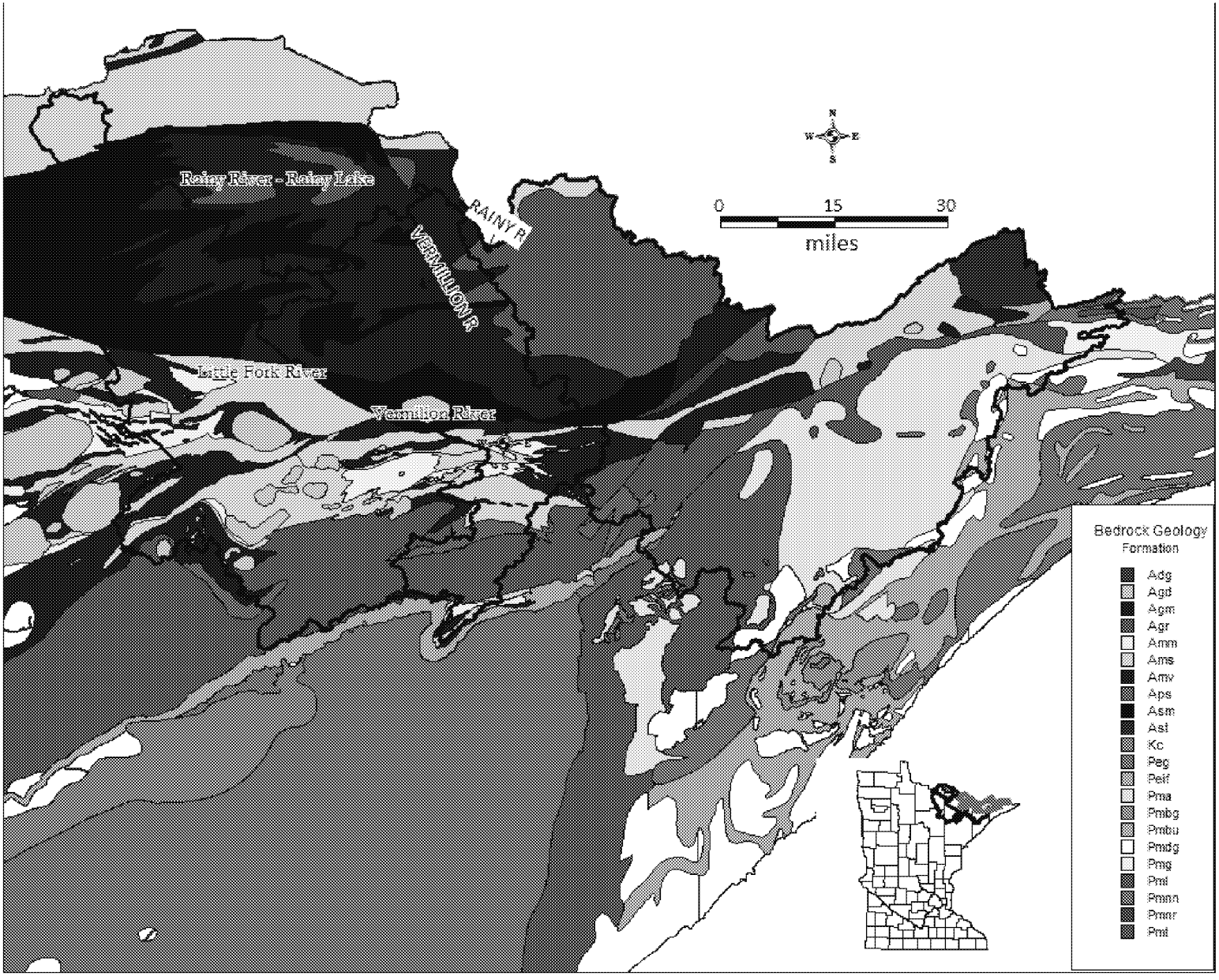

Figure 3: Geology type for the watersheds draining to Voyageurs National Park.

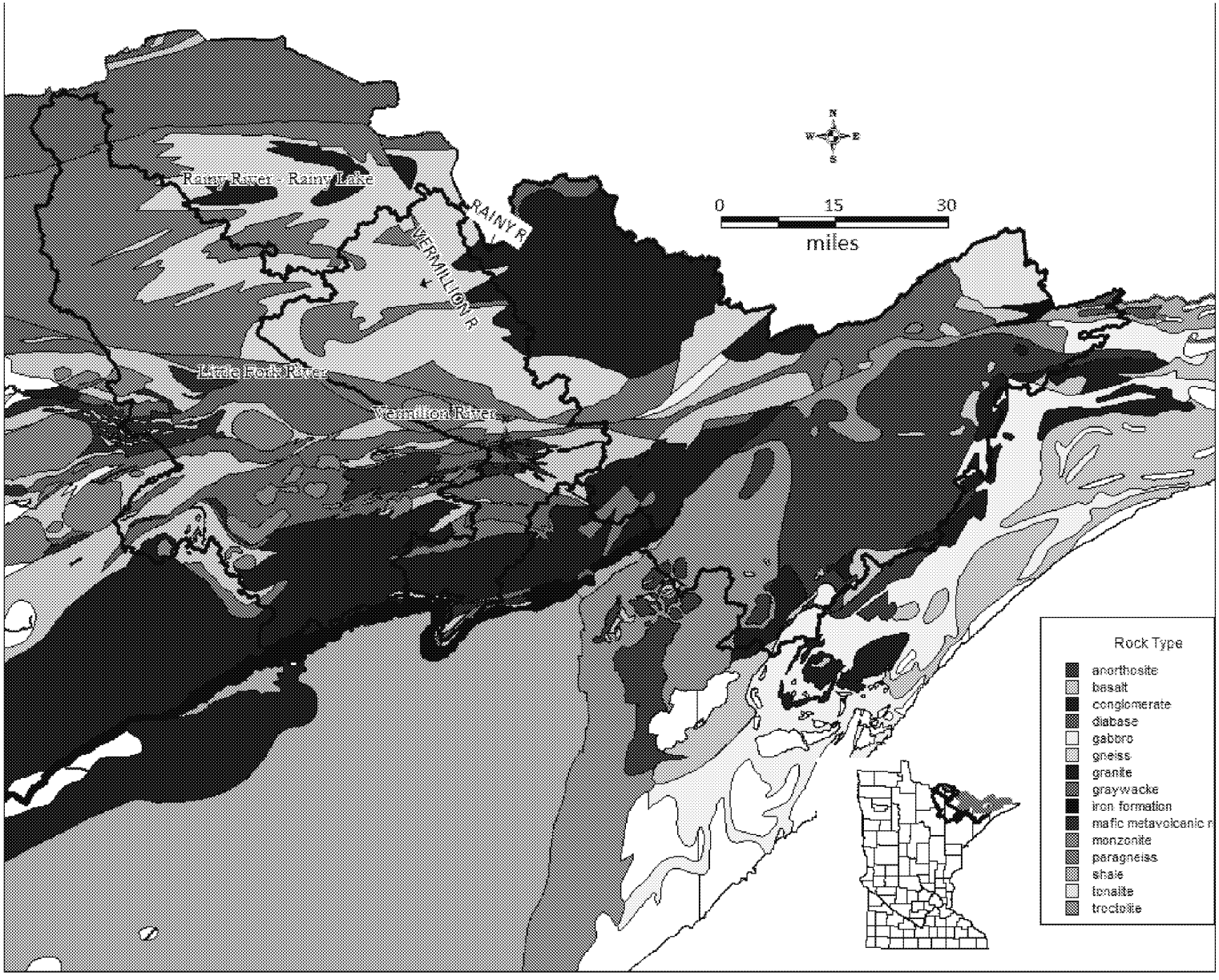

Figure 4: Bedrock type for the watersheds draining to Voyageurs National Park

Soils and wetlands control where recharge occurs and the location of most pathways as well as affecting the groundwater chemistry. Minnesota has several well-developed GIS databases describing soils at a statewide level with accuracy to a 40 acre scale, as described in Land Management Information Center (1996) and associated GIS databases.

Figure 5 shows the larger wetlands in the area. The density and areal coverage is higher in the Vermilion River, Little Fork River, and Rainy River Rainy Lake watersheds than in the Rainy headwaters. If the wetlands are perched, meaning no connection with groundwater, these areas could have little recharge (Sophocleus 2002, Winter 1998). Otherwise, wetlands could be alternately recharge and discharge areas.

Tower Ely glacial drift and bedrock covers most of the north and eastern portions of the study area (Figure 6). Agassiz Lacustrine Plain covers much of the western part of the Vermilion River watershed and most of the Little Fork River watershed. This material differs from glacial drift in that it is lake-bed sediment so the soils are probably much finer and the flow characteristics would differ. Lake beds would be more homogeneous with low conductivity.

Soil type is a soil landscape unit based on four characteristics, each with a letter description (Table 2), describing texture and drainage. Some soils, such as PEAT, are not included because their characteristics do not break down easily into the categories. Most of the study area soils are relatively free-draining (Figure 7). Type RLWL covers the northern two-thirds of the study area. This means light-colored, well-drained loam above shallow bedrock, which suggests there should be substantial interflow through the soils and recharge to the surficial aquifer but not a lot of connection to deeper layers. RSWL differs because sand occurs in place of the loam and covers much of the upstream half of the Vermilion River watershed. The headwaters of the Vermilion River and Rainy River Headwaters are SSWL which means that sand extends below the upper five feet.

The soil type just described mostly coincides with the hydrologic soil classification (Figure 8). The area described as RLWL and RSWL is mostly hydrologic type C or D meaning there is substantial runoff (Table 3); in this case the runoff would be due to shallow bedrock. Just south is an area with a large amount of A group soil, which would have high infiltration. This is the area in which sand replaces bedrock under the upper five feet of soil. Infiltration would occur much deeper here. The remaining areas along the southern boundary of the study area have infiltration rates intermediate to the C, D and A groups.

Maps of surface permeability (Figure 9) and subsurface permeability (Figure 10) shows that much of the northern part of the study area has both surface and subsurface permeability greater than 0.8 inches/hour (in/h). The south-central portion has much higher permeability with surface rates exceeding 2.5 in/y and subsurface rates exceeding 5 in/h. The least

permeable areas for both surface and subsurface permeability are in the far northwest portion near VNP.

Finally, Figure 11 shows that almost all soils in the study area are acidic, with the exception being in the far northwest where they are neutral. This probably corresponds with the poor buffering capacity in surface waters discussed below.

A general description of the soils and wetlands in the area is that precipitation generally does not infiltrate deeply in the northern two-thirds of the watersheds but rather becomes interflow or causes the water table to rise and may discharge to the surface becoming overland flow. Surface storage may be important, especially in the areas with substantial wetlands. However, in the headwaters of the watersheds where the mineral deposits are, the soils are deeper and allow deeper infiltration. More water contacts the underlying bedrock, which corresponds to the results found modeling the watersheds draining to Birch Lake (Myers 2014b; Siegel 1981).

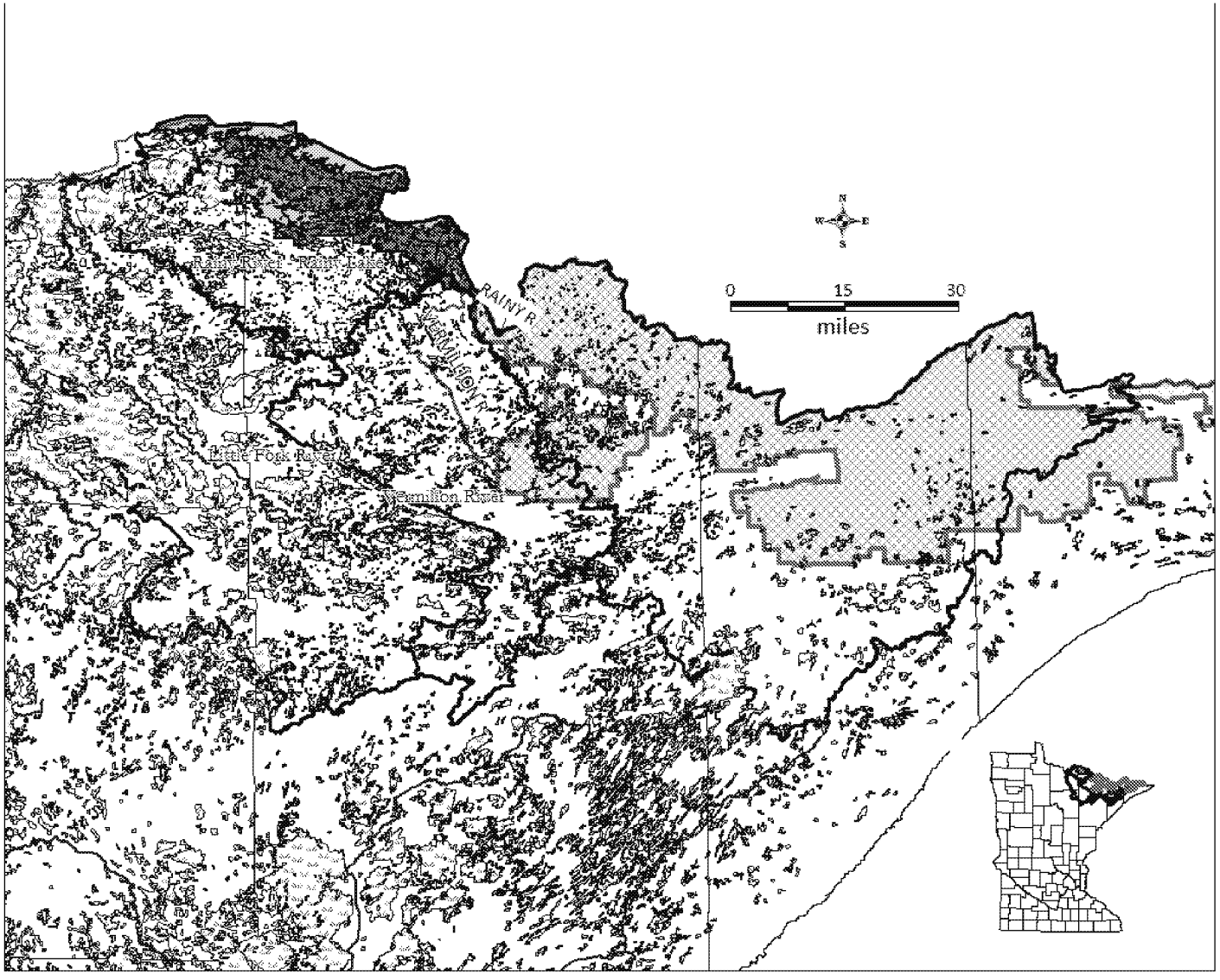

Figure 5: Location of wetlands in the watersheds draining to Voyageurs National Park. Wetlands GIS file from Dnr100khydrography, from www.mngeo.state.mn.us/chouse/metalong.html

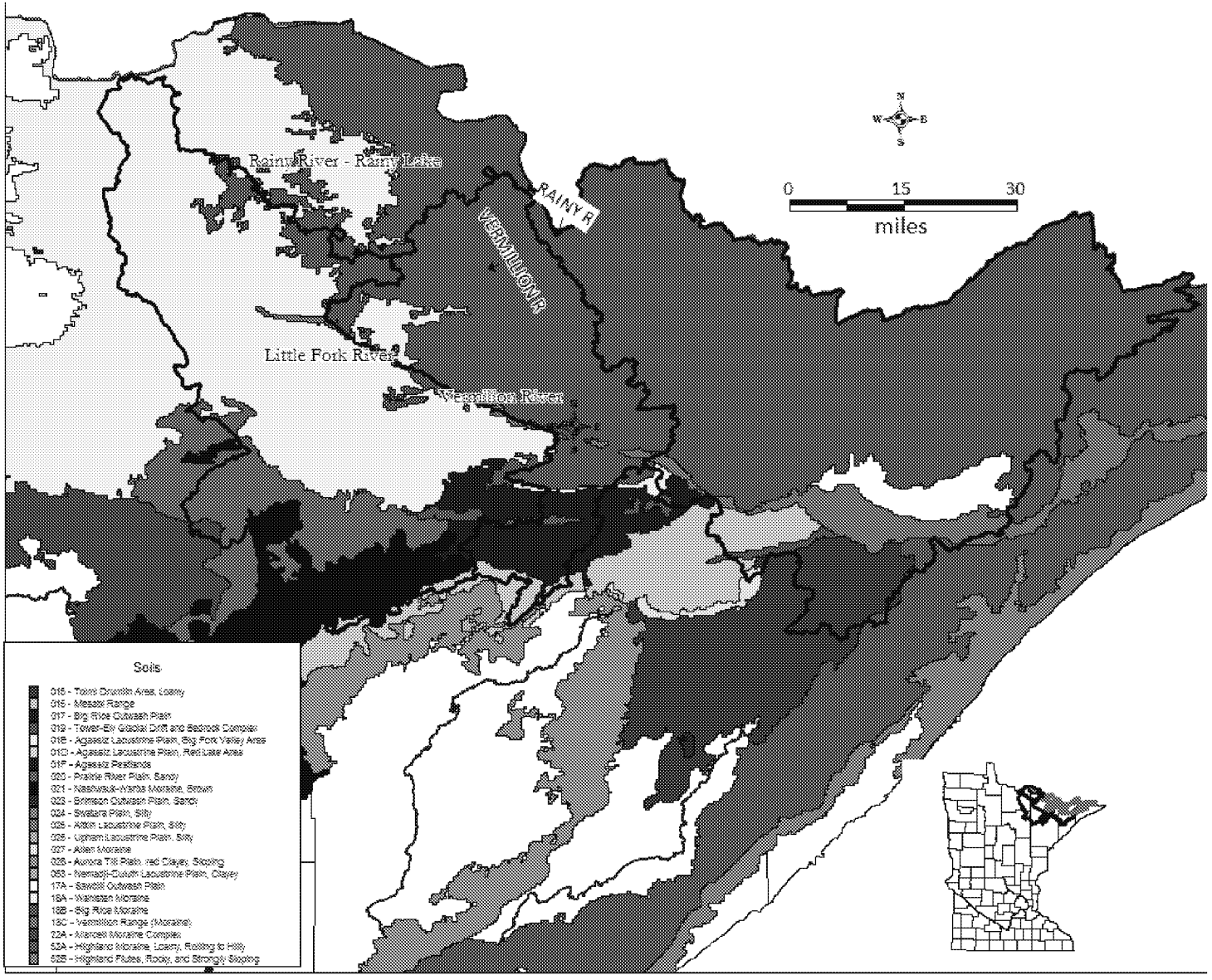

Figure 6: Soil type for the watersheds draining to Voyageurs National Park. From Minnesota soil atlas: http://www.mngeo.state.mn.us/chouse/metadata/soil_atlas.html

