Exhibit 1

Minnesota Center for Environmental Advocacy
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February 29, 2012

VIA ELECTRONIC AND U.S. MAIL

Kate Frantz
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Road North
Saint Paul, MN 55155-4194

Re: Mesabi Nugget Delaware LLC NPDES/SDS Permit MN0067687

Dear Ms. Frantz,

MCEA offers the following comments on the draft NPDES/SDS Permit MN0067687 for Mesabi Nugget. 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 also has statewide membership. MCEA appreciates the opportunity to comment on this permit.

MCEA requests a hearing of this permit before the MPCA Citizens Board pursuant to Minn. Stat. § 116.02, subd. 6(4).

I. FACTUAL BACKGROUND.

The Mesabi Nugget facility is located in St. Louis County, Minnesota. It produces iron nuggets from iron ore concentrate. The facility consists of manufacturing, conveyance and storage facilities, the Area 1 Pit, and non-sewage wastewater treatment systems.

For its manufacturing processes, Mesabi Nugget appropriates water from the Area 1 Pit. The water is used for process temperature control, and for process water, including the wet scrubber system. Mesabi Nugget may also take water from the Area 2WX Pit or Area 9 pits, if necessary.

The wastewater treatment system uses chemical coagulation and precipitation to remove sulfate, fluoride, solids, and metals. In addition, Mesabi Nugget has developed its own patented filtration system, the MNC Mercury Filter, for enhanced mercury removal "if needed to meet permit limits."[1] The effluent from the chemical precipitation system is discharged into the Area 1 Pit. Water from the east end of the Area 1 Pit can be routed into one of the MNC Mercury Filter units before discharge.

[1] Draft Permit p. 4.

The final treated effluent is discharged through Outfall SD001 into Second Creek at an average of 1.5 MGD, with a maximum of 5.8 MGD. Second Creek is a Class 2B, 3C, 4A, 5 and 6 water under Minn. R. 7050.0430 and, as a surface water in the Lake Superior water basin, it is also an Outstanding International Resource Water ("OIRW") under Minn. R. Ch. 7052. Second Creek flows into the Partridge River, which ultimately flows into the St. Louis River. The St. Louis River is impaired for mercury, PCB's, and persistent bioaccumulative toxins. The portion of the Partridge River that is downstream from Second Creek is used in the production of wild rice.[2]

The draft permit grants variances from water quality standards for four pollutants – bicarbonate, hardness, specific conductance and total dissolved solids. The draft permit contains interim limits for these four pollutants based on current and projected discharges, and final limits based on water quality standards. However, the draft permit does not include a date certain when these final limits apply.

The draft permit restricts discharges from SD001 from April to August in an effort to protect the wild rice in the Partridge River from the effects of the sulfate in the discharge. However, there is no effluent limit for sulfate for the remaining months of the year.

II. THE VARIANCE APPLICATION SHOULD NOT BE GRANTED BECAUSE IT DOES NOT MEET STATE AND FEDERAL LAW REQUIREMENTS.

A. The Variance Does Not Meet State Law Requirements.

i. Mesabi Nugget has failed to show that this is an exceptional circumstance resulting in an undue hardship, as required by Minn. R. 7050.0190.

State law and regulation dictate against the granting of a variance. Under state regulation, Minn. R. 7050.0190, only in *exceptional circumstances* and where there is demonstrated an *undue hardship* is a variance from water quality standards warranted. The "exceptional circumstances" and "undue hardship" set up a significantly high bar that Mesabi Nugget cannot reach in this instance.

Mesabi Nugget makes primarily an economic argument. It contends that implementing technology to meet effluent limits for existing water quality standards would result in approximately $14.20 per ton increase in the cost of producing its product, a result that it alleges would jeopardize its investment.

First, granting a variance to a major corporation simply because a pollution control technology increases its costs permits the agency nearly unlimited discretion as to when a variance should be granted. Mesabi Nugget contends that the increased cost amounts to 5.5 percent of the average price of iron nuggets and similar products on the global market (although it should be noted that the price has varied widely from $95 to $700 and, as Water Legacy pointed out in its comments, currently hovers around $450). Even assuming that this 5.5 percent estimate is accurate, it is unclear why 5.5 percent of cost constitutes an "exceptional circumstance" and demonstrates an

[2] Statement of Basis, p. 11.

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"undue hardship." Perhaps the same could be said of a technology that increases costs by 3 percent, or one percent. Mesabi Nugget contends that this increase will "jeopardize" its business, but that may simply be an all-too-common scare tactic intended to evade regulation. The MPCA must further refine this analysis to determine what constitutes an "exceptional circumstance" and a showing of an "undue hardship" in order to give this regulatory language any meaning.

Second, giving a variance where a company alleges hardship due to increased costs sets a dangerous precedent. Other corporations are expending resources to comply with water quality standards around Minnesota. For instance, Mesabi Nugget mentions in its variance application that Essar Steel, Polymet, and U.S. Steel at its Minntac and Keetac facilities are piloting pollution control technology.[3] Although these facilities have not yet implemented this technology, MPCA should support their investment in piloting potential solutions. These facilities will no longer have an incentive to do so if they can simply allege that investing in technology to control pollutants in their discharges would increase its costs, and they should receive a variance.

For these reasons, Mesabi Nugget has not shown that it is in an exceptional circumstance, and that requiring it to meet water quality standards would result in an undue hardship, and the requested variances should be denied.

B. The Requested Variances Do Not Meet Federal Law Requirements.

i. EPA regulations require that a variance be used only where the water quality standard may ultimately be met, and progress must be made toward that end.

Federal law and guidance is specific regarding when a state may grant a variance in NPDES permits. EPA's NPDES Permit Writers Manual chapter 10 discusses the procedures and requirements for states or EPA permit writers when assessing variances from water quality standards. Section 10.2.3. of the NPDES Permit Writers Manual provides:

> Water quality standards variances require similar substantive and procedural requirements as removing a designated use, but unlike use removal, variances are both discharger and pollutant specific, are time-limited, and do not forego the currently designated use of a water body. *A variance is appropriate where the state believes that the standard can be ultimately attained.* By maintaining the standard rather than changing it, the state will assure that further progress is made in improving the water quality and attaining the standard.