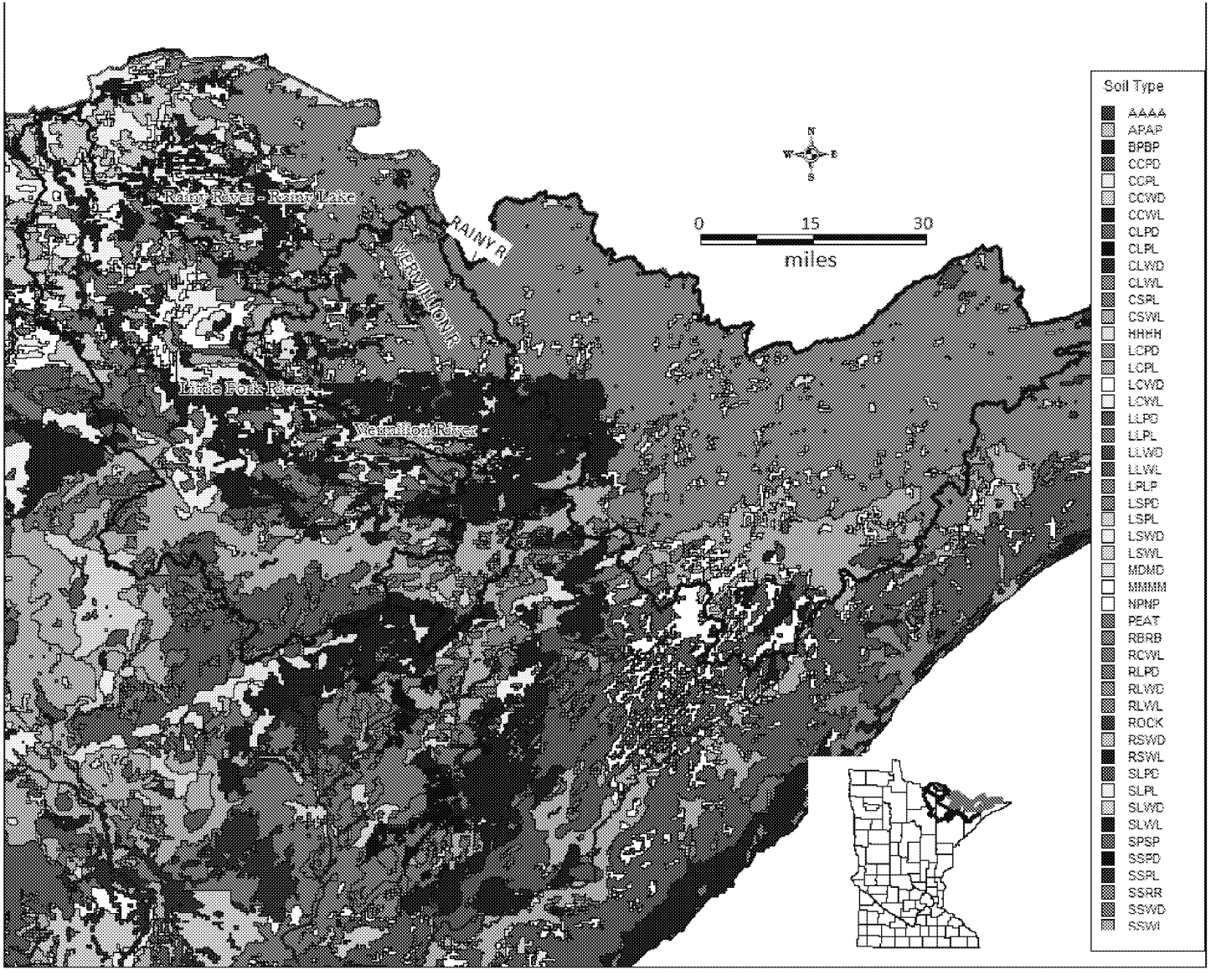

Figure 7: Soil type (Table 2) for watersheds draining to Voyageurs National Park. From Minnesota soil atlas: http://www.mngeo.state.mn.us/chouse/metadata/soil_atlas.html

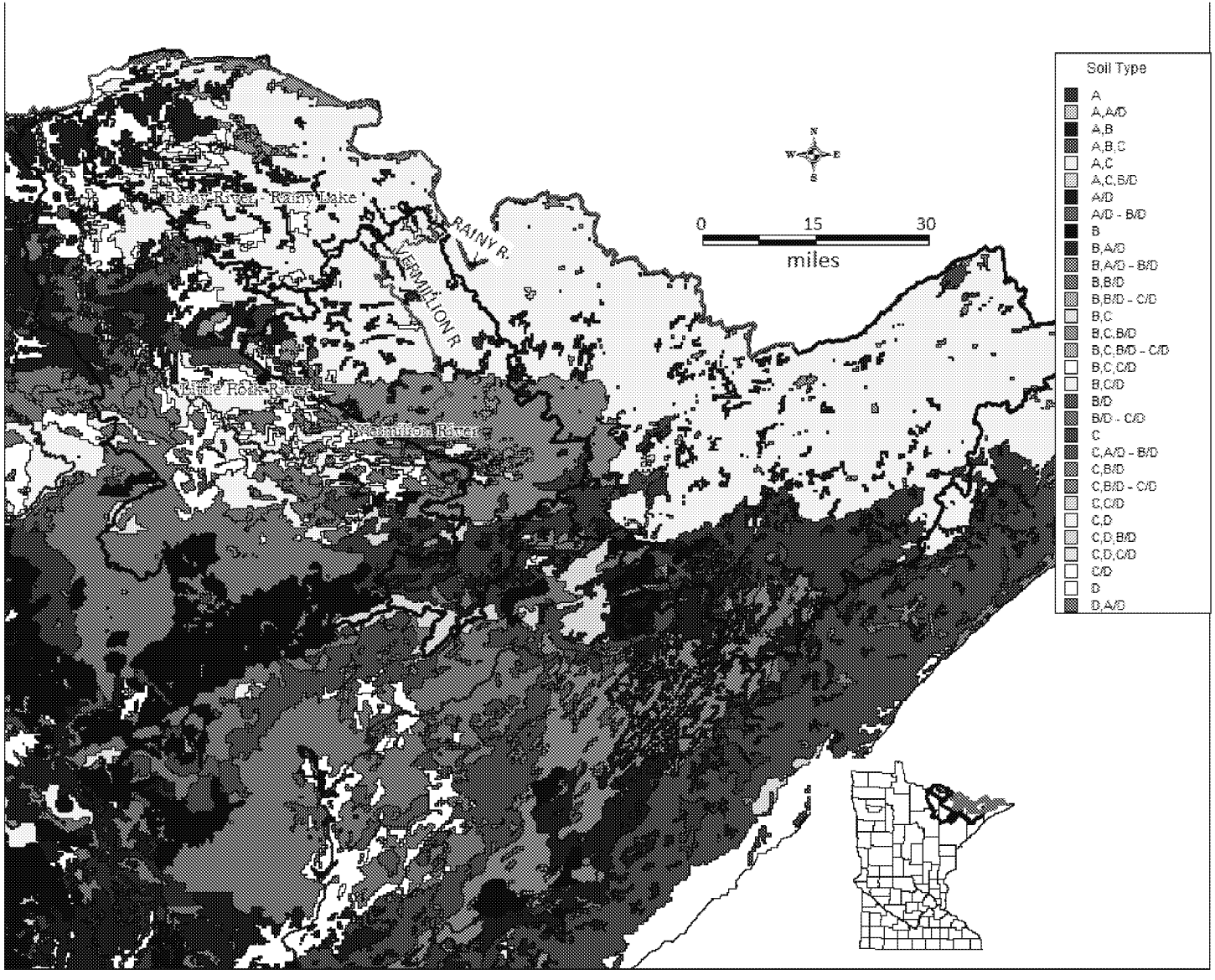

Figure 8: Hydrologic soil type (NRCS 2007) for watersheds draining to Voyageurs National Park. From Minnesota soil atlas: http://www.mngeo.state.mn.us/chouse/metadata/soil_atlas.html. See Table 3 for a description of the hydrologic soil type.

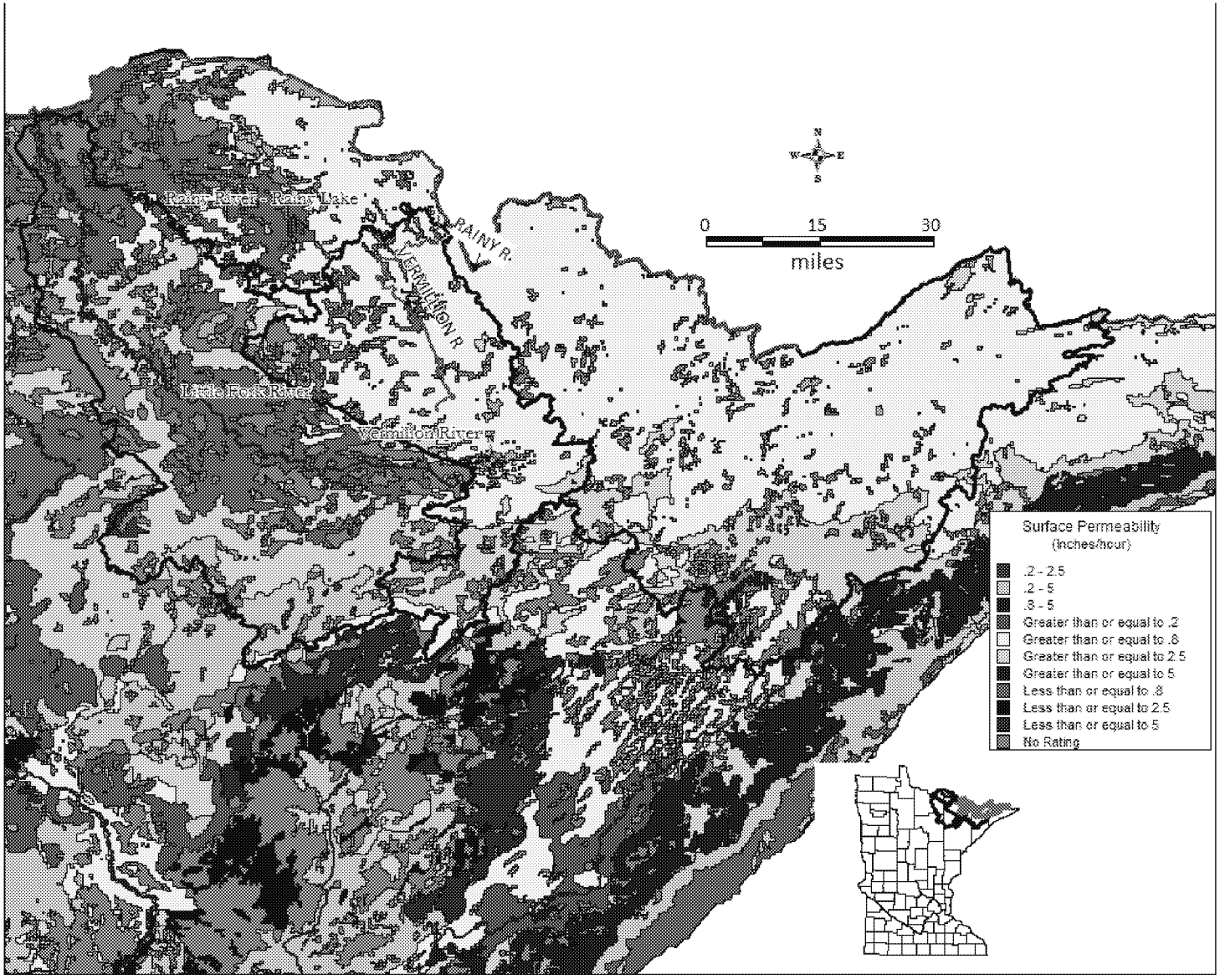

Figure 9: Surface permeability for watersheds draining to Voyageurs National Park. From Minnesota soil atlas: http://www.mngeo.state.mn.us/chouse/metadata/soil_atlas.html

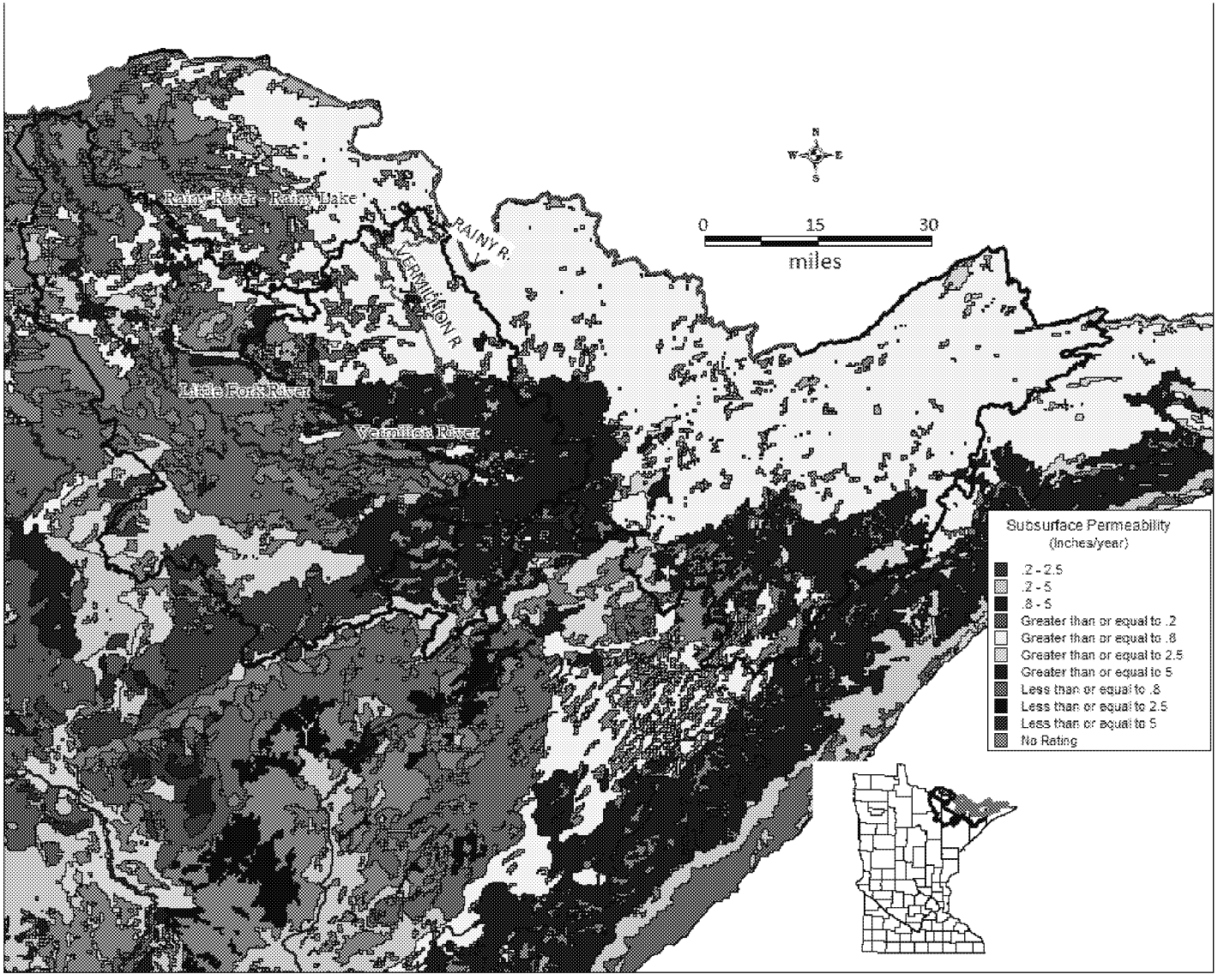

Figure 10: Soil subsurface permeability for watersheds draining to Voyageurs National Park. From Minnesota soil atlas: http://www.mngeo.state.mn.us/chouse/metadata/soil_atlas.html