Further guidance is provided earlier in chapter 10 where EPA discusses requirements for designated use reclassifications:

> Once a use has been designated for a particular water body or segment, the water body segment cannot be reclassified for a different use except under specific

[3] Mesabi Nugget Variance Application, p. 12-13.

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> conditions. To remove a designated use, as specified in Section 101(a)(2) of the Clean Water Act, the state must perform a use attainability analysis pursuant to 40 C.F.R. § 131.10(g).

The EPA Permit Writers Manual then references the Water Quality Standards Handbook for further guidance. The Water Quality Standards Handbook provides that for variances from water quality standards:

> A variance should be used instead of removal of the use where the state believes *the standard can ultimately be maintained.* By maintaining the standard rather than changing it, the state will assure that further progress is made in improving water quality in attaining the standard.

See, EPA NPDES Permit Writers Manual, chapter 10, sections 10.2.3. and 10.2.2. *See also,* USEPA (1994) Water Quality Standards Handbook: Second Edition, EPA 823-B-94-005a, Office of Water.

Under these requirements, the variance is inappropriate because the draft permit does not require that existing water quality standards will ultimately be achieved. The permit contains language that Mesabi Nugget has the "responsibility" to "make all reasonable progress towards attainment of water quality tandards." However, this language is not meaningful unless the permit contains an enforceable schedule of compliance. The permit does not include a schedule of compliance that details when Mesabi Nugget must achieve the final effluent limits. Instead, it requires Mesabi Nugget to conduct a series of studies that may or may not result in Mesabi Nugget's ability to meet the final effluent limits. There is no timeline that states when the final effluent limits will apply.

In fact, it is not even clear when the studies must begin. Although the permit states that the first study must be approved within 60 days of reissuance,[4] the permit also states that Mesabi Nugget must complete studies associated with its air permit prior to initiating any studies required in this permit, leaving the timeline for the initiation of *any* studies uncertain.[5]

While a variance does not appear to be justified in this circumstance, if MPCA finds that variances are justified, MCEA recommends that the draft permit be amended to include a date certain by which Mesabi Nugget must meet the final effluent limits.

ii. Mesabi Nugget has not shown substantial and widespread social and economic impact as required by federal law.

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[4] Draft Permit p. 19, paragraph 8.6, requiring that the Water Balance Study be submitted for approval within 60 days of the permit reissuance. This apparently starts a chain of events for the remaining studies, with the Chemical Balance Study approval taking place within 60 days of approval of the Water Balance Study, and the Pollutant Reduction Study approval in another 60 days.

[5] Draft Permit p. 18, paragraph 8.4.

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Each of the guidance provisions set forth above references the procedures and requirements in 40 C.F.R. § 131.10(g). Under the guidance and 40 C.F.R. § 131.10(g), EPA reviews a variance as a change in use designation under 40 C.F.R. 131.10.

MPCA may proceed under 40 C.F.R. § 131.10(g) only if the state can demonstrate that attaining the existing use is not feasible because of one of the following:

> Naturally occurring pollutant concentrations prevent attainment the of the use;
>
> Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use....;
>
> Human caused conditions or sources of pollution prevent attainment of the use and they cannot be remedied or would cause more environmental damage to correct than to leave in place;
>
> Dams, diversions, or other types of hydrologic modifications....;
>
> Physical conditions related to natural features.....;
>
> Controls more stringent than those required by sections 301(b) and 306 of the [Clean Water] Act would result in substantial and widespread economic and social impact.

Only the last is arguably applicable in this case. Mesabi Nugget has failed to show "substantial and widespread economic and social impact" if it does not receive the requested variances. Indeed, it has failed to even analyze the economic and social impact of its requested variances. It has only analyzed the economic impact on itself. However, there are social and economic benefits to clean water, including public health and tourism. There are economic benefits to investments in reverse osmosis technology to remove pollutants from its discharge, as this would result in jobs in other industries. For this reason, the requested variances should be denied.

III. THE PERMIT FAILS TO ENSURE THAT MERCURY DISCHARGES FROM AREA 1 PIT WILL NOT EXCEED WATER QUALITY STANDARDS.

The draft Permit contains no limit for mercury for the water in the Area 1 Pit. The MPCA Variance Issue Statement states that the Area 1 Pit is hydrologically connected to Second Creek:

> Pit 1 watershed hydrology is such that total water inflows exceed water losses to groundwater and evaporation resulting in a long-term overflow or discharge of the pit to Second Creek. Even if the Mesabi Nugget plant was not present or operating, discharges from the Area 1 Pit to Second Creek would continue at levels exceeding water quality standards. [6]

[6] MPCA Variance Issue Statement, p. 13-14.

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In other words, it appears likely that, despite the fact that water from the east end of the Area 1 Pit may be routed through an MNC Mercury Filter before discharge, seepage has and will continue to flow from Area 1 Pit to Second Creek without any additional treatment for mercury.

The Clean Water Act regulates seepage from a tailings basin as a point source.[7] Thus, MCEA supports the following suggestions from Water Legacy:

> *Set mercury limits for SW003 (the Area 1 Lake/Reservoir) as well as for SD001.*
>
> *Revise page 16, Part 7.4 of the draft permit to allow the Permittee to continue iron nugget production after mercury exceedances only if, prior to occurrence of the conditions in Part 7.1, the Permittee has demonstrated through studies approved by the MPCA that water in the Area 1 pit is not hydrologically connected to surface waters.*

IV. THE DRAFT PERMIT MAY NOT COMPLY WITH THE APPLICABLE WATER QUALITY STANDARDS FOR SULFATE.

The Partridge River is used in the production of wild rice. As such, it is subject to the water quality standard of 10 mg/L of sulfates found in Minn. R. 7050.0224, subp. 2.

Rather than place effluent limits for sulfate on Mesabi Nugget's discharge, the proposed permit restricts its discharges from April 1 through August 31 of each year.[8] The support for this restriction can be found in the Variance Issue Statement: "As part of the permit development MPCA staff determined that the downstream waters used for the production of wild rice are susceptible to damage from high sulfate levels during the months of April through August."[9] The remainder of the year, Mesabi Nugget may discharge sulfates without limit.

The relationship between sulfate levels and wild rice is complex. The MPCA is currently organizing a Wild Rice Advisory Group to oversee a study of this relationship, and MCEA is participating in this process. Mesabi Nugget's draft permit also requires it to undergo a Sulfate Transport and Wild Rice Impact Study. Until these studies are complete, however, the 10 mg/L limit in Minn. R. 7050.0224, subp. 2 remains in effect. MCEA requests that MPCA further support its conclusion that the wild rice in the Partridge River is only susceptible to high sulfate levels during the months of April through August, or, if it is unable to do so, then it should include effluent limits consistent with the 10 mg/L water quality standard for all discharges from SD001 in Mesabi Nugget's permit.

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[7] *See, e.g., Sierra Club v. Colorado Ref. Co.*, 838 F. Supp. 1428, 1434 (D. Colo. 1993) (Holding that "Sierra Club's allegations that CRC has and continues to discharge pollutants into the soils and groundwater beneath the refinery which then make their way to Sand Creek through the groundwater state a cause of action under the Clean Water Act."), *Northern California Riverwatch v. Mercer Fraser Co.*, No. C-04-4620 SC, 2005 WL 2122052, at *6 (N.D. Cal. Sept. 1, 2005) (Holding that "proof of a hydrological connection between a man-made settling basin and a water of the United States is sufficient to bring discharges from such a basin within the purview of the CWA.")

[8] Draft Permit, p. 15, Paragraph 6.1.

[9] Variance Issue Statement, p. 2.

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V. CONCLUSION

MCEA requests that the Mesabi Nugget NPDES permit no longer include a variance, as the state and federal requirements for a variance are not met here. If a variance is included, the permit should a schedule of compliance and a date certain when the final effluent limits must be met. The permit should include the suggested changes in Section III to prevent mercury pollution from the Area 1 Pit. Finally, if MPCA cannot show that the wild rice in the Partridge River are only affected by high sulfate levels in April through August, then the permit should include an effluent limit for sulfate on all discharges.

Thank you for your consideration.

Best Regards,

Kathryn M. Hoffman
Staff Attorney
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Saint Paul, MN 55101
(651) 287-4868
khoffman@mncenter.org

cc: Commissioner Paul Aasen, MPCA
Tinka Hyde, EPA Region V
Kevin Pierard, EPA Region V

Exhibit 2

From: Kathryn Hoffman <khoffman@mncenter.org>
To: David Pfeifer/R5/USEPA/US@EPA, Linda Holst/R5/USEPA/US@EPA,
Date: 11/02/2012 02:46 PM
Subject: Mesabi Nugget Variance

Dave and Linda,

I am contacting you in regards to the proposed variance for Mesabi Nugget. MCEA commented on the proposed permit and variance, and also testified before the Citizens Board. I have attached a copy of my testimony before the MPCA Citizens Board. In particular, I wanted to draw their attention to Steel Dynamics (81% owner of Mesabi Nugget) and their most recent 10K filing, which states on page 40 that "compliance with current environmental laws and regulations is not likely to have a materially adverse effect on our financial condition, results of operations or liquidity." You can find the 10K here: http://biz.yahoo.com/e/120227/stld10-k.html

This statement is inconsistent with Mesabi Nugget's statements to MPCA that if it did not receive a variance from water quality standards, the facility would need to shut down.

I noticed that the original variance application requested a statement by a CPA or similar person that analyzes the effect on the company if a variance is not granted, if the variance is requested based on economic hardship. But at the time, Mesabi Nugget only claimed technological feasibility barriers, and no such analysis was submitted. Even though Mesabi Nugget is now claiming economic hardship, I am not aware of any analysis by a CPA or similar person ever being done. It seems like this level of support for Mesabi Nugget's claims should be provided, at a minimum. Mesabi Nugget has certainly convinced the mayor of Hoyt Lakes that it cannot afford to comply with water quality standards, but mining companies have a long history of playing politics with jobs in Northern Minnesota. It is operating at a loss, but mines always do at the beginning. It needs to provide further support, in our opinion.

Finally, I have a question. Have you received the submission from PCA seeking approval? If so, how long before you respond?

Please do not hesitate to contact me with any questions. Thank you for your attention to this matter.

Best,

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Exhibit 3

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

FEB 29 2012

REPLY TO THE ATTENTION OF:

WN-16J

Mr. Jeff Stollenwerk
Industrial Water Quality Permits
Minnesota Pollution Control Agency
525 Lake Ave. South, Suite 400
Duluth, Minnesota 55802

Re: Mesabi Nugget Delaware, LLC

Dear Mr. Stollenwerk:

The U. S. Environmental Protection Agency has reviewed the draft public noticed National Pollutant Discharge Elimination System (NPDES) permit for Mesabi Nugget (MN0067687). We have the following comments. We appreciated the opportunity to discuss these comments in calls with the Minnesota Pollution Control Agency over the last several weeks.

1. ***Variance based limits (40 CFR 131.10 and 122.44(d))*** - The interim limits for total dissolved solids (TDS), bicarbonates, hardness, and specific conductivity presume that EPA will approve a variance request for those parameters. This permit cannot be issued with the interim limits included unless EPA first approves the variance. If a variance is approved any corresponding conditions must be incorporated into the permit. Additional comments regarding EPA's expectations with respect to requesting a variance are provided below.

2. ***Variance schedule (40 CFR 131.10)*** – The variance schedule in the permit includes studies and an eventual plan for a path forward due with the permit renewal application, 4.5 years into the permit term. The schedule presumes that a variance will be approved in the next permit term as well as this permit term. If a variance is approved, the schedule in the permit will need to be modified in order to comply with any conditions of the variance. EPA expects that an appropriate schedule be included in the proposed permit which identifies a date when water quality-based effluent limits will be met. Milestones included in the schedule may include studies for a short term and must include actions that the facility will undertake to work toward meeting water quality-based effluent limits.