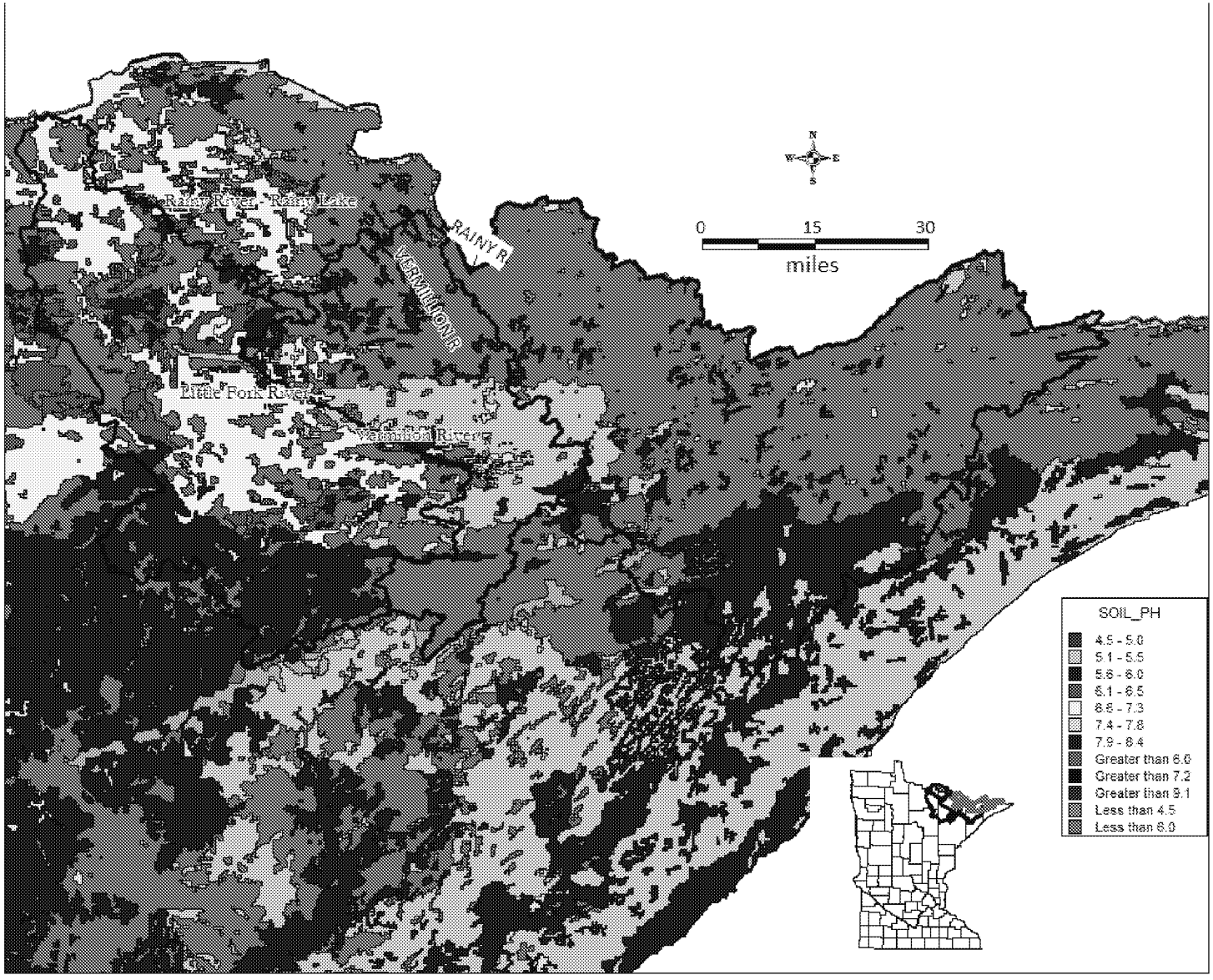

Figure 11: Soil pH for watersheds draining to Voyageurs National Park. From Minnesota soil atlas: http://www.mngeo.state.mn.us/chouse/metadata/soil_atlas.html

Table 2: Description of soil type

Factor number	Description
1	Texture of the soil material below 5 feet of the surface, with "S" designating sandy; "L" for loamy or silty; "C" for clayey "X" for mixed sandy and loamy; "Y" for mixed silty and clayey; and "R" for bedrock.
2	Texture of the material in the first 5 feet below the surface, or a significant part of it, with "S" for sandy; "L" for loamy, and "C" for clayey.
3	Drainage of the unit, where "W" means well-drained (water table commonly below the rooting zone), and "P" means poorly-drained (water table within the rooting zone).
4	Color of the surface horizon with "D" for dark-colored and "L" for light colored (Darker colors associated with higher organic matter content).
For example, RLWL means bedrock below 5 feet below the surface, loamy for the top 5 feet, well-drained below the root zone, and light colored.	

Table 3: Description of soil properties with respect to infiltration by hydrologic soil group (NRCS 2007)

Hydrologic soil group	Description
A	Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands and or gravel. These soils have a high rate of water transmission and would result in a low runoff potential.
B	Soils having moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.
C	Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of (1) soils with a layer that impedes the downward movement of water, or (2) soils with moderately fine to fine texture and slow infiltration rate. These soils have a slow rate of water transmission.
D	Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of (1) clay soils with a high swelling potential, (2) soils with a high permanent water table, (3) soils with claypan or clay layer at or near the surface, and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission.

Estimate of Surface and Groundwater Flows

Precipitation segregates into evapotranspiration (ET), runoff or infiltration into the ground. ET includes direct evaporation of surface water and precipitation intercepted by vegetation and transpiration of soil water through the vegetation. River flow is either direct runoff from the surface, interflow, or groundwater discharge of recharge. Infiltration either becomes interflow, recharge to groundwater, or transpiration back to the atmosphere.

Interflow is flow through the soils and vadose zone above the water table to rivers, and includes both unsaturated and saturated flow to streams that occurs during and just after storms, with saturation causing temporary perched zones (Sophocleous 2002). Because of the shallowness and flatness of the groundwater table in this study area, especially in wetland areas, interflow is limited. Because of the variable thickness of the soil layer between the water table and ground surface, interflow likely encounters areas that are too thin to fully transmit the flow causing some to discharge to the ground surface and become overland flow. Another possible short-term shallow groundwater discharge to the rivers may be caused by groundwater ridging which causes a rapid conversion of the capillary zone to atmospheric pressure which would rapidly increase the groundwater head and significantly increase the gradient for flow to surface drainages over the short-term (Sophocleous 2002).

Groundwater discharge to rivers is baseflow, which is assumed to equal recharge (Cherkauer 2004; Scanlon et al 2002). Wintertime precipitation is frozen along with the soils so little direct runoff or recharge occurs during winter. Sixty percent of the runoff at the Kawishiwi River near Ely gage occurs during snowmelt from April through June whereas less than 11 percent occurs from December through March for the 1955 to 1976 time period (Siegel and Ericson 1981). Average monthly river flow at the Kawishiwi River near Ely gage peaks at more than 30 in/y during May just two months after the low flow of less than 3 in/y recorded in March (Figure 12). This seasonal runoff causes stream levels to rise which causes a gradient for water to flow from streams into streambanks, increasing the recharge during spring snowmelt. Groundwater levels just outside of the study area have been shown to fluctuate up to six feet during the spring (Polymet 2013a), in response to the spring snowmelt, which Myers (2013a and b) found represented about 8 to 11 in/y recharge.

Seasonal groundwater level fluctuates up to six feet at two wells within the study area (Figures 13 and 14). The well in Figure 13 is more than 30 feet deep and that in Figure 14 is less than 10 feet, but the seasonal fluctuations are similar. Close examination of the low point reached in 1977 suggests that the fluctuations in the deeper well lagged a bit, but that may be an artifact of the frequency the water level was measured. These figures show the substantial variation both seasonally and among dry and wet years.

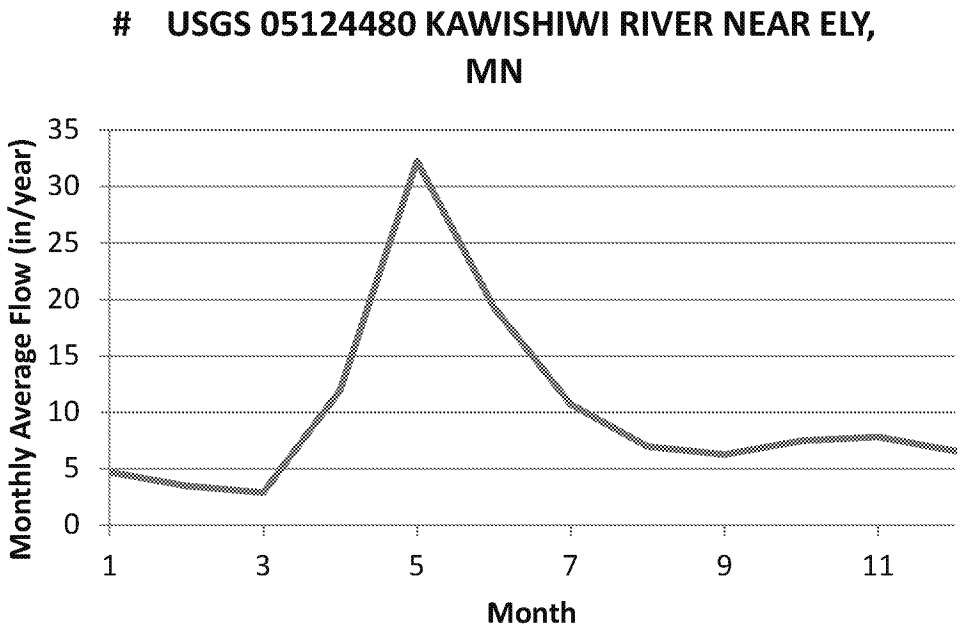

Figure 12: Average flow by month (1=January, 12=December) in inches per year for the Kawishiwi River near Ely, MN. Source: http://waterdata.usgs.gov/mn/nwis/sw/

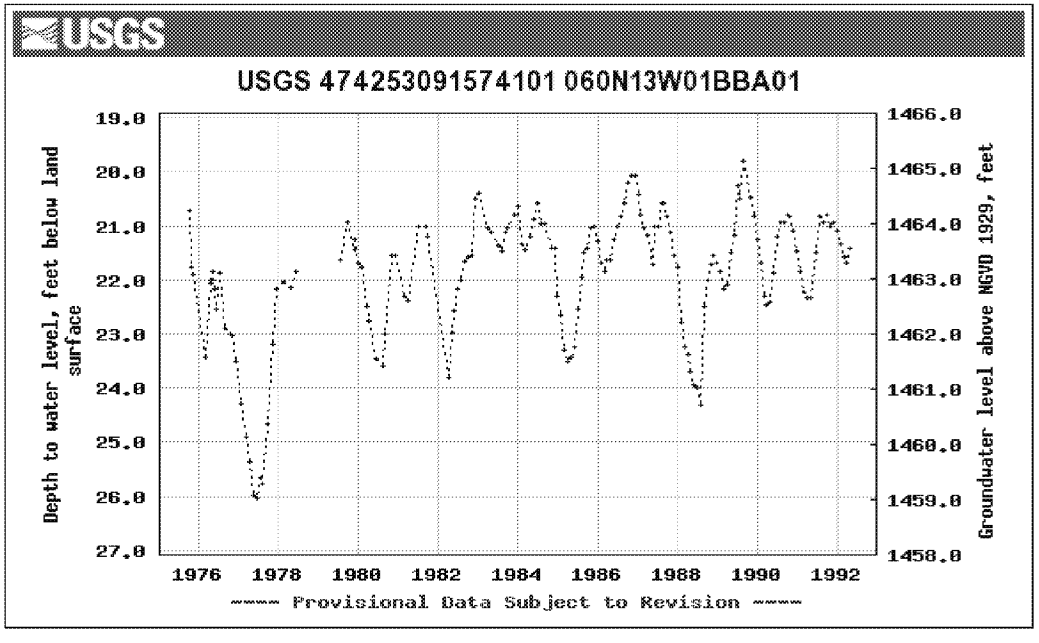

Figure 13: St Louis County, MN, HU 09030001, Latitude 47°42'53", Longitude 91°57'41", Land-surface elevation 1,485.00 feet above NGVD29, Depth of well 30.0 feet below land surface, depth of is 42.0 feet below land surface. This well is completed in the Wisconsin Stage (112WSCS) local aquifer. Source: http://nwis.waterdata.usgs.gov/mn/nwis/gwlevels

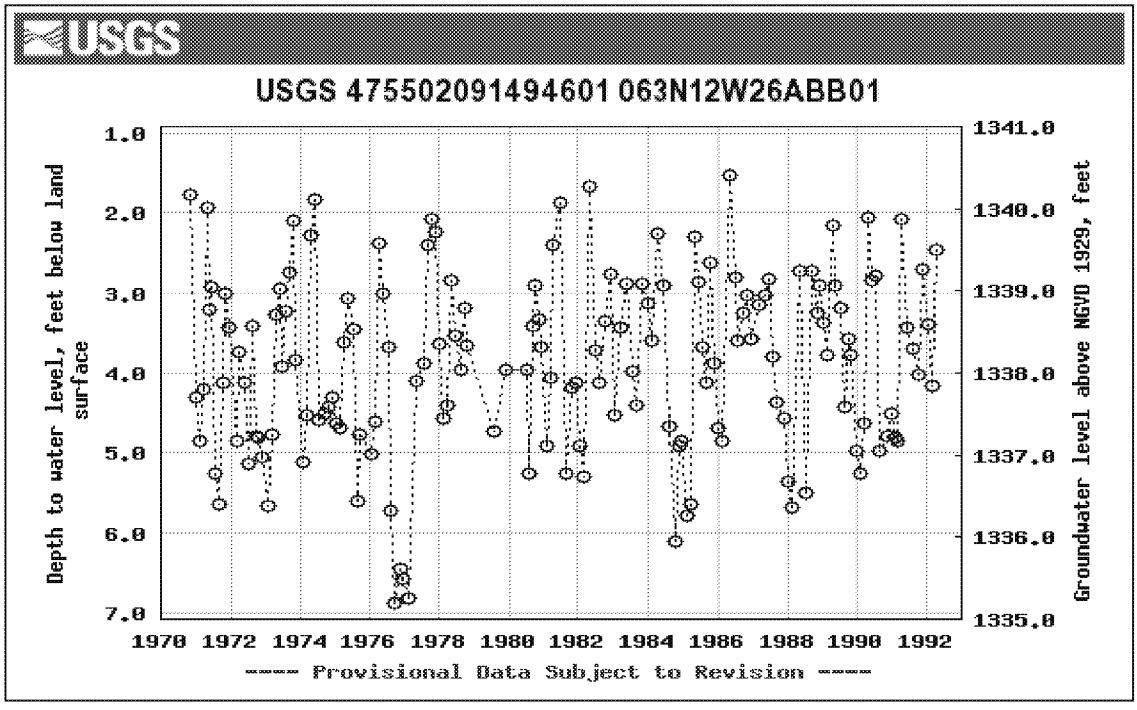

Figure 14: St Louis County, Minnesota, Hydrologic Unit Code 09030001, Latitude 47°55'02", Longitude 91°49'46" NAD27, Land-surface elevation 1,342.00 feet above NGVD29, The depth of the well is 9.0 feet below land surface. The depth of the hole is 9.0 feet below land surface, near Ely, MN. Source: http://nwis.waterdata.usgs.gov/mn/nwis/gwlevels

Setting baseflow equal to groundwater recharge over the basin (Scanlon et al. 2002) does not mean that the lowest observed flows on a river equals an average recharge rate distributed evenly across the basin. Peak recharge coincides with the snowmelt because more water is available for infiltration and seepage from stream channels. Except during a low snowmelt year, most of the watersheds would initially be contributing recharge at the peak snowmelt. With time since the peak, however, the area contributing recharge would decrease as portions of the watershed complete their melt. Downstream areas that receive runon from upgradient would have the longest period with recharge. The baseflow hydrograph would be shaped similarly to the recharge pattern. Baseflow would decrease according to a function of the contributing area and the flow time from that area. The actual discharge would be related to the gradient at the stream which would decrease as the groundwater level in the banks decreases; this could not be directly related to contributing area because the water table is not linear and the groundwater flow times from portions of the watershed differs according to gradient and transmissivity. At minimal baseflow, the entire drainage area is not contributing. Just southwest of the Laurentian Divide, Myers (2013a) found that the lowest baseflow cannot equal the average recharge because of the long time period since recharge would have occurred (the previous snowmelt period) and the short travel time through the aquifers due to

the high conductivity and thinness of the surficial aquifers. A similar process controls through the study area here.