3. ***Chronic whole effluent toxicity (WET) Limit (40 CFR 122.44(d))*** – Data available to EPA indicates that the Mesabi discharge has reasonable potential to cause or contribute to chronic toxicity in the receiving waters. Therefore, a WET limit is required under 40 CFR 122.44(d), unless the permit includes water quality-based limits for pollutants that cause WET (see 40 CFR 122.44(d)(1)(v)). A WET limit must be derived from and comply with water quality standards and should be consistent with the *Technical Support Document for Water Quality-based Toxics Control* (TSD) (EPA/505/2-90-001).

4. ***Chronic WET monitoring frequency (40 CFR 122.44(i) and 122.48(b))*** – The draft permit requires analysis of WET one time per year. Consistent with sections 5.5.3 and 5.7.5 of the TSD, samples should be collected at a frequency consistent with the frequency used for limit development, and considering the factors listed in section 5.7.5 of the TSD. Samples must be collected during discharge.

5. ***Permit as a shield (33 USC 1342(k))*** - The permit application identifies a discharge at SD004 from the Area Pit 1. EPA understands that this outfall is not active; however, its inclusion in the application coupled with issuance of the permit could be construed by the permittee to authorize the discharge at this location despite the fact that the permit does not include any effluent limitations, prohibitions, or conditions for such a discharge. Please add an explicit prohibition on a discharge from this location in the permit to eliminate any ambiguity.

6. ***Sulfate fate and transport study*** – This study should have a requirement to examine sulfate buildup in the receiving streams and sediments as well as sulfate transformation. At a minimum, EPA would like to see monitoring for levels of sulfate and hydrogen sulfide downstream in ambient water and sediment to gauge sulfate or hydrogen sulfide levels in the water and determine whether they are accumulating in the sediment in Second Creek and the Partridge River. Since Minnesota is implementing the first seasonal application of its Class 4A (wild rice) water quality standard, it would be helpful in this permit to track any changes due to the seasonal discharge, while the State completes its much more comprehensive wild rice study.

Expectations for variances from water quality standards can be found in EPA's *Water Quality Standards Handbook* available at: http://water.epa.gov/scitech/swguidance/standards/handbook/chapter05.cfm#section3. For EPA to approve a variance from water quality standards granted by a state, the state should provide documentation that addresses the considerations in the *Handbook*. Documentation submitted to date by the state of Minnesota for Mesabi Nugget is not sufficient to demonstrate that controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impacts. To approve a variance from water quality standards for specific conductivity, hardness, alkalinity, and TDS, consistent with federal regulations at 40 CFR 131.10(g), the following issues must be addressed:

a. EPA is aware of other facilities with similar water quality issues as Mesabi Nugget that have achieved compliance with water quality-based effluent limits through the use of treatment technologies such as reverse osmosis and crystallization. Mesabi Nugget has not demonstrated that existing technologies are not available to meet water quality-based effluent limits for the parameters for which Mesabi Nugget is seeking a variance. Also, it is unclear from the information provided to EPA thus far what the impact is to Mesabi Nugget and the surrounding community if Mesabi Nugget were compelled to comply with limits based on Minnesota's water quality standards through application of these control technologies to their effluent. For EPA to approve a variance, the record provided to EPA must demonstrate that attaining the water quality standards would require controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act, and application of those controls would result in substantial and widespread social and economic impact. To date, Mesabi Nugget has provided estimates of costs of wastewater treatment, but has not provided information that shows how being compelled to bear these costs would cause substantial and widespread social and economic impacts. We requested this information on January 11, 2012. We recommend using EPA's *Guidelines for Economic Analyses*, located at

http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html to document the economic impacts.

b. Consistent with EPA guidance, any variance submitted to EPA for approval should also include steps to be taken during the life of the variance to make reasonable progress toward attaining the water quality standards. The materials presented to EPA thus far indicate that Mesabi Nugget will be considered to be making reasonable progress if, upon completion of a scrubber optimization study required by their air permit, Mesabi Nugget completes a water balance study, a chemical balance study, and a pollutant minimization study. Numerous studies (i.e., *Dissolved Solids and Chemical Balance Study for Mesabi Nugget Phase II Project,* 520 pp., Dec 09, June 2011; *Area 1 Pit Water Treatment Evaluation in Support of the Nondegradation Analysis, Mesabi Nugget Phase II Project*, June 2011; *Toxicity Identification Evaluation 2008-2011 Study for the Mesabi Pits, Mesabi Nugget Phase I Project*, June 2011)) have been completed, and these studies include extensive discussion of the Area 1 Pit. It is not apparent to EPA why the additional water balance, chemical balance, and pollutant minimization studies need to be undertaken to identify and implement actions to improve effluent quality. An explanation must be provided for why existing data are not sufficient and why additional studies are needed to make wastewater treatment technology decisions. If additional studies are still warranted, it is incumbent upon Mesabi Nugget to do that which is possible now to reduce existing contaminants in the pit discharge, concurrent with the studies, during the life of the permit.

c. If, based on the submittal of the information in the preceding two paragraphs, it is determined that a variance is warranted, Minnesota must protect existing uses and ensure compliance with its anti-degradation policy. The interim limits presented in the draft permit for TDS are 1160 mg/L as a monthly average and 1228 mg/L as a daily maximum, and for specific conductance 1889 μS/cm as a monthly average and 1965 μS/cm as a daily maximum. MPCA has stated that these limits were derived from predictions made by Mesabi Nugget in support of their Draft Environmental Impact Statement. The reported effluent quality for TDS for the period of January to June 2010 was 843 mg/L on average and 871 mg/L as a maximum and for specific conductance 1204 μS/cm on average and 1244 μS/cm as a maximum.

The document, *Area 1 Pit Water Treatment Evaluation in Support of the Nondegradation Analysis Mesabi Nugget Phase II Project*, (June 2011) states:

> In addition to these specific chemical parameters, the water in the Area 1 Pit has shown intermittent low-level chronic toxicity to *Ceriodaphnia dubia* (*C. dubia*). Identifying the specific source of toxicity is the subject of an ongoing toxicity identification evaluation (TIE) study. As indicated in Table 2-1, the TDS water quality standard referenced is 700 mg/L. Achieving this concentration of TDS in the Area 1 Pit discharge may help to mitigate the current intermittent toxicity issues. . . For the test species *C. dubia*, the reference toxicant is sodium chloride. The reference chronic IC25 for the laboratory conducting the WET testing for Mesabi Nugget (Environmental Toxicity Control, Inc.) is approximately 800 mg/L total dissolved solids (TDS) as sodium chloride. Therefore, water with a TDS concentration less than 800 mg/L should pass the WET test because solutions that consist of just sodium and chloride are generally more toxic than solutions with similar TDS levels but with a broader array of ions. Hence, using a TDS target of 700 mg/L should be conservative for achieving a non-toxic condition. (*Area 1 Pit Water*

Treatment Evaluation in Support of the Nondegradation Analysis Mesabi Nugget Phase II Project, page 5, June 2011.)

Based on this information, it appears that the interim limits proposed to complement the variance would not protect existing aquatic life uses. If true, this would be inconsistent with Minnesota's water quality standards at Minn. R. 7050.0185, Subpart 1:

> Existing beneficial uses and the water quality necessary to protect the existing uses must be maintained and protected from point and nonpoint sources of pollution.

To be consistent with Minnesota's antidegradation policy, the final variance must ensure protection of existing aquatic life uses. In addition, the permit must be clear that despite the variance, Mesabi Nugget must comply with the WET limit in the permit.

MPCA should resolve the issues identified in each of the above comments.

After the close of the comment period, please submit the proposed permit and variance to EPA along with a copy of all comments received during the public comment period and MPCA's responses to the comments. Please submit documentation generated by Mesabi Nugget and/or MPCA to satisfy 40 CFR 131.10(g) together with a certification by the State Attorney General or other appropriate legal authority within Minnesota that the variance was duly adopted pursuant to Minnesota law. EPA will then review the revised proposed permit under 40 CFR 123.44 and we will review the variance consistent with section 303(c) of the Clean Water Act, 33 USC 1313(c), and 40 CFR 131.21. Please contact either of us if you have any questions.

Sincerely,

Kevin M. Pierard, Chief
NPDES Programs Branch

Linda Holst, Chief
Water Quality Branch

cc: Kate Frantz, MPCA

Exhibit 4

Variance Application
NPDES/SDS Permit Renewal
Permit No. MN0067687

Mesabi Nugget LSDP Facility

Prepared for
Steel Dynamics, Inc.
Mesabi Nugget, LLC

June 2010

BARR

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MESABI NUGGET
A new age of iron.

Exhibit 4

Variance Application
NPDES/SDS Permit Renewal
Permit No. MN0067687

June 2010

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1.0 Variance Application

When the current National Pollutant Discharge Elimination System and State Disposal System (NPDES/SDS) Permit No. MN006768 was issued in 2005, the Minnesota Pollution Control Agency (MPCA) recommended and the United States Environmental Protection Agency (EPA) granted variances from the water quality standards for alkalinity, hardness, TDS and specific conductance for the discharge from Area 1 Pit to Second Creek. At the time that the variances were granted, it was assumed that the Large Scale Demonstration Plant (LSDP) would be built and operated for several years, providing additional data for permit and variance reissuance. As it happened, the LSDP was not built until 2009, and did not begin operating until January 2010. The LSDP has not achieved its full production rate, and as a result, there is little additional operational data to inform decisions regarding reissuance of variances than was available in 2005.

During the interim, several other changes have occurred which change the premises under which the original variances were granted. Whole effluent toxicity testing conducted in 2008 and 2009 has shown that the discharge from Area 1 Pit, prior to operation of the LSDP, has an intermittent chronic toxicity to *Ceriodaphnia Dubia (C. Dubia)* during the late summer. The effluent is not acutely toxic to either fathead minnows or the *C. Dubia.* The effluent is not chronically toxic to fathead minnows any time of the year, or to the *C. Dubia* (except as noted above in the late summer).

In February 2010, the MPCA announced that it had a new interpretation of a nearly 40 year old Class 4 water quality standard for protection of wild rice production areas. MPCA advised Mesabi Nugget that effective immediately, the MPCA would require that wherever wild rice is present, water quality must meet a 10 mg/L sulfate standard. During the summer of 2009, a wild rice survey (required by the MPCA) discovered wild rice in the Partridge River, just downstream from the confluence of Second Creek.

Mesabi Nugget requests a continuation of the variances from these water quality standards for the 5-year term of the reissued permit. Mesabi Nugget proposes to reduce the magnitude and duration of the variances as originally granted in 2005. Mindful of the new interpretation of sulfate limits , and mindful of the need to protect the aquatic life uses in Second Creek and the Partridge River, Mesabi Nugget proposes to reduce the magnitude of the variances for TDS and specific conductance, and to limit the time during the year when the variances will be needed.

Mesabi Nugget will stop discharging to Second Creek during the following time periods:

1. April through June: During periods when wild rice, present downstream in Partridge River, is allegedly sensitive to impacts of sulfate; and
2. August through September: When water in Area 1 pit has exhibited intermittent toxicity characteristics based on previous toxicity tests. Future testing may provide information to minimize or eliminate this discharge period.

Thus, discharging to Second Creek from Area 1 pit will occur only during the month of July and October through March. Mesabi Nugget will monitor the effluent mercury concentrations in the discharge from Area 1 Pit and manage the maximum discharge flow rate to ensure that the daily allowable mercury mass discharge limit in the current permit of 0.00007 kg/day is not exceeded. This will prevent the discharge from causing or contributing to downstream impairments for mercury.

The period for protection of wild rice is based upon the only known precedent for imposition of a water quality based effluent limit based on the 10 mg/L sulfate standard for protection of wild rice in production: the Minnesota Power Clay Boswell permit, originally issued in the mid 1970's, but with WQBEL which continues to the present day. This period (April through June) is also consistent with the available research on wild rice.

This variance application provides information indicating water treatment is technically infeasible for the Area 1 Pit.