Estimate of Baseflow and Low Flows for Headwaters Streams

Baseflow was estimated for all US Geological Survey gaging stations in the area using methods of Lim et al. (2010, 2005) found at https://engineering.purdue.edu/~what/main.html (accessed 4/29/14) (Table 4). Essentially, the method determines a recession index[3], similar to Lorenz and Delin (2007), which is then used to back calculate a baseflow hydrograph from under the peak of each runoff peak. If the flow rate decrease is relatively smooth, it is assumed to be controlled by drainage from one primary component controlling continuing flow, such as release from surface storage or groundwater.

Total flow was divided into direct runoff and baseflow. The sum of average flow for each day of the period of record is total flow in cfs-days (cubic feet per second x days) which divided by number of days yield average flow in cfs (Table 4). The same applies to direct runoff and baseflow (Table 4). The baseflow index is the proportion of total flow that is baseflow. Yield is total streamflow per area, so the difference between total precipitation and yield is the average ET from the watershed. Recharge is baseflow per area, assuming that all recharge becomes baseflow (Cherkauer 2004, Scanlon et al 2002). The estimate is the average of distributed recharge (through the ground surface over the watershed) and runoff recharge. The actual location of recharge depends on the distribution of soils, geology, rainfall, and recharge from streams. The heterogeneity of these features was discussed above. Flow management may also affect the baseflow, including reservoir control of flow releases and the discharge of mine pit dewatering discharges.

Total and baseflow yield is higher for gages on the east portion of the study area, in the Rainy Uplands including the Kawishiwi River drainages, than in the west. Total and baseflow yield ranges from 9.5 to 12.3 and from 6.5 to 9.5 in/y, respectively, for gages in the Rainy Headwaters, with gages on smaller watershed having the most extreme values. The total and baseflow yield in the Little Fork and Vermilion River watersheds is less than 9.8 and 7.3 in/y, respectively. The largest watershed, the Little Fork, #1, has the lowest baseflow yield of large watersheds.

The baseflow index varies from about 0.65 to 0.79, with a few outliers. The lowest values, occurring for stations 17 through 20, are for streams with very small watersheds; without a large proportion of lakes. Filson Creek, #27, also has a low value at 0.61. Filson Creek is a 25.2 km^2 tributary described by Siegel (1981) as having two significant lakes and being 60% covered

[3] The recession index is the time for a flow hydrograph to decrease, or recede, by one base 10 logarithmic interval from a peak flow.

by upland forest, 30% covered by wetlands and lakes, and the remainder by stands of pine. The watershed has less than one meter of drift covering the bedrock which outcrops over about 10% of the watershed (Id.). Under the wetlands, there is a layer of peat with thickness up to 15 meters (Id.). Peat generally has very low permeability (Siegel et al. 1995) and wetlands underlain by peat are usually perched, so that little recharge through the wetlands occurs. Based on Siegel's (1981) description of Filson Creek, the presence of ground cover that limits recharge may also cause low BFI because runoff is higher.

Of the larger watersheds, the Little Fork at Littlefork MN gage has a BFI on the low end of the range, which may reflect a lack of lakes affecting drainage. On the other extreme, the Basswood River at Winton gage, the largest drainage area in the study, has a BFI equal to 0.78. This probably reflects the substantial string of lakes above the gage (Myers 2014b).

Baseflow yield tends to become smaller moving west from the Rainy Headwaters, along with the decrease in rainfall. Based on the BFI, the proportion of rainfall that becomes recharge also decreases. The average recharge for the Little Fork watershed is 5.6 in/y, for the Vermilion River watershed is 7.1 in/y, and for the Rainy Headwaters ranges from 7.5 to 8.2 in/y; these estimates are simply the baseflow yield for the gages with the largest watershed. Again, these averages do not account for local variation due to the various heterogeneities.

The recharge estimates derived herein are less than the range as determined using the Delin et al (2007) methods. For the Kawishiwi watershed, Delin et al (2007) yields recharge equal to 8 to 11 in/year (Myers 2013b). Further west through the Little Fork watershed, Delin et al (2007) would yield from about 5.8 to 9.6 in/y. The trend using the Delin et al (2007) method is similar to that described here but it has slightly higher rates.

Low flow conditions occur during baseflow but represent the extreme lower flows. Groundwater is the primary source of flow, but from only a portion of the watershed. It is during these low flow periods that conditions most critical both ecologically and economically occur. Two studies have estimated low flows for Minnesota streams (Arnston and Lorenz 1986; Winterstein et al 2007). The earlier study estimated low flow return intervals for gage stations with ten or more years of record (Arnston and Lorenz 1986) and the latter study provided similar estimates for stations with twenty or more years of record (Winterstein et al 2007) (Table 4). The ten-year seven-day low flow (7Q10) is considered here because it is long enough for contaminant concentrations to become critical. The low flow values, and baseflow estimates, are determined from available data for a gage without regard to whether the periods of record (Table 4) are overlapping.

Table 4: US Geological Survey gaging stations used for this study, various station parameters, and flow values. The Armston and Lorenz and Winterstein et al columns are the ten-year seven-day low flow value for the specified station.

Number	Site Number	Site Name	Altitude (ft amsl)	Area (sqmiles)	Avg Flow (cfs)	Direct Runoff (cfs)	Base flow (cfs)
1	5131500	LITTLE FORK RIVER AT LITTLEFORK, MN	1083.59	1680	1045.72	348.13	697.59
4	5131455	NETT LAKE RIVER NEAR NETT LAKE, MN		128	90.94	30.51	60.43
5	5131448	WOOD DUCK CREEK NEAR NETT LAKE, MN	1275	31.8	21.25	7.84	13.41
8	5130500	STURGEON RIVER NEAR CHISHOLM, MN	1305.7	180	122.18	36.33	85.85
9	5131000	DARK RIVER NEAR CHISHOLM, MN	1316.8	50.6	36.50	11.31	25.18
10	5129115	VERMILION RIVER NR CRANE LAKE, MN	1180	905	613.01	137.51	475.50
11	5129000	VERMILION RIVER BLW VERMILION LK NEAR TOWER, MN	1347.36	483	319.67	68.77	250.91
13	5128500	PIKE RIVER NEAR EMBARRASS, MN	1410.27	115	79.04	26.63	52.41
14	5127205	BURNTSIDE RIVER NEAR ELY, MN		69	59.44	13.89	45.55
15	5127210	ARMSTRONG CREEK NEAR ELY, MN		5.29	4.57	1.84	2.72
16	5127215	LONGSTORFF CREEK NEAR ELY, MN	1360.67	8.84	7.75	3.02	4.73
17	5127207	BJORKMAN'S CREEK NEAR ELY, MN		1.36	1.07	0.51	0.57
18	5127219	SHAGAWA RIVER Trib AT ELY, MN		0.71	0.11	0.06	0.04
19	5126000	DUNKA RIVER NEAR BABBITT, MN	1488.98	53.4	38.73	13.95	24.78
20	5127220	BURGO CREEK NEAR ELY, MN		3.04	3.26	1.42	1.84
21	5126500	BEAR ISLAND RIVER NEAR ELY, MN	1388.86	68.5	42.93	11.62	31.31
22	5127230	SHAGAWA RIVER AT ELY, MN		99	89.58	20.14	69.44
23	5126210	SOUTH KAWISHIWI R ABV WHITE IRON LAKE NR ELY, MN		837	642.53	181.30	461.23
24	5127000	KAWISHIWI RIVER NEAR WINTON, MN		1230	988.03	304.77	683.26
26	5125000	SOUTH KAWISHIWI RIVER NEAR ELY, MN	1430		404.86	101.68	303.17
27	5124990	FILSON CREEK IN SESW SEC. 24 NEAR WINTON, MN		9.66	7.61	2.95	4.67
28	5127500	BASSWOOD RIVER NEAR WINTON, MN	1296.8	1740	1341.27	295.83	1045.44
29	5125500	STONY RIVER NEAR ISABELLA, MN	1632.45	180	125.72	36.65	89.06
30	5124480	KAWISHIWI RIVER NEAR ELY, MN		254	188.35	44.20	144.15
31	5124500	ISABELLA RIVER NEAR ISABELLA, MN	1453.1	341	280.57	104.72	175.85

Table 4: continued

Map #	Base Flow Index (BFI)	Yield (in/y)	Baseflow yield (in/y)	Arntson and Lorenz (1987)	Winterstein et al (2007)
1	0.67	8.45	5.64	40.20	43.9
4	0.66	9.64	6.41		
5	0.63	9.07	5.72		
8	0.70	9.21	6.47	8.10	8.4
9	0.69	9.79	6.76	3.00	3
10	0.78	9.19	7.13		55.4
11	0.78	8.98	7.05	9.9	10
13	0.66	9.33	6.19	1.50	
14	0.77	11.69	8.96	0.2	
15	0.60	11.72	6.99	0.00	
16	0.61	11.91	7.26	0.00	
17	0.53	10.71	5.66		
18	0.40	2.02	0.81		
19	0.64	9.84	6.30	0.1	
20	0.56	14.55	8.21	0.00	
21	0.73	8.51	6.20	0.2	
22	0.78	12.28	9.52	1.7	
23	0.72	10.42	7.48		
24	0.69	10.90	7.54	38.7	42.9
26	0.75			42.8	
27	0.61	10.70	6.56		
28	0.78	10.46	8.16	191	194
29	0.71	9.48	6.72	7.7	
30	0.77	10.07	7.70	12	16.8
31	0.63	11.17	7.00	31.4	

Seven stations have 7Q10 flows determined by each method and all have similar values regardless of the study. That the studies were completed 20 years apart and rely at least in part on data collected before and after 1986, low flow characteristics have not changed substantially with time.

Low flows can be a very small proportion of baseflow, which reflects that only a small portion of the aquifers in the area are contributing to flow during low flows. Most larger watersheds have low flows less than 10% of the baseflow, although the Basswood River nr Winton MN is an exception with the lowest flows being about 19% of baseflow. Low flows from most of the smaller watersheds, if they were estimated at all, were only a few percent or even near zero. The low flows at a gage just below large reservoirs may be unrealistically low if the reservoir operators were not required to maintain minimum releases, as was the case in earlier time periods (Luce and Metcalfe 2014).

Lakes

The watersheds draining to VNP contain many lakes of many different sizes and morphometric characteristics (Table 5). Rainy Lake is by far the largest but it is also mostly within and downstream of VNP, lying on the north boundary with a majority within Ontario; contaminants will not flow through it on a pathway to VNP. Contaminants from the Rainy Headwaters would pass through top seven lakes on Table 5 prior to reaching VNP. Contaminants from the gold deposits in the Vermilion River watershed would pass through the very large Vermilion Lake before reaching VNP.

Table 5: Morphometric characteristics for lakes along the flow paths to VNP and within VNP (Figures 1 and 16). Volume is calculated by assuming the average depth of the littoral area is 7.5 feet and the average depth of remainder is the average of 15 and the max depth. Littoral area is that portion of the lakes less than 15 feet deep. Source: http://www.dnr.state.mn.us/lakefind. Source for volume on Kabetogama, Namakan and Rainy Lake is Kallemeyn et al. (2003).

Lake	Area (ac)	Littoral area (ac)	Max Depth (ft)	Volume (acre-feet)
Birch	1267	754.9	45	28,715
White Iron	3238	1603	47	87,251
Farm	1292	459	56	45,505
Garden	653	239	55	22,509
Fall	2258	1178	32	50,433
Newton	516	358	47	9964
Basswood Lake	22722	7034	111	1,276,419
Vermilion Lake	39272	15006	76	1,580,638
Kabetogama Lake	24034	7440	80	769,000
Rainy Lake	230301	18949	161	7,392,000
Namakan Lake	24065	5026	150	1,121,000
Little Vermilion Lake	1288	231	52	52,997
Iron Lake	3238	1603	47	87,233
Upper Bottle Lake	459	176	55	15,470
Lower Bottle Lake	641	311	110	27,908
Lac La Croix	34750	8500	168	2,859,375

Conceptual Flow Model at Voyageurs National Park

The majority of VNP is covered with water of reservoirs, lakes, and wetlands (Christensen et al 2013) (Figure 15). As noted above, the Rainy Headwaters watershed flows directly into the east end of VNP and the Vermilion River watershed flows into the east end of VNP from the south (Figure 1). These watersheds are the sources of contaminants and host the rivers which would transport contaminants into the park and into Namakan and Rainy Lakes (Figures 1 and 15).

The park is within the Rainy River – Rainy Lake watershed which also drains lands from south of the park into and through the park to Rainy Lake. Kabetogama Lake lies completely within the park. Most of the watershed lying south of VNP drains through Kabetogama Lake which is also connected to Namakan Lake (Figure 15). The water levels in those two lakes are essentially the same due to the connection (see Attachment 2 which shows water levels at Gold Portage (Kabetogama Lake) and Kettle Falls (Namakan Lake).

The operating rules for Kabetogama Lake were changed in 2000 to instill more natural level fluctuations to the reservoir (Christensen et al 2013, 2004). This change resulted in increased high flows at the outlet from the lake since 2000 (Figure 16, upper). All of the recorded daily flows exceeding 900 cfs since 1982, more than two hundred occurrences, have occurred since 2000. During both periods however, there are many zero flows (Figure 16, upper and lower, almost 1500 zero flows) because flow does not commence until the Namakan Reservoir water elevation reaches 1113.5 ft (Kallemeyn et al. 2003). Figure 16 demonstrates the increased variability in the flow resulting from the operating rules, however flow leaving the lake at Kettle Falls and Squirrel Narrows far exceeds that at Gold Portage. For example, at Squirrel Narrows averaged 13,100 cfs. Surface water flowed in an unpredictable pattern, in both directions, between Kabetogama Lake and Namakan Lake during 2008, 2009, and 2011 (Christensen et al. 2013).

VNP contains 26 interior lakes, although all quite small (Figure 15). Only one of the interior lakes exceeds 247 acres in area, and they are quite variable in lake area to drainage area ratio and in average and maximum depths (Kallemeyn et al. 2003). The interior lake basins have no threat from mining and do not serve to route contaminant flows, so their flows and morphometric characteristics will not be discussed further here.

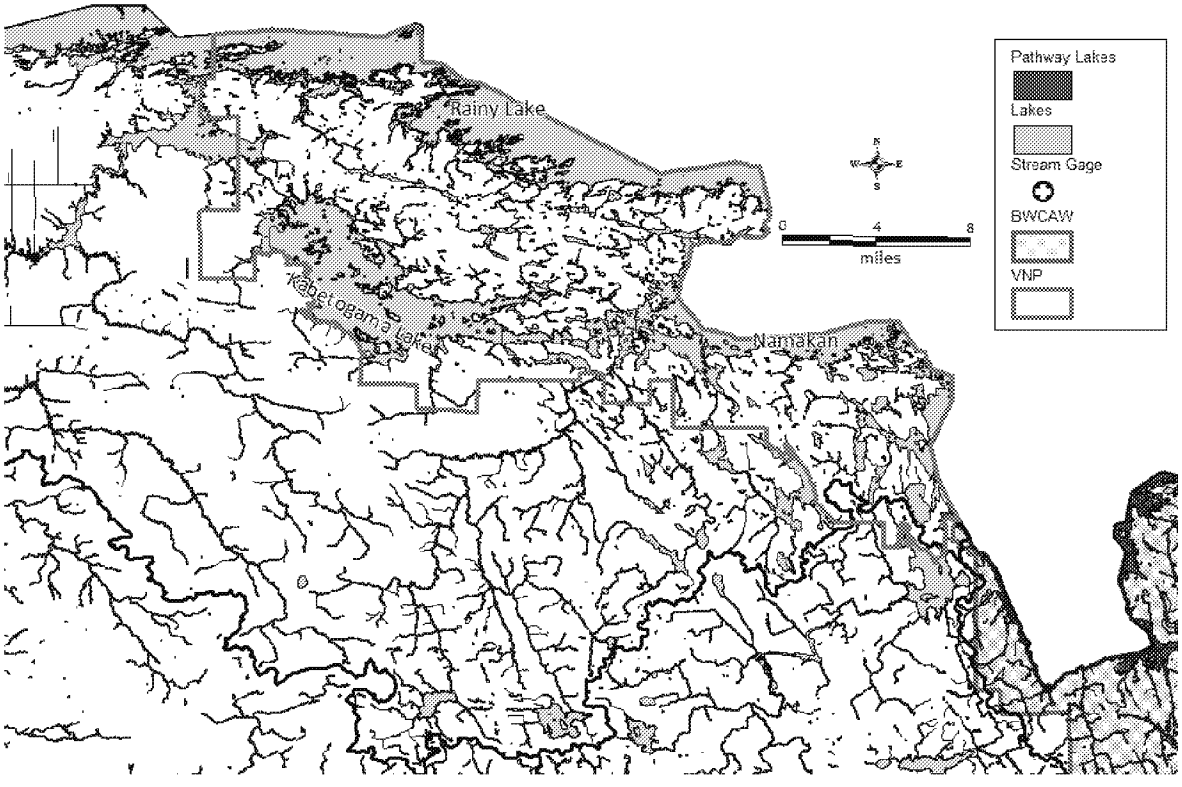

Figure 15: Map showing Voyageurs National Park (VNP) and the three largest lakes within the park. The map also shows the northwest portion of the Boundary Waters Canoe Area Wilderness (BWCAW) and lakes that are on the pathway for contaminants to reach VNP.