This variance application is submitted in accordance with Minn. Rules Part 7000.7000 subpart 2 and Minn. Rules part 7053.0280 and 7052.0320.

1.1 Minn. Rule Part 7000.7000 Subp. 2

Minnesota Rules 7000.7000 – Variances – provides in relevant part:

> *Subp. 2. In no case shall the board or commissioner grant a variance unless a written application has been made to the board or commissioner. The application must be served upon the commissioner.*

Subsections 1.1.1 through 1.1.8 provide the information required by MN Rules 7000.7000, Subpart 2, A. through H.

1.1.1 Name and address of the applicant

A. Name and address of the applicant and the person who prepared the application.

Applicant

Jeff Hansen

Mesabi Nugget Delaware, LLC

P.O Box 235

Hoyt Lakes, MN 55750

218-225-6000

Person Who Prepared the Application

Barr Engineering Company

4700 West 77th Street

Minneapolis, MN 55435-4803

1.1.2 Signature of the applicant

B. The signature of the applicant or authorized representative

Jeff Hansen

Plant Manager

Mesabi Nugget Delaware, LLC

1.1.3 Description of facility for which variance is being sought

C. A description, including the location, of the business, plant, system, or facility for which a variance is sought.

In January 2010, Mesabi Nugget began operating a 600,000 metric tons/year iron nugget production facility at the Cliffs Erie site (formerly LTV Taconite) at Hoyt Lakes, Minnesota. The nuggets produced contain approximately 96 to 98% iron, and can be fed directly to electric arc furnaces (mini-mills) as well as to foundries and conventional integrated iron and steel manufacturing facilities. Although the facility is operational, it is not operating at full capacity. The following is a description of the existing facility to aid in understanding the project.

The process consists of the following basic steps:

- Raw material delivery and preparation
- Iron nugget production and product separation
- Product handling and shipping

Raw material delivery and preparation

Raw materials consist of iron ore concentrate from various sources, various coals, fluxes and binders. All raw materials are delivered by rail, truck, or in bulk supersacks with iron ore concentrate and other raw materials stored in outdoor storage piles and/or storage bins. The coals and fluxes are pulverized on-site. Air emissions from material transfer and pulverizing will be controlled by baghouses. Fugitive dust emissions from storage piles, roadways and material handling are controlled by procedures in a fugitive dust plan.

Iron Nugget Production and Product Separation

Coals, fluxes, binders and iron ore concentrate are mixed and formed into green balls (similar to taconite operations). The balls are dried and fed into a rotary hearth furnace, where they are converted to metallic iron and slag material. The iron and slag are cooled and separated. The iron nuggets are directly loaded into rail cars, or stored in stockpiles for shipment at a later date. The slag will be stored in a slag storage pile area for shipment at a later date.

Air Pollution Control

Carbon monoxide (CO), volatile organic compounds (VOCs), and organic hazardous air pollutants (HAPs) from the rotary hearth furnace are controlled by oxidation using an air infiltration system. This system allows air to enter the rotary hearth furnace exhaust duct at a controlled rate, sufficient for oxidation of CO, VOCs and organic HAPs in the rotary hearth exhaust.

After heat recovery, the rotary hearth off gases pass through emission control devices to control sulfur dioxide, acid gases, inorganic HAPs (metallic HAPs and mercury), and particulate matter. A wet scrubber is used to control these pollutants. RHF staged combustion inherent to the process (with low excess air in some zones) and low NO_x burners will be used to control NO_x emissions.

Particulate matter generated during pellet formation, pellet/product drying, product separation and material handling is controlled by fabric filters or baghouses. NO_x from pellet drying is controlled by low NO_x burners. CO and VOC from pellet drying are controlled by good combustion practices.

Fugitive dust emissions from storage piles, roadways, and material handling by heavy equipment is controlled by procedures specified in the fugitive dust plan.

Water Treatment Materials

Materials required for water treatment are transported by truck or rail and pneumatically conveyed, or otherwise conveyed in a closed system, or hydraulically transported to containers at the water treatment plant. Smaller volumes of some materials may be delivered by drum, supersack, tote bin, or other suitable containers for each material

Similarly, sludge and other byproducts from the water treatment plant are transported as wet cake (e.g. filter cake) by truck or rail from the facility for beneficial reuse or proper disposal.

Water Supply and Treatment

Mesabi Nugget is using water from the Area 1 Pit for the water supply primarily for process equipment protection and for process water (e.g. scrubber water supply). The wastewater generated from the process water is treated prior to return back into the Area 1 Pit. Mesabi Nugget employs chemical coagulation and precipitation to remove sulfates, fluorides, solids and metals, followed by a mercury filter, if needed. The treated wastewater is discharged back into Area 1 Pit. The discharge from Area 1 Pit is treated by a mercury filter and/or a sand filter to meet permit limits prior to a direct discharge through SD001 to Second Creek. Water from Area 1 Pit will be discharged to Second Creek only during the months of July and October through March as previously described.

1.1.4 Nature of the variance sought

D. If the applicant seeks a variance primarily on grounds of economic burden, financial statements prepared or approved by a certified public accountant, or other person acceptable to the agency, which shall fairly set forth the status of the business, plant, system, or facility for each of the three financial years immediately preceding the year of the application, and an analysis of the effect of such financial status if the variance is not granted (if the business, plant, system, or facility has not been in operation for this period, then the financial statements and analysis must be based on the most complete data available);

Mesabi Nugget requests MPCA to grant a continuance of the variances from the water quality standards for alkalinity, hardness, TDS and specific conductance. For TDS and specific conductance, the requested average monthly limits are based on water quality projections provided in Section 8.3.1 of the Dissolved Solids and Chemical Balance report (Barr, 2009a). The requested maximum daily TDS limit was calculated by multiplying this average monthly limit by the ratio of the maximum daily limit to average monthly limit in the current permit.

Table 1-1 provides a summary of the past and present Area 1 Pit variance parameter concentrations; current and requested variance limits; and water quality standard criteria applicable to Second Creek.