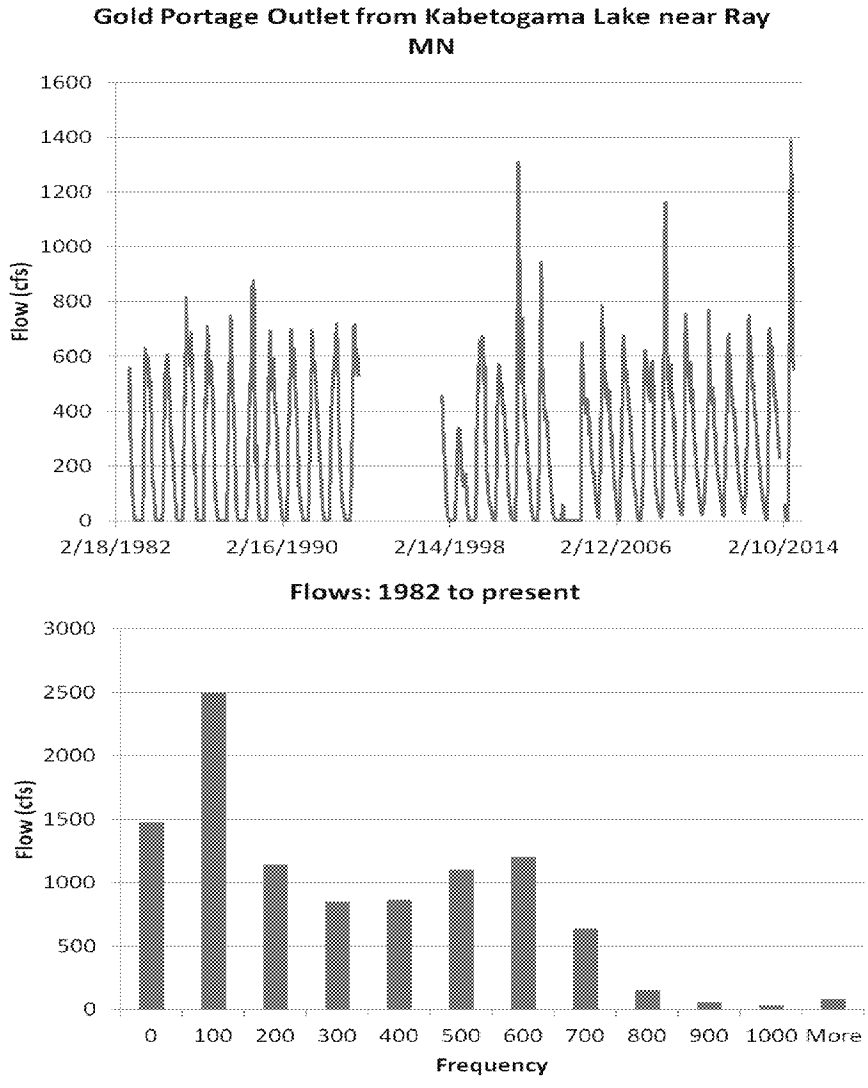

Figure 16: Measured flow (upper) and frequency of measured flow (lower) at the Gold Portage Outlet from Kabetogama Lake near Ray MN, gaging station # 05129290. Data source: http://waterdata.usgs.gov/mn/nwis/sw/

Groundwater Chemistry

Groundwater in shallow sand and gravel aquifers is a magnesium bicarbonate type typical of groundwater that has either a short residence time or has been collected in a recharge zone (Olcott 1992; Siegel and Ericson 1981). In till, the groundwater is either calcium magnesium bicarbonate or calcium magnesium sulfate; the latter occurs near mineralized zones where oxidation may occur (Id.). The till has a smaller particle size and therefore larger surface area to volume ratio which leads to more dissolution and faster chemical reaction times and therefore higher concentrations of various constituents (Id.). For example, "mean values of major dissolved constituents are significantly higher for water from till than from sand and gravel.

Mean and median concentrations of the major ions, specific conductivity, and hardness in water from till are about twice that found in sand and gravel" (Siegel and Ericson, 1981, p 19).

Concentrations of copper, cobalt, and nickel can exceed 100 ug/l in surficial material located above mineralized areas (Id.). This indicates there is an exchange of groundwater between the surficial and bedrock aquifers or an upward flow gradient in these areas. Higher concentrations of copper and nickel extend over an area of 5 to 10 miles from the center of the contact zone (Id.). Iron concentrations are sometimes very high. These trends are also reflected in stream concentrations, as observed in ongoing studies by the USGS described in the next section.

In the bedrock, concentrations are highly variable because they reflect localized concentrations in fracture zones and sometimes increase with depth. Duluth Complex water is either sodium chloride or sodium bicarbonate and Biwabik Iron and Virginia Argillite water is a calcium magnesium bicarbonate type similar to the overlying surficial materials. Metals concentrations are generally lower than in the surficial aquifer near contact zones. This may relate a lack of oxygen for oxidation rather than a lack of the presence of metals at depth. At depth the groundwater may contain substantial concentrations of salt (Olcott 1992).

Surface Water Chemistry

There is little information on basinwide chemistry of surface water in this study area. The USGS has commenced a study on two headwaters watersheds, Filson Creek and Keeley Creek near Birch Lake and near the copper-nickel deposits currently being explored by Twin Metals (Jones et al 2014). Their study will run through 2016 and any results presented were preliminary. Filson Creek has Duluth Complex rocks with copper/nickel mineralization (Jones et al 2014; Siegel 1981) and Keeley Creek has no mineralization (Jones et al 2014) so they provide a comparison between watersheds with various levels of mineralization. In general, the water from Filson Creek is very dilute with pH generally acidic, ranging from 5.0 to 7.2. Jones (presentation of Jones et al 2014) stated that the lower pH was likely the effect of mineralization as well as the effect of bogs in the watershed; the dissolved organic carbon was relatively high and sulfate was low. The concentration of Ni and Cu was generally less than 10 ug/l in both watersheds, although it was slightly higher in Filson Creek. Concentrations increase in a downstream direction reflecting the inflow of groundwater from bedrock. In response to a question, Jones stated that the buffering capacity in the watershed was very low (Id.).

The position of a lake in its watershed controls its chemistry and how well it can absorb acid. In general, headwaters lakes that receive mostly precipitation with little groundwater inflow will be softer or more poorly buffered (Blann and Cornett 2008). Myers (2014a) verified with a numerical groundwater flow model that there was little discharge to headwaters lakes. Lakes

in Minnesota Arrowhead and Northern Lakes and Forests regions commonly have alkalinity less than 50 ppm (Blann and Cornett 2008).

Electrical conductivity (EC), a surrogate for total dissolved solids, generally is lower when river flow includes surface runoff. Surface runoff has less salt because it has less contact time with the surficial aquifer during which salts would be dissolved. The lakes in VNP maintain EC less than 100 umhos/cm, however the Ash River which enters VNP from the west has substantially higher EC at 150 to 200 umhos/com (Kallemeyn et al 2003). On the Little Fork River, EC decreases nonlinearly with flow during the time the USGS collected the data concurrently (Figure 17). Minimum EC occurs at around 100 umhos/cm, although a few values at between 1500 and 2000 cfs were as low as 80 umhos/cm. The high EC at baseflow reflects that most flow is groundwater with higher salt content and verifies the assumption that baseflow is groundwater discharge. The scatter at higher values is likely due to the variable amount of surface runoff and groundwater baseflow in the total flow.

The EC – flow relation at the Dunka River nr Dunka MN gage is similar but more variable to that on the Little Fork River (Figure 18). Low EC values at flows as low as 20 cfs suggests that even at lower flows the river is mostly surface runoff, rather than groundwater. Above about 180 cfs, the variability decreases substantially because the flow is predominantly low-salinity runoff. Together, the EC-runoff relations show how salinity depends on the hydrograph.

The salinity entering the Rainy River system from Ontario is also extremely low, with EC in Beaver House Lake, Seine River[4], and Turtle River being 28, 50-55, and 25 uS/cm, respectively (Kallemeyn et al. 2003). Flow from Canada therefore effectively dilutes the already very low salinity in the river system.

[4] See the discussions elsewhere in this report regarding past and potential future pollution problems in the Seine River.

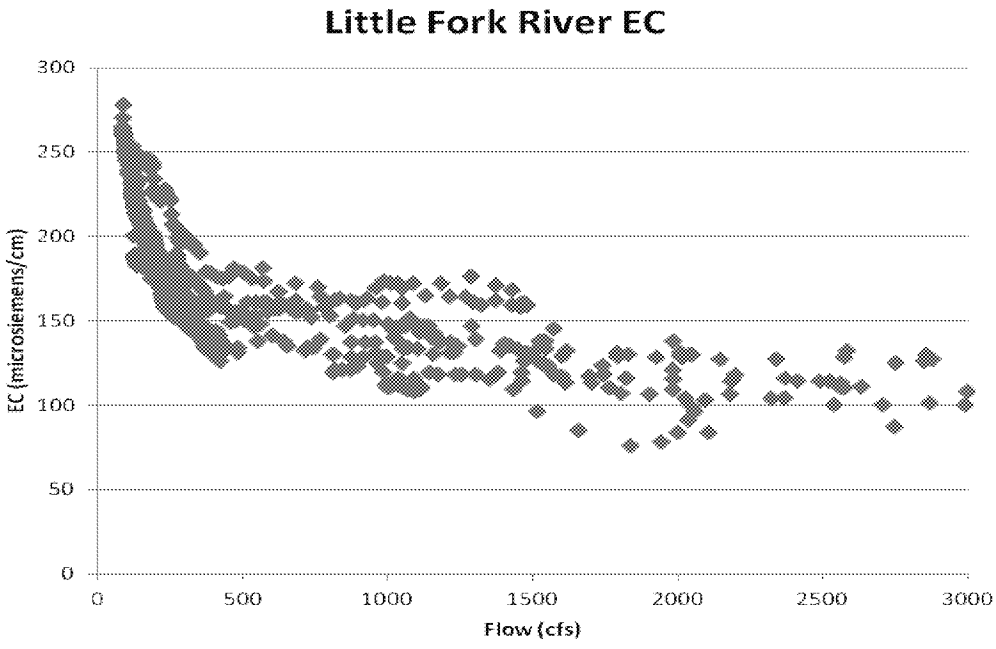

Figure 17: Relation of electrical conductivity with flow at the Little Fork River at Littlefork MN gage (#05131500). Years 1980 through 1983. Data source: http://waterdata.usgs.gov/mn/nwis/sw/

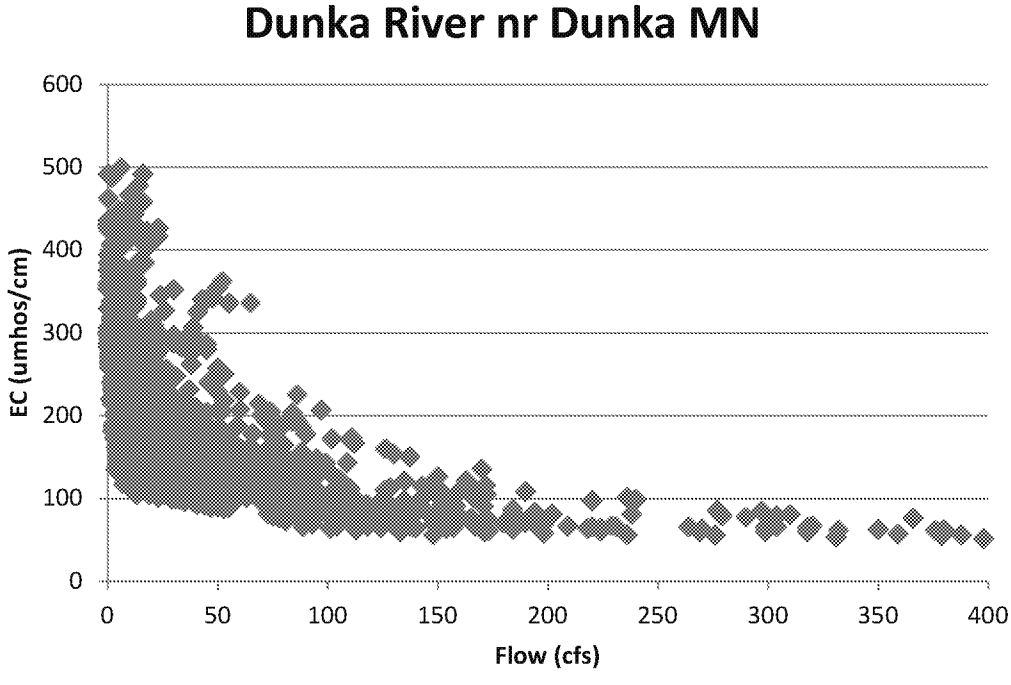

Figure 18: Relation of electrical conductivity to flow at the Dunka River nr Dunka MN gage (#05126000). Years 1975 to 1980. Data source: http://waterdata.usgs.gov/mn/nwis/sw/

The lowest salinity observed in the watershed occurred during sixteen measurement collected in 1976 at the South Kawishiwi River above White Iron Lake near Ely gage (#05126210). The highest observed total dissolved solids concentration was about 35 mg/l and occurred during baseflow when the river would have predominantly been groundwater discharge.

Carbonate is nondetect at the South Kawishiwi River above White Iron Lake which along with there being almost no carbonate rock in the watershed indicates a very low acid buffering capacity. Buffering is the ability of the water to absorb an acid without the acidity increasing. In this river system, the addition of an acid would significantly increase the acidity. Soils throughout the study area had low pH which also reflects an inability to neutralize acid.

Alkalinity in the Rainy Lake and Namakan Lakes in VNP is less than 20 mg/l, or very low (Kallemeyn et al 2003), which also reflects cumulative lack of buffering. Kabetogama Lake has higher alkalinity, up to 40 mg/l (which is still quite low) (Id.), which probably reflects the much higher values from Ash River (75 to >100 mg/l). Kabetogama Lake receives drainage from calcareous drift and Lake Agassiz sediments south and west of the lake whereas the Rainy River drains thin glacial till and bedrock (Id.).

Kallemeyn et al (2003) found that 13 of 19 lakes were moderately sensitive to acid precipitation and that 2 more lakes were extremely sensitive. Only two smaller lakes, Mukooda and O'Leary, were non-sensitive. Acid neutralizing capacity increased moderately in the smaller lakes and sulfate deposition has moderately decreased with time (Id.). In the headwaters, Siegel (1981) found that snowfall contributed the vast majority of sulfate to Filson Creek. Any areas that had been found sensitive to acid precipitation would also be sensitive to AMD.

Mercury contamination is a current issue in all watersheds draining to VNP, based upon the streams and lakes listed as impaired under the current Minnesota Clean Water Act Section 303d impaired waters list (http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/impaired-waters-list.html, accessed 12/3/13). In the Kawishiwi watershed, with the river, Birch Lake, and many other streams and ponds are listed as impaired for mercury. The impairment is often due to "mercury in fish tissue" rather than a water column measurement. This reflects the tendency for mercury to be bound in sediment, the tendency for methylation to occur due to bacterial activity (Greeson 1973), and the Hg to bioaccumulate up the food chain to the fish (Greeson 1973). Methyl mercury, or CH3Hg, is soluble in water and it can be incorporated into the body tissues of organisms in the aquatic environment where it bioaccumulates (Greeson 1973).

The sources and transport of mercury through streams varies greatly around the nation (Scudder et al. 2009). Basin geology has been shown to be the primary source in some basins, such as the Colorado (Graf 1985), but in northern Minnesota the source is almost totally airborne mercury emissions (Wiener et al. 2006). Although methyl mercury is soluble, total mercury (THg) often moves through the watershed adsorbed to sediment during high flows, especially during the spring (Jenne 1973). This is a very common transport process in areas where the mercury source is mining (Scudder et al. 2009, Miller et al. 1996). Also, mercury moves as total mercury simply because it takes a while to convert to the more soluble methylmercury – this is especially true where there is a significant Hg loading (Randall and Chattopadhyay 2013), such as at mine. Balogh (2010) presented data from Minnesota rivers that show THg peaks with suspended sediment, and flow rate, indicating that fluvial processes are responsible for a large portion of Hg transport.

The lakes within VNP have been responding in a varying fashion to the general decrease in atmospheric mercury (Hg) deposition since 2000 (Brigham et al 2014). Two lakes had decreasing, one lake had increasing concentrations of methylmercury ($MeHg_{(aq)}$) and one lake had no discernible trend. Contrary trends probably related to the amount of overland runoff and dissolved carbon or the amount of $MeHg_{(aq)}$ reaching lakes (Brigham et al 2014). In the long run, Hg in the lakes should continue to decrease due to decreased deposition, but the rate of decrease will vary throughout the systems depending on local conditions. Increased sulfate or H+ ions (acid) in lakes or wetlands can increase the rate of methylation and the concentration of $MeHg_{(aq)}$ in the lakes (Brigham et al. 2014; Greeson 1973).