Table 1-1 Area 1 Pit Water Quality Predictions Summary

Parameter	Average/ Maximum Concentrations Prior to LSDP Operation (Aug. 2008- Dec. 2009)	Average/ Maximum Concentrations during LSDP Operation (Jan-May 2010)	Predicted Concentrations (Year 5)	Current Variance Limits (Monthly Avg./Daily Max.)	Requested Variance Limits (Monthly Avg./Daily Max.)	Second Creek Water Quality Standard Criteria (mg/L)
Alkalinity, Bicarbonates as CaCO3 (mg/L)	328/362	344/347	280	396/445	396/445	250
Hardness (mg/L)	728/806	770/800	570	740/831	740/831	500
TDS (mg/L)*	806/932	843/871	1,200	1619/1818	1200/1348	700
Specific Conductance (µS cm^{-1})*	1152/1331	1204/1244	2,000	2159/2425	2000/2246	1,000

* Based on TDS (mg/L) = Specific Conductance (µS cm^{-1}) X 0.7

Based on water quality predictions, levels of alkalinity and hardness will continue to decrease through time with the operation of the LSDP and scrubber water treatment system discharge to Area 1 Pit. However, it is estimated that TDS and specific conductance will continue to increase through time.

Period of Time for Which Variance is Requested

Mesabi Nugget requests that this variance remains in effect until the end of the permit term.

Reasons Relied upon by the Applicant Requesting the Variance

The primary reason for requesting the variance is the technical infeasibility of implementing a water treatment technology to reduce the levels of constituents in Area 1 Pit water prior to discharge to meet water quality standards. There are only two technologies which may meet the 10 mg/L sulfate standard (see Section 1.1.5 of this application). No commercial facility exists which has met a water quality standard of 10 mg/L. Extensive pilot testing and engineering would be required to verify if these technologies can in fact achieve the 10 mg/L standard, and to conduct the detailed engineering for such systems. It is not reasonable to require construction and attempted operation of a treatment system which is not commercially available and which is likely not technically feasible. .

Mitigation of the existing water quality in the Area 1 Pit depends upon treating the wastewater discharge as well as mitigating the source of the dissolved solids in the pits. It is unfortunate that: 1) the quantities of materials involved are so enormous and 2) conventional mitigation techniques will likely not provide sufficient mitigation.

Area 1 Pit currently contains roughly 50 million cubic meters or 13 billion gallons of water. Average inputs to these pits (P-E and runoff+ groundwater inflow) are 223 gpm and 2,232 gpm respectively (See Section 6.2.1 - Mine Pit Hydrogeology and Water Balances (Barr, 2009b)). Area 1 Pit is currently being pumped to Second Creek at a rate of up to 4,000 gpm. Traditional secondary water treatment systems, such as aerobic and anaerobic biological treatment, will have no affect on the products of sulfide oxidation and neutralization found in the pits. Traditional physical/chemical treatments, such as precipitation or softening, would have little effect, as the concentrations of the pollutants which are elevated above the water quality criteria are below saturation and therefore cannot be easily removed via chemical precipitation. As discussed in the Executive Summary of the Area 1 Pit Water Treatment Evaluation in Support of the Non-Degradation Analysis (Barr, 2009c), the only treatment technology which could reduce elevated concentrations to meet water quality standards is membrane technology – nanofiltration or reverse osmosis. Based on information provided in this evaluation, the annual electrical usage required to operate such a treatment system of adequate scale would be 8.3 million kilowatt-hours per year. As indicated in Section 3.3 of the Greenhouse Gas Emission Inventory Report (Barr, 2009d) and Section 3.1.2 of the Climate Change

Evaluation Report (Barr, 2009e), electrical usage of this magnitude will require a significant increase in electrical power generation requirements and greenhouse gas emissions.

Although there are similar systems at smaller scales in place in mining situations throughout the world, most are employed in areas where there is the potential for either ocean disposal of brine or evaporation ponds. Many of the systems in use are at gold and precious metal mines, where recovery of even trace amounts of those metals makes economic sense.

Lacking the ability to use ocean disposal or evaporation ponds, the brine must be concentrated, evaporated and crystallized, at great expense. Section 3.4.3 of the Area 1 Pit Water Treatment Evaluation in Support of the Non-Degradation Analysis (Barr, 2009c) provided a preliminary cost estimate of $52.2 million in capital costs, with annual operating costs of $4.8 million to treat a flow rate of 4,000 gpm. Net present value of such a system operated in perpetuity is $113 million. Additionally, there are serious concerns that such a system would be feasible in northern Minnesota during winter months.

Additional information is provided in Section 1.1.5.

1.1.5 Economic Burden

E. If the applicant seeks a variance on grounds that compliance is not technologically feasible, a report from a registered professional engineer, or other person acceptable to the agency, stating fully the reasons why compliance is not technologically feasible;

Table 1-2 below provides an overview of the effectiveness, implementability, dependability, and cost considerations relative to water treatment technologies for sulfate removal.

Exhibit 4

Table 1-2 Water Treatment Technology Summary

	Effectiveness			Implementability	Status	Cost Considerations			
Treatment Technology	Can achieve 250 mg/L sulfate?	Can achieve 10 mg/L sulfate?	Can reduce other parameters of concern (TDS, hardness, alk)?	Multiple commercial installations?	Emerging or established technology?	Relative net present value	Relative Chemical Consumption	Relative Power Consumption	Relative Solid Waste Generation
Biological Treatment (Sulfate Reduction)									
Constructed wetlands	P	N	N	Y	Established	$$	Low	Low	Low
Floating wetlands	P	N	N	P	Emerging	$$	Medium	Low	Low
Natural wetlands	P	N	N	Y	Established	$	Low	Low	Low
Biofilters	P	N	N	Y	Established	$$	Low	Low	Low
In-pit biological treatment	P	N	N		Emerging	$$	Low	Low	Low
Anaerobic reactors	P	N	N	Y	Established	$$$	Medium	Medium	Medium
Chemical Precipitation									
Barium precipitation	Y	Y	P	P	Established	$$$$	High	Medium	High
SAVMIN (Ettringite)	Y	P	N	N	Emerging	$$$	High	Medium	High
CESR (Ettringite)	Y	P	N	N	Emerging	$$$	High	Medium	High
Gypsum precipitation	N	N	Y	Y	Established	$$$	High	Medium	High
Lime softening (hardness and alkalinity reduction)	N	N	Y	Y	Established	$$$	High	Medium	High
Ion Exchange									
Sulf-IX (Bioteq)	Y	P	P	N	Emerging	$$$	Medium	Medium	High