Metals concentrations in various VNP lakes exceed standards at least occasionally (Kallemeyn et al 2003). There are few measurements, but in the larger lakes that drain the study area watershed, the Rainy Lake and Namakan Lake, cadmium and lead exceeded standards during the only observations taken (Id.). Nickel, copper, and zinc also exceeded standards occasionally (Id.). In the Lake of the Woods, the sediments contain large arsenic concentrations especially in bays that receive inflow of waters draining historic gold mining areas (Clark and Sellers 2014). These lakes apparently reflect the cumulative water quality of the watersheds upstream of them, meaning they are a repository for metals from all of the natural and anthropogenic sources in the watershed.

Nutrient loading becomes significant moving downstream through the watershed, with more critical conditions occurring downstream of VNP. Phosphorus loads during the 1970s and 80s were very high but regulations causing decreased discharges from the International Falls area had decreased those loads about fivefold (Clark and Sellers 2014). Even so, the Rainy River watershed currently provides about half of the phosphorus load to the Lake of the Woods (Id.).

Surface water sediment transport is generally low in the Kawishiwi River, at about 5 tons/year/mi^2; this is less than half that found in the Partridge River and Embarrass River basins (Siegel and Ericson 1981). Presumably the peak load occurs during spring runoff. There was also no data related to contaminant loads on the sediment.

Upstream sediment, but from the Ontario side, has been a problem to VNP in the past. Sediment removal from the original Steep Rock Lake to access iron ore deposits caused a massive release of about 4 million cubic meters of colloidal silt and clay (Conly et al. 2010) causing Rainy Lake to become brown and seriously harming aquatic life and fishing (Sowa et al. 2001). This is an example of large-scale fine sediment transport through a river system which had essentially no lakes between the source and Rainy Lake.

Between 1967 and 1977, water temperature at the Kawishiwi River near Ely gage peaked at near 20°C during July and August based on a 1967 to 1977 average (Siegel and Ericson 1981). Interestingly, the air temperature averaged several degrees lower than the water temperature. The significant wetland area probably causes the higher summer water temperature due to higher insolation over the large surface water area.

The temperatures of the epilimnion of the larger lakes at VNP remained relatively constant up through the late 1990s, but showed a definite increase by the early 2000 (Kallemeyn et al 2003). An upward trend in degree days, measured with a 10° C base, is more apparent. With climate change, that is a trend that could continue. AMD has been shown to potentially increase with temperature due to global warming (Street 2003) and it is possible that increased temperature could hasten the acid/base reactions occurring in the river systems downstream from AMD sources, such as at VNP.

Climate Change

A general rule of thumb regarding climate change is that wet areas will become wetter and dry areas will become drier. Northern Minnesota is projected to have a small increase in annual runoff due to climate change (IPCC 2007). Increased precipitation and temperature can have variable effects depending on the relative and seasonal changes, with increased ET decreasing runoff at some parts of the year while increased precipitation can increase runoff at other times.

Minnesota streamflow has a linear relationship with non-winter precipitation and summer temperatures (Nichols and Verry 2001). Historic stream flow data shows that summertime rainfall runoff peaks have increased as have summertime baseflows (Novotny and Stefan 2007). During 2012, rainfall and flooding estimated at a return interval in excess of 500 years, wreaked heavy damages in the Duluth area (Czuba et al 2012). This is primarily due to increased

precipitation, which manifests as heavier individual events rather than more storm events. More recently in 2014, many river gages the Lake of the Woods watershed have recorded their highest flows on record (http://mn.water.usgs.gov/), this was rain on spring snowmelt. Attachments 2 through 4 provide some hydrographs of 2014 flows.

The flow record at the gage at the Little Fork River at Littlefork MN (Table 1), a river which enters the Rainy River downstream of VNP, has a sufficiently long record (1912-16, 1929-2013) to consider long-term[5] trends in annual flows and possibly the effect of climate change. The annual flows show a variation prior to 1970 that appears cyclic (Figure 19), with 10-year moving average value varying from about 700 to 1400 cfs. After 1970, there is a slight downward trend, which is most obvious in the 10-year moving average. However, the slope for the 1929 through 2013 period is a statistically insignificant (p=0.28) 1.8 cfs/year. The flows commence with the gage's lowest flows on record which causes the positive slope. At least for the Little Fork watershed, the effects of climate change to date on annual flows are inconclusive.

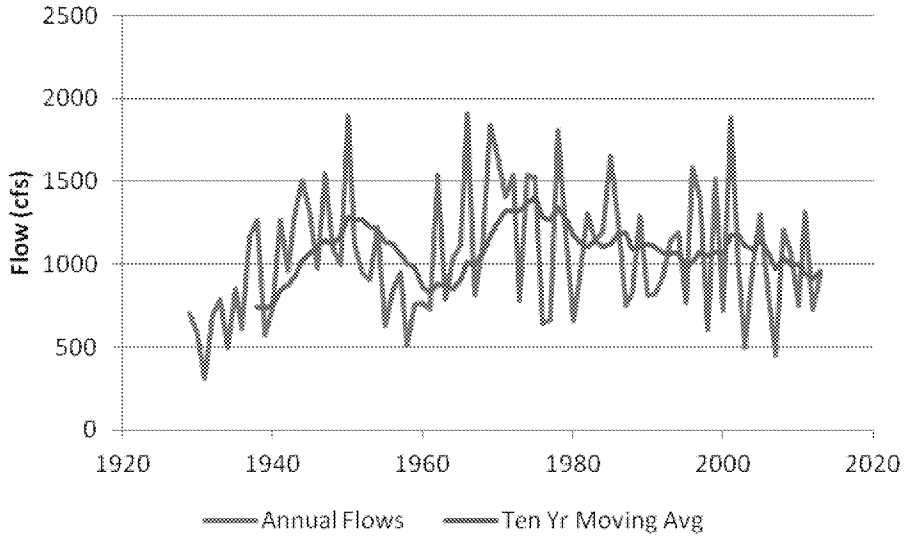

Figure 19: Annual and ten-year moving average flow from 1929 for the Little Fork River at Littlefork MN gage (#05131500). Data source: http://waterdata.usgs.gov/mn/nwis/sw/

The Interagency Climate Adaptation Team (2013) has made several observations of changes already observed in Minnesota and upper Midwest climate and has also made several future projections based on global climate modeling. Since 1895, the average temperature increase in the Midwest has been 1.5 degrees F. The change is most apparent in northern regions, most specifically the northern half of Minnesota. By mid-century, the temperature in northern Minnesota is projected to increase by up to 5°F. Average precipitation across northern

[5] With respect to streamflow, long-term is on the order of several decades. In this case, long-term is near a century which allows consideration of changes that could be due to a changing climate.

Minnesota has increased up to 15%, although over the Rainy Headwaters it has increased about 5%. The percent change in very heavy precipitation[6] is 45%. The projections for mid-century are that annual precipitation will increase from 1.4 to 1.6 inches, there will be at least one more day with heavy precipitation per year, the wettest annual 5-day total precipitation will increase by up to 0.4 inches, and number of dry days will decrease by up to six days. These observations and projected trends all point to a wetter future with more heavy rainfall which of course means more large floods (Interagency Climate Adaptation Team 2013).

Increased precipitation in general would increase the moisture accessing the unsaturated zone, including the unsaturated zone in above-ground waste or tailings impoundments. The additional precipitation could increase recharge if it causes higher flows during traditional baseflow periods or adds rainfall runoff to low snowmelt flows following dry winters. In either instance, climate change should make mine impoundments more susceptible to failing and should increase seepage through mine waste facilities. Without detailed knowledge of a specific facility, it is not possible to estimate how much additional seepage could occur, but it is clear that there would be some increase. Large floods could cause the water level or saturated tails to rapidly increase beyond design capacity which could cause rapid failures; as for seepage it is not possible to assess an actual risk without knowing the location and design of the facilities.

Potential Mine Threats

Myers (2013b) found seven potential threats caused by Twin Metals Mining to the Boundary Waters Canoe Area Wilderness. They are risks to water quantity from mine dewatering and production water development and risks to water quality from the development and seepage of acid mine drainage (AMD), seepage of tailings water, tailings impoundment failures, the runoff of sediment from the site due to stormwater, and wetlands disturbance. Some of these are pertinent to VNP and there are additional factors which have been uncovered as part of this work that could affect both areas.

First, the water quantity factors are not a substantial concern because of the huge intervening area between the deposits in the Rainy Headwaters and the Vermilion Rivers watershed. Mine dewatering would remove water deep from the bedrock and the effects, even during dry periods, would be limited to local areas. Discharge of mine dewatering water could contain very high levels of salinity, however. Water used for ore processing also would be a very small proportion of the flow moving through VNP. Mine development is unlikely to affect the flows through VNP in a noticeable fashion.

[6] A very heavy precipitation event is the heaviest 1% of all daily events.

Second, sedimentation would also not be a factor as far downstream as VNP. This is because the large volume of lakes lying between the sources and the park would retain significant sediment. Wetlands loss at the scale of the potential mines in a watershed as large as that draining to Rainy Lake would not be a problem, unless the loss of a wetland removed a potential barrier to contaminants reaching the rivers.

The seepage of either AMD or tailings water are long-term risks in that once the seepage commences it may be years before it is even detected, much less remediated. A tailings dam or other catastrophic failure generally results in a large load of contaminants reaching a water body over a period of weeks at most, thereby being a short-term risk.

Pathways

There are two primary mine deposits which could be future contaminant source – the Cu-Ni deposits in the Rainy Headwaters near Birch Lake and the gold deposits above Vermilion Lake in the Vermilion River watershed. Once a seep reaches the surface it will pass through lakes and rivers to reach VNP, as shown in Figures 1, 2 and 15; the lakes are described in Table 5.

Lakes may control most contamination reaching VNP. Most simple analysis methods assume that contaminants from a spill fully mix in a lake, although that assumption may grossly overstate the dilution capability if the contaminants follow a preferred path from their entry point to the lake discharge. Most of the lakes have large surface area but are not relatively that deep so that the river flows may still pass through the reservoir as a slug with less mixing than would occur in deeper lakes with less surface areas. Tributary inflows may further cause the contaminant to flow along a primary thalweg while at the same time diluting the contaminant slug as it moves through the lake.

Contaminants from the Rainy Headwaters would pass through first seven lakes on Table 5 prior to reaching VNP and each would disperse and dilute the flow. Myers (2014b) found that a spill entering Birch Lake would devastate that lake but the concentrations would decrease by five orders of magnitude prior to reaching Garden Lake. It would pass through the much larger Basswood Lake before reaching VNP. Inflow from the Canadian portion of the drainage, including from the Maligne River into the Rainy River prior to entering VNP and Seine River into the Rainy Lake, further dilute the flows in the mainstem portion of VNP. The Seine River average flow ranges from 1000 to 2000 cfs (Attachment 4).

Contaminants from the gold deposits in the Vermilion River watershed have a more straightforward pathway to VNP, but would pass through the very large Vermilion Lake. Vermilion Lake has a large littoral area, compared to its total area, and therefore contaminants would be likely to follow a flowpath from inflow to outflow without thoroughly mixing, so that lake could be a less effective barrier to contaminants than its size might otherwise suggest.

More detailed modeling of Vermilion Lake would be necessary to estimate the effects of a spill passing through that lake. If the lake does not substantially mix, long-term leaks or seepage would be much more likely to pass through the lake and reach VNP.

Acid Mine Drainage

AMD is the generation of acid due to mine wastes being exposed to air and water. Specifically, it is the oxidation of sulfide minerals that produces the acid which means that a metal-sulfide complex reacts with water and oxygen to release hydrogen atoms, which are acid. Commonly in northern Minnesota, the mineral is pyrite, which is FeS_2 and the reaction is:

$$\mathbf{2FeS_2(s) + 2H_2O + 7O_2 \rightarrow 4H^+ + 4SO_4^{2+} + 2Fe^{2+}}$$

This reaction generates large amounts of acid, as exemplified by the $4H^+$ term, which means that for two molecules of pyrite, four protons are generated. There are several more reaction steps that are outlined in many books of aquatic chemistry and in EPA (1994). The yellow, orange or red deposit so often found on stream bottoms in streams affected by AMD is $Fe(OH)_3$, or yellow boy (EPA 1994).

AMD can be limited by the presence of neutralizing minerals such as calcite or dolomite. The H^+ is consumed ultimately by combining with OH^- to form water. The most serious AMD problems occur whether these minerals are limited. Limestone is sometimes used as an amendment in waste that is considered likely to generate AMD. Other limiting factors can include clay, on which the H^+ can bind, or gypsum precipitation.

AMD production rates also depend on particle sizes. The most optimum conditions will combine particle sizes that are small enough to have a large area to volume ratio but not so small as to limit the flow of air or water through them. Large rocks generate little AMD because the air and water can access only very small volume of the mineral. Very small particles, such as silt, generate little AMD because the pores are so small that water and air flow through them very slowly. Thus, rocks crushed in a blend of gravel and sand sizes leads to the best AMD formation.

Similar considerations apply to acid neutralizing material. Rock piles with large amounts of dolomite will still generate lots of acid if the dolomite is in large sizes while the pyrite is smaller and accessible to air and water. However, there can be too much water. Saturated rock will prevent air from reaching the rock faces. Submergence in a pit lake is one way that mining companies prevent AMD. Rock piles, such as waste rock, that have wetting and drying cycles due to storm infiltration, can generate substantial long-term AMD. AMD from tailings impoundments may be limited if the tails are saturated, but once they dry out, usually after mine closure (or abandonment), water flowing through them can generate AMD. Tails however

are often finer-grained so the rate of moisture flow and therefore AMD production may be lessened. Rock around both open pits and underground mines become desaturated during mining so that air can enter and oxidation occurs; as the water levels recover when dewatering ceases there is often a slug of AMD.

AMD is caused almost exclusively by materials already on the mine site. Acid generation occurs prior to mining at a much slower rate than during mining because of the particle size discussion above. In-situ rock has water flow only through existing fractures, thus most of the volume is not accessed by sufficient water and air to generate acid. Mining removes, crushes, and piles that rock so that the surface area of rock that can be accessed by water increases manyfold. It is mining that causes the acid formation because it is mining that removes and crushes the rock.

The largest problem with AMD is not usually the acid itself, but the metals that dissolve in the acid. EPA (1994) lists the following metals and metalloids as being dissolved in AMD from various mines: copper, iron, manganese, lead, arsenic, cadmium, zinc, c obalt, nickel, silver, and sulfate. The last on the list is not a metal but can be very critical in Minnesota because of its effect on wild rice. Selenium and mercury may also be associated with AMD, but the relationships are more complicated. It is these elements that affect the aquatic life most negatively.

Waste from the deposits in the Rainy Headwaters is likely to generate acid because it would meet the requirements just discussed if the operator does not take appropriate and effective measures to prevent AMD. The volume percent of sulfide reported for the Spruce Road deposit is several times that found to produce significant acid mine drainage in Duluth Complex waste (Lapako 1988), so the potential for AMD at these sites must be considered high. The streams and soils between the sources and VNP are poorly buffered meaning that AMD and associated metals would not be chemically attenuated. An AMD seep into waterways reaching VNP would be very difficult to contain or remediate. Lakes in VNP already have metals concentrations that exceed standards. Therefore, any addition of metals to the stream above VNP would be considered a degradation and make it more difficult to bring the lakes' metals concentrations into compliance.

The Dunka Mine in the Kawishiwi watershed and the Soudan Mine in the Vermilion Lake watershed have discharged AMD and could portend future problems for the area. The EPA used the Dunka Mine as an example in its AMD manual because of the amount of pollution it causes (EPA 1994) and AMD from it has been considered important even in the context of the entire Lake of the Woods watershed (Clark and Sellers 2014). The Dunka mine was developed in the Duluth Complex formation and has seeps with pH as low as 5.0 and copper and nickel concentrations at 1.7 and 40 mg/l (ITRC 2010; EPA 1994). The copper maximum level

contaminant goal is 1.7 mg/l, which means this water could have toxic effects on people drinking it. The nickel concentration exceeds the former maximum contaminant level by 400 times. This low-quality seepage resulted from a deposit with relatively low sulfide content, averaging around 0.6 ppm in the bulk rock at the site (EPA 1994). The seeps developed over a dozen years, starting in the 1970s (Id.) and new seeps turned acid in 1989 (ITRC 2010). The seepage, estimated at 500,000,000 gallons/year, discharges to a stream which flows into Bob Bay, a part of Birch Lake (EPA 1994, p 40), and increases the concentrations of copper, nickel, cobalt, and zinc in the bay to levels higher than the regional average (Id.). Metals concentrations in sediments are elevated, but less than 40% of the nickel load was removed through natural lake processes (Id.). This indicates that Birch Lake was insufficient to naturally "treat" the AMD seepage from the Dunka Mine.

The underground Soudan Mine[7] closed in 1962 (Eger 2009, 2007), but has been an AMD problem since then (http://www.itrcweb.org/miningwaste-guidance/cs61_soudan.htm). About 60 gpm discharge with high levels of cobalt, copper, and mercury from the shaft (Eger 2007) One specific area causes the problem with up to 10 gpm discharging with acid pH near 4.0 (Eger 2007). Mercury is a large problem (Eger 2009) especially since the watershed draining to VNP is stressed due to mercury (Kallemeyn et al. 2003).

Waste from proposed mining from any of the underground deposits in the Rainy Headwaters could generate seepage just as degraded as from the Dunka Mine, since they are hosted in the same formation and have as much or more sulfide. Based on metals expected from sulfide ore at the Polymet Mine (Polymet 2013a), arsenic, copper, nickel, lead, zinc, and possibly mercury could be included in seepage. The low buffering capacity of the rivers could allow contamination to be transported a long distance downstream, including to VNP (Myers 2014b). Seepage may require decades to transport from the underground sources to the river, but once it reaches the river there would be little chance of preventing it from reaching VNP.

AMD seepage over a long time period could be a more difficult problem once started, as well. This is because the general baseflow through the system would have a higher contaminant concentration. After a long period, it would approach steady state. This is a particular problem with waste sources deep underground. Once mining ceases and groundwater levels recover, the underground mines become part of the groundwater system. AMD could generate in the mine tunnel walls and rock fractures that had been dewatered. The discharge points for bedrock groundwater have not been determined, so AMD discharge could occur at a distance from the mine. Because the porosity of the bedrock is low but fracture controlled, groundwater and contaminants would flow through the bedrock many times faster than the

[7] The mine was originally an open pit, but converted to underground for safety reasons, eventually reaching a depth of 2400 feet (Eger 2009).

estimated groundwater flow rate (because actual water molecules move through the pores whereas the flow rate is determined for the entire cross-section). Areas with bedrock average flow rates equal to 10 feet per year could have contaminant transport rates (through the actual fractures) greater than 1000 feet year, which indicates that a discharge point a few miles away could be affected within a couple of decades. If the AMD is generated near the ground surface, it could discharge quickly to nearby streams. If the source continues for a long time period, it would reach through the river systems to the VNP.

AMD would likely exacerbate an existing problem in the VNP – methyl mercury contamination. Decrease in pH could increase the rate of methylation and increase the concentration in the lakes.

An additional transport mechanism that occasionally causes large load to move along the river is movement on sediments. Metals often adsorb to sediments which can move in large slugs during floods. Additionally, sulfate is often released from mine sites, and wild rice is particularly susceptible to high sulfate concentrations.

Discharge of Pit Lake or Dewatering Water

This study's focus has been threats on the American side of the Rainy Lake watershed with inflows from Canada primarily for their dilution value. The Seine River however also flows through and near the pit lake system at the Steep Rock iron mines. During construction these mines caused significant sediment problems for the Rainy Lake, but their largest threat may occur when the Hogarth and Caland Pits overflow sometime between 2030 and 2060 (Sowa et al. 2010). The overflowing water will contain sulfate concentrations up to 1500 mg/l, a level shown to be chronically toxic in the pit lakes (Sowa et al. 2010). This threat will manifest unless a diversion plan is implemented, but remediating the water will be a high volume treatment problem that, if it fails, would threaten VNP.

The deposits in the Rainy Headwaters are primarily located deep in the bedrock. These deposits would have to be dewatered if they are to be mined. Because of the low conductivity at depth, the amount of dewatering should not be that high, but it could be very salty. No studies have discussed the expected deep bedrock water quality other than to suggest that it could qualify as brine. If Minnesota allows this water to be discharged into the Kawishiwi River system, it could cause increases in total dissolved solids all through the river system to VNP. The problem could be long lasting because of the long time needed to mine the deposits at depth.

The existing Northshore Mine may also be a long-term threat to VNP. The environmental assessment for its current expansion states that, when the mine closes, the pit will fill with

water until it overflows into a tributary of the Dunka River. The EA does not analyze the expected pit lake water quality, but it will likely be poorer than the existing groundwater that is being discharged to the Dunka River because of oxidation that will occur in the pit walls thereby contaminating the pit lake water (Castendyk and Eary 2009).

Tailings Impoundments Leaks and Failures

Tailings impoundments could generate AMD or leak other process chemicals. Although they are designed not to leak, liner failures are common (Kuipers et al. 2006). If the leakage is either not detected or not containable, it could reach the surface water system and flow toward VNP. Streams draining toward VNP have high water quality and would be affected by small amounts of contamination for a long time. Once it starts, a leaky tailings impoundment is very difficult to remediate. The leak at the existing tailings near the proposed Polymet Mine (Polymet 2013b) has been contaminating groundwater for a long time. Pumpback wells have been used to contain a nitrate plume at the tailings impoundment near Jerritt Canyon mine in Nevada since the 1980s[8].

The best example of potential contaminants from potential mines in the Rainy Headwaters or Vermilion Lake watershed is the existing contaminants at the Polymet Mine, because of similarities in geology and ore bodies. The following metals are predicted to be present in the tails: arsenic, boron, calcium, cobalt, copper, iron, magnesium, manganese, mercury, molybdenum, nickel, potassium, and sodium (Polymet 2013b). Other parameters of concern are alkalinity, chloride, fluoride, sulfate and total dissolved solids. In sufficient concentrations, any of these could be a problem. Additional mercury reaching the VNP would add to the problems discussed above; in combination with AMD or sulfate loading, the methylmercury problem could be substantially increased.

Immense water resources damage could be caused by a tailings failure. As written by Caldwell and Charlebois (2010): "The thesis of this paper is that tailings impoundments fail as a result of a string of incidents, each of which is trivial and within the bounds of normal events, but which, taken together, constitute an event so unusual that it lies outside of the bound of normal occurrence and experience." Rico et al (2008b) documented over 146 tailings impoundment failures (over an unspecified time period), with the majority occurring in the United States. The vast majority were of dams less than 45 m high. Thirty-six of the failures were due to high rainfall (Rico et al 2008a and b), although as noted by Caldwell and Charlebois (2010), there were probably smaller items that failed leading to the ultimate failure. The run-out distance for tailings dam failures has been as high as 100 km, with the maximum distance occurring when the failure is into a river system (Rico et al. 2008a).

[8] The author has personal experience examining the contamination at this mine.

The recent failure of the Mt Polley Mine in British Columbia apparently resulted from a failure to manage the tailings impoundment properly. Simply, it appears the mining company stored too much saturated tails waste above the dam and it failed. The failure released more than 10 million cubic meters (350 million cubic feet) of water and 4.5 million cubic meters (150 million cubic feet) of sand into downstream Polley and Quesnel Lake, according to estimates from British Columbia's Ministry of Environment. That is enough water to fill 4,000 Olympic-sized pools (http://earthobservatory.nasa.gov/IOTD/view.php?id=84202, accessed 8/28/14). Approximately 2600 tonnes of mercury had been stored in the impoundment since 2009, so the potential contamination is quite large.

The effect of a large spill in a watershed that contains many large lakes is complicated[9]. Water leaving Quesnel Lake, downstream of the Mt Polley spill discussed above, was relatively clean for several weeks after the spill. Much sediment was trapped in the lake. It is likely however that the sediment will be a source of heavy metals to the waters flows through the lake for decades. Myers (2014b) found that a spill into the lake system below the deposits near Birch Lake would dissipate but still be measurable reaching the BWCAW. Over time, metals would continue flowing to VNP. A spill in the Vermilion Watershed, if mines are ever developed there, may be more critical. The pathway is Vermilion Lake and the river before reaching VNP. At more than 1.5 million acre-feet (Table 5), Vermilion Lake has plenty of buffering and dilution capacity. However, if the waste short circuits through the lake rather than mixing, the effects could be much worse. The transport of sediment from Steep Rock lake to Rainy Lake (Conly et al. 2010; Sowa et al. 2001) discussed above is an example of the kind of transport which could occur if a large-enough release were to hit the river system leading into VNP.

The recent occurrence of extreme flooding in northern Minnesota (Czuba et al 2012) accentuates the concerns raised by the potential for large flooding on tailings impoundments. Global warming and the consequent increase in extreme events will affect mines in many ways, but with increasing flood runoff (IPCC 2007) and climate change as discussed above, the proximity of any potential tailings impoundment to the river system, the fact that a tailings impoundment must not fail forever, and the connectivity of surface waters in the watershed, development of tailings impoundments presents a large risk to VNP.

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[9] The description herein is from an email prepared by Ramsey Hart of MiningWatch Canada, so is effectively a personal communication.

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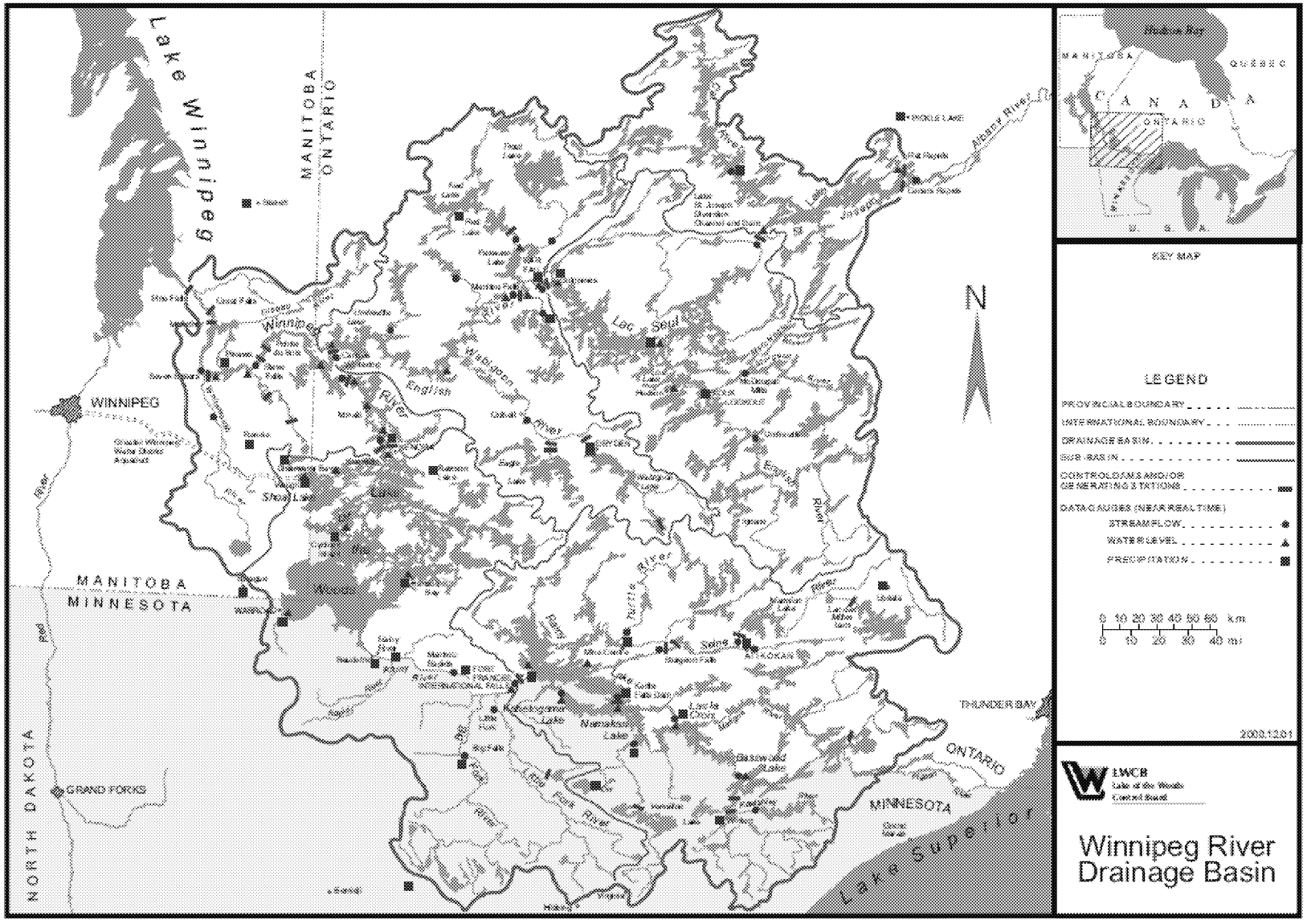
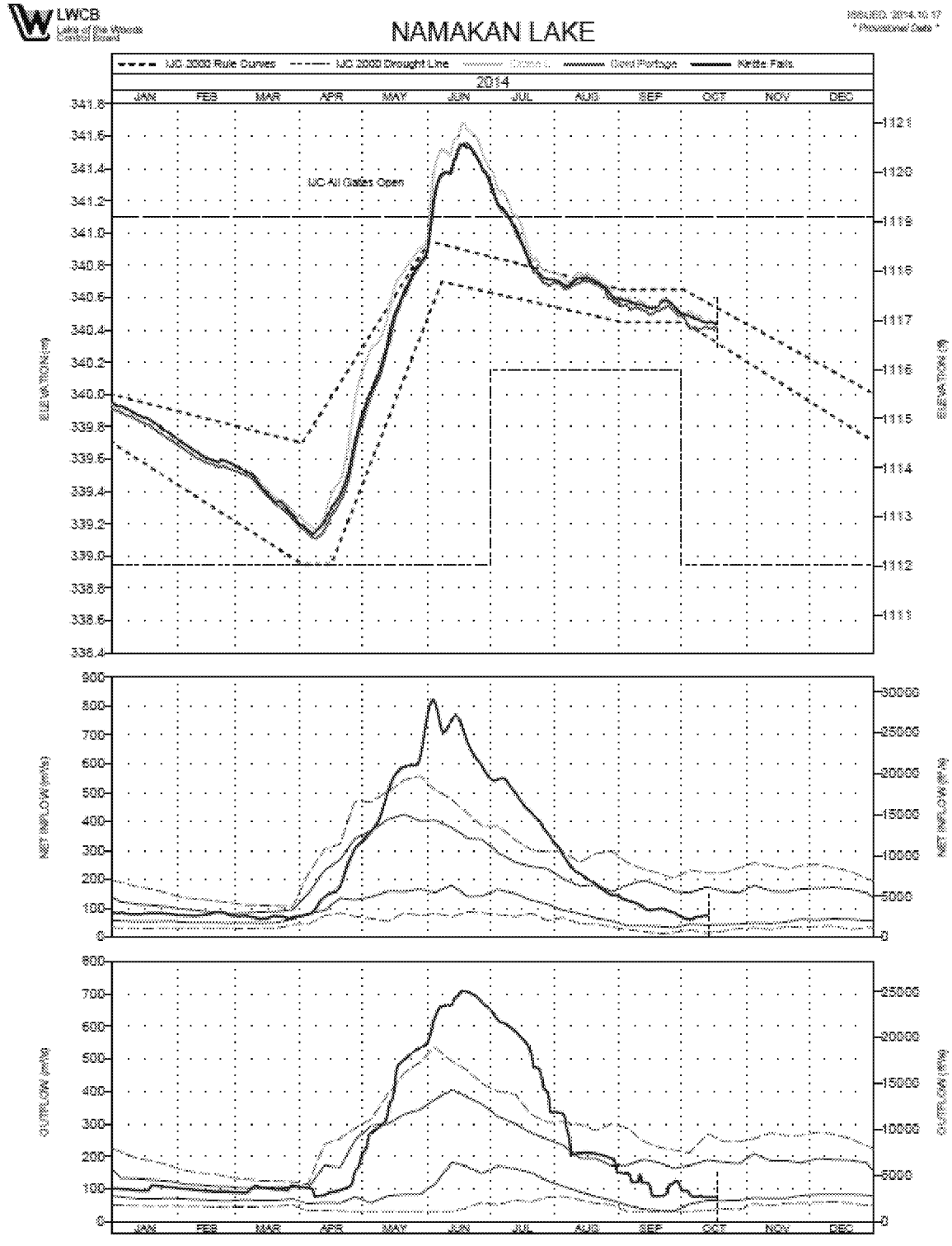
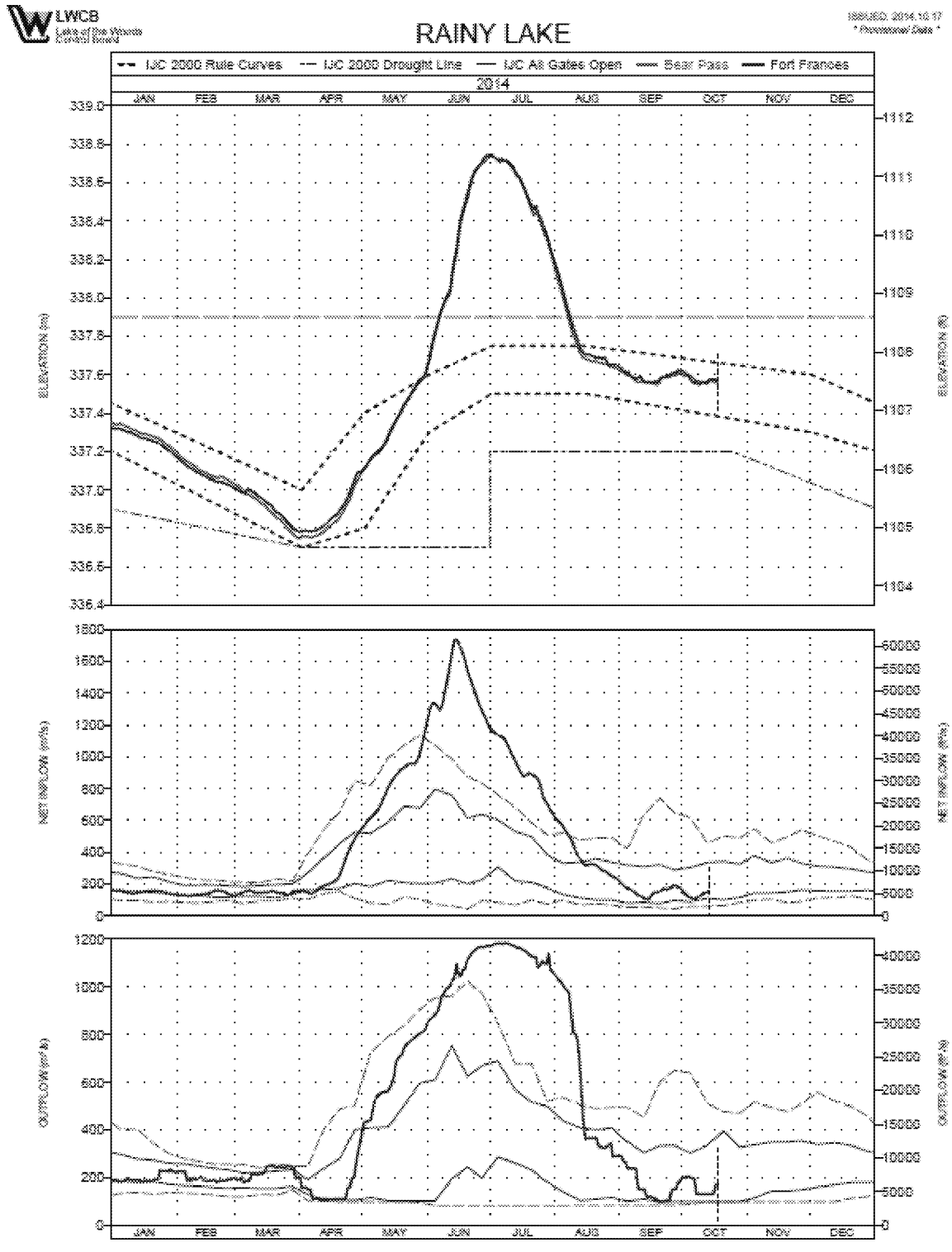


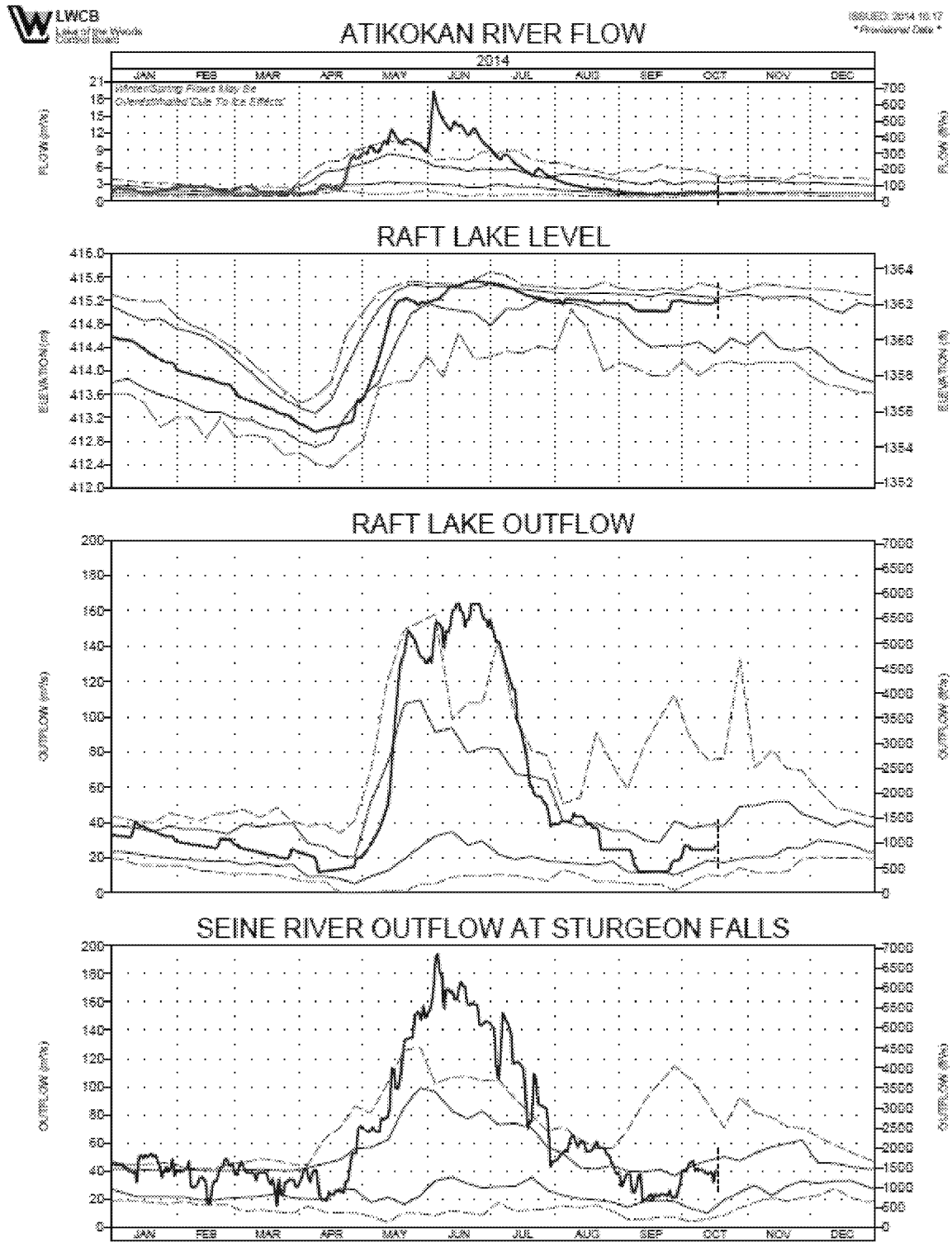
Attachment 1: Map of the Winnipeg River Drainage Basin, from *www.lwcb.ca/*



Attachment 2: Flows and reservoir levels for Namakan Lake, source *www.lwcb.ca/*



Attachment 3: Flows and reservoir levels for Rainy Lake, source *www.lwcb.ca/*



Attachment 4: Flows for various rivers and the Raft Lake water level, source *www.lwcb.ca/*

VOYAGEURS NATIONAL PARK ASSOCIATION

Voyageurs National Park Association's mission is to connect people to Voyageurs National Park, enhance the visitor experience, and protect the park for present and future generations. **Learn more at voyageurs.org**

December 22, 2016

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Rd. North
St. Paul, MN 55155

RE: Public notice for U.S. Steel Minntac tailings basin National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) Permit MN0057207

Mr. Smith,

Voyageurs National Park Association (VNPA) appreciates the opportunity to comment on the National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit reissuance (MN0057207) for the U.S. Steel Corp Minntac Tailings Basin Area (facility) to construct and/or operate wastewater treatment facilities and to discharge into waters of the State of Minnesota.

VNPA is a 501c3 nonprofit organization whose mission is to connect people to Voyageurs National Park, enhance the visitor experience, and protect the park for present and future generations. VNPA works to protect and preserve this ecologically and historically significant National Park so that the public can enjoy scenic, educational, scientific, and recreational treasures in a natural setting and in balance with the natural resources and uses of the park, leaving it unimpaired for future generations. VNPA works to take sound science and analysis and translate that information into good practice and policy through education and advocacy.

Voyageurs National Park contains waters that are designated by the State of Minnesota as Outstanding Resource Value Waters, for which new or expanded discharges to these waters are prohibited. The park is located downstream of the proposed permitted area. VNPA has serious concerns about the release of contaminated water into groundwater upstream of Voyageurs National Park. It is the interest of VNPA and its members, the over 230,000 annual visitors to Voyageurs National Park, as well as the natural and cultural resources in the Rainy River Watershed, that the new permit has provisions that protect Voyageurs National Park and Minnesota's waters consistent with federal standards. These permits, if issued, should consider the cumulative impacts of multiple mining projects in the watershed.

The U.S. Steel Corp Minntac Tailings Basin Area has been operating under an expired permit since 1992. During that time the Minnesota Pollution Control Agency (MPCA) and the facility have conducted studies that have revealed "significant seepage escaping the basin over its 8000+ acre footprint and that this seepage is causing exceedances of water quality standards in surface water and groundwater in a broad area surrounding the basin." A summary of conditions in the draft permit include surface water monitoring and toxicity testing; however, the facility has failed to act on prior proposals to address basin water quality, despite violating the Schedule of Compliance as agreed upon with MPCA.

VNPA thanks the MPCA for including expanded monitoring and new pollutant limits in the draft permit.

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VNPA requests specific consideration of the following concerns with respect to issuing the proposed permit:

- The lakes of Voyageurs National Park are 303d listed by the U.S. EPA for mercury impairment. Sulfate, one of the principal contaminants in the tailings pond water which would be released through the proposed permit, is important in the conversion of mercury to toxic and biologically-available methylmercury and is, at times, the limiting factor in that conversion. Thus, increased sulfate in the tributaries and waters leading to Voyageurs National Park could result in increased methylmercury concentrations in park lakes, which would exacerbate the current mercury impairment of these waters.

- Modeling has shown potential impacts of proposed mining operations within this watershed on waters of Voyageurs National Park (Meyers, 2014/Rev. 2015) through contaminated groundwater discharge to surface waters, and the impacts of contaminated groundwater related to the proposed permit are unknown and are upstream of Voyageurs National Park.

- Mining affects the entire watershed. In streams, flow and channel alterations from various mining processes reduce available fish habitat and biotic diversity at local and watershed scale. Toxic metals also bioaccumulate in fish tissues causing increased disease susceptibility reduced growth and population size or death. Most of Voyageurs' 230,000 annual tourists enjoy recreational fishing.

- The purpose of the additional evaluation in the NPDES permit is to identify feasible technologies to reduce the concentration of sulfate with in the tailings basin to 800 mg/L within five years of permit issuance, and 357 mg/L within ten years from permit issuance, or in the shortest reasonable period of time. Sulfate targets should be lowered, as possible, to correspond with wild rice standards in review by MPCA.

- The potential impacts of a discharge from the Minntac tailings pond should be considered along with the potential impacts of other mining activities in the waters that drain toward Voyageurs National Park. Contaminants originating from mining within the Rainy Lake and Namakan watersheds may flow through Voyageurs (Meyers, 20 14/Rev. 2015) and cumulative impacts within the affected watershed need to be considered.

- The U.S. Department of Interior and Department of Agriculture recently (December 15, 2016) took actions that denied an application for renewal of two hard rock mineral leases in the Boundary Waters Canoe Area Wilderness, as well as initiated steps to withdraw key portions of the watershed from new mineral permits and leases. These actions are indicative of the level of concern present regarding potential contamination of the area's water resources.

- Although not directly pertaining to the current permitting process, we strongly encourage the MPCA and other Federal and State Agencies involved in the Rainy River Watershed to immediately partner to sponsor a project to determine the cumulative effects of past, present, and potential future mining activities on water quality. Such a project has been already defined (but currently unfunded) as part of the International Joint Commission's Plan of Study for the LOW-Rainy watershed. Cumulative effects should also be part of the recently announced national environmental review of Superior National

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Forest land. Such a study is needed so future mining operations, permitting activities, and contaminant removal strategies can be judged from a broader perspective.

- VNPA supports the National Park Service's recommendation to develop a current NPDES/SDS permit for the U.S. Steel Minntac facility. We believe this would be an effective tool for water quality improvement at the facility if the permit adheres to strict targets and definitive timeline for bringing discharge waters into compliance with all applicable standards for receiving waters.

- Please require the Permittee to conduct and publish an engineering study of the risk of a major breach in the basin walls and dams considering the increased probability of severe precipitation events due to climate change and the age of the basin construction.

- In addition, require the Permittee to conduct an annual inspection on the integrity of the basin.

- Please include in the permit a simplified version of the Limits and Monitoring Table on page 11 of the draft. We suggest selecting a few key monitoring points for both surface and groundwater with columns for the parameter, its limits, effective date, and applicable limits based on Federal and State Standards. We realize that the site and its monitoring are very complex, but such a table would contribute to transparency in the process and better public understanding.

- To further increase public awareness and project transparency, please develop a public website, produced either by MPCA or the Permittee, to present current and historical water quality data in waters downstream of the basin. Include a few key water quality parameters including sulfate.

Thank you for considering these comments.

Sincerely,

Christina Hausman
Executive Director

Attachment:

Technical Memorandum: Potential Metals Mining and the Voyageurs National Park Risk Assessment for Upstream Metals Mining
Prepared for:
Voyageurs National Park Association, Minneapolis MN
National Parks Conservation Association, Washington DC
By: Tom Myers, Ph.D.; Hydrologic Consultant, Reno, NV
October 30, 2014; Revisions January 8, 2015

December 7, 2016

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Road North
Saint Paul, MN 55155

Dear Mr. Smith:

I am writing regarding the draft water quality permit for Minntac's tailings basin. I, along with my family, neighbors and coworkers, live in Northeastern Minnesota, care about the environment, and enjoy all of the recreational activities our region has to offer.

One of the reasons I support Minntac is the initiative the company has taken to build a record as an industry leader in environmental performance. During the past 10 years, Minntac has undergone more than $94 million in environmental improvements. I am concerned that conditions in the draft permit overlook the progress Minntac is making and would come at a far greater cost than our business can shoulder in our highly competitive global industry. This is especially true at a time when families and communities are suffering from the glut of cheap foreign steel illegally dumped here by our competitors.

Specifically, I have the following comments on the draft NPDES permit for the Minntac tailings basin:

- I support the reissuance of the permit.
- I support appropriate permit conditions to protect the environment that are based on science and use recent and relevant data.
- I ask that the MPCA act upon U. S. Steel requests to perform a Use Attainability Analysis and establish site specific water quality standards for Minntac, requests that were submitted by U. S. Steel in 2014 and 2015, respectively.
- I urge the MPCA to finalize the permit only after the MPCA has completed the revision of Class 3 (industrial consumption) and Class 4 (agricultural and wildlife) designations and associated water quality standards. The MPCA has been working on that revision since 2008 and it should be completed before the permit is issued.
- I do not support the overly burdensome and costly permit conditions that are not required to ensure compliance, particularly those with safe access concerns.
- I do not support the inclusion of mine closure requirements in this permit. The Minnesota Department of Natural Resources is responsible for permitting mine closures.

The Minnesota Pollution Control Agency and U. S. Steel have worked together to protect our region's jobs while preserving our environment before. It is my hope that can be done again as development of this permit continues. Thank you.
NAME:

Online form letter as suggested by Water Legacy

Dear Mr. Smith,

The history of failure to control pollution from the Minntac Tailings Basin does not represent Minnesota's history of caring for our environment or the importance of protecting our unique fresh water resources north of the Laurentian Divide and extending to international waters.

I request that the Minnesota Pollution Control Agency (MPCA) completely rewrite the proposed draft wastewater permit for Minntac to require compliance with both groundwater and surface water quality standards as required by state and federal law. The MPCA's draft permit for the Minntac Tailings Basin is inadequate:

- The draft permit fails to require compliance with Minnesota's sulfate limit of 10 parts per million in wild rice waters either to the east or to the west and would fail to protect wild rice as required by Minnesota rules. Minntac tailings seepage has already decimated wild rice in the Sand River and Sandy and Little Sandy Lakes.

- The draft permit doesn't protect fish and aquatic life from high levels of salts and ions that are toxic to the aquatic food chain.

- The draft permit doesn't limit manganese in groundwater or surface drinking water to the levels set by the U.S. Environmental Protection Agency or to the limits set by Minnesota Health Department to protect infants and children from brain damage.

- The draft permit would allow high levels of sulfate to flow downstream, increasing levels of toxic methylmercury in fish in waters that are already impaired due to high mercury, such as the Sturgeon River, Little Fork River, Rainy River and Lake of the Woods.

- The draft permit tries to evade the federal Clean Water Act by claiming that pollution collected in the basin and discharged to streams, rivers, lakes and wetlands through connected groundwater doesn't really count as surface water pollution, even though state scientists have proved that the pollution comes from the Minntac Tailings Basin.

Industry pressure should not be an excuse for continuing to allow toxic pollution from the Minntac Tailings Basin in violation of state and federal laws. Please rewrite the Minntac Tailings Basin permit and issue a permit with strong and enforceable limits as soon as possible to protect Minnesota clean water, wild rice, fish and human health.

Respectfully yours,