	Effectiveness			Implementability	Status	Cost Considerations			
Treatment Technology	Can achieve 250 mg/L sulfate?	Can achieve 10 mg/L sulfate?	Can reduce other parameters of concern (TDS, hardness, alk)?	Multiple commercial installations?	Emerging or established technology?	Relative net present value	Relative Chemical Consumption	Relative Power Consumption	Relative Solid Waste Generation
Membrane Treatment									
Microfiltration	N	N	N	Y	Established	$$	Medium	Medium	Medium
Ultrafiltration	N	N	N	Y	Established	$$	Medium	Medium	Medium
Nanofiltration	Y	N	Y	Y	Established	$$$	Medium	High	Medium
Reverse Osmosis	Y	Y	Y	Y	Established	$$$	Medium	High	Medium
Electrodialysis reversal	Y	P	Y	Y	Established	$$$	Medium	High	Medium

Y = Yes, known

P = Potential, but some uncertainty or limited installations

N = No, very unlikely

Notes:

The qualitative comparisons provided in this table are based upon the following information, which was compiled or developed for numerous projects from 2008-2010:

1. Peer-reviewed scientific literature
2. Vendor-supplied information and costs
3. Design manuals and guidance developed by professional water treatment organizations
4. Reviews compiled by the U.S. and Canadian governmental agencies
5. Chemical modeling and conceptual designs

In the Executive Summary of the Area 1 Pit Water Treatment Evaluation Report in Support of the Non-degradation Analysis (Barr, 2009c), a summary is provided on the evaluation of several potential water treatment technologies and the estimated cost of implementation to demonstrate that "additional control measures [which] are not reasonable", per MN Rules 7050.0185, subpart 8. This evaluation concluded that implementation of reverse osmosis (RO) with zero liquid discharge is the only potential treatment alternative that could be implemented to consistently achieve applicable water quality standards. It was estimated that the net present value of implementation of this treatment option would be more than $113 million dollars over the 20-year project life.

Significant questions exist on the feasibility of such treatment systems, given the volume and hardness of the water requiring treatment. This would be a very complex treatment facility, and would include complex equipment, such as reverse osmosis units, brine concentrators, and crystallizers, that are not typically used in projects of this scale. These additional treatment technology requirements, coupled with the operation of a first of its kind production facility (the Large Scale Demonstration Project) would add an unacceptable level of risk to the overall operations.

1.1.6 Technological Feasibility

F. If the applicant seeks a variance on grounds that compliance is not technologically feasible, a report from a registered professional engineer, or other person acceptable to the agency, stating fully the reasons why compliance is not technologically feasible;

The Executive Summary of the Area 1 Pit Water Treatment Evaluation Report in Support of the Non-Degradation Analysis (Barr, 2009c) provides a summary of an evaluation of several potential water treatment alternatives to reduce levels of several constituents, including hardness, specific conductance, total dissolved solids and bicarbonates (alkalinity). Since the concentrations of dissolved solids are, for the most part, below saturation levels, conventional coagulation and precipitation treatments will not improve water quality to meet water quality standards (including nondegradation) and reduce or eliminate toxicity. The only option considered technically capable of reducing the levels of these constituents which give rise to the need for a variance is membrane treatment with zero liquid discharge of solids using reverse osmosis and evaporation and crystallization of the reject water. Since the new interpretation of the 10 mg/L sulfate water quality for production of wild rice, only membrane treatment with zero liquid discharge or barium precipitation will meet that standard as well. However, barium precipitation will not result in other Class 3 and 4 parameters meeting existing water quality standards, and the cost of barium treatment exceeds $100 million per year. Therefore, it is not a feasible treatment technology.

The use of membrane filtration: nanofiltration with or without chemical precipitation, or reverse osmosis, with or without evaporation and crystallization to treat mine dewatering is not feasible for three reasons:

1. While other mining projects have proposed treatment of process water, no such system has been proposed, permitted, or built in Minnesota.

2. While constructed for other facilities, such as ethanol plants in Minnesota and elsewhere, evaporator/crystallizer systems performance has been unreliable.

3. A wastewater treatment facility capable of treating the large volume of reject water (brine) from such systems within the Lake Superior Basin does not exist. While sufficient large wastewater treatment facilities exist in Minnesota (e.g. the Metro plant), international treaties effectively prohibit the removal of large volumes of water from the Great Lakes Basin.

Each of these reasons is discussed below.

1. <u>While other mining projects have proposed treatment of process water, no such system has been permitted, or built in Minnesota for mine pit dewatering</u>

The four systems proposed (but not yet permitted or constructed) for northern Minnesota have been proposed to meet process water quality requirements, or to comply with federal and state regulations which prohibit new or expanded discharges to impaired water (40 CFR 122.4(i)).

At U. S. Steel's Minntac facility, it had been proposed to provide "treatment of process water, using membrane separation and chemical precipitation to reduce sulfate, chloride, hardness and specific conductance in the Minntac tailings basin reservoir"(Application for Reissuance of NPDES/SDS Permit #MN0057207 for the Minntac Tailings Basin (U. S. Steel, 2009a)).

U. S. Steel at its Keetac facility is planning to "install a nano-filtration system (or similar wastewater treatment process) to treat the scrubber blow down. The scrubber blow down is pumped to the tailings basin where it is recycled for use as process water. Presently, the wet scrubber uses hydrated lime ($Ca(OH)_2$) in the treatment system to precipitate out calcium sulfate in the wet scrubber wastewater. It is predicted that the installation of this technology would reduce sulfate concentrations by 50 percent" (Draft Environmental Impact Statement (DEIS), Keetac Taconite Expansion Project (MN DNR, 2009a)). The MPCA and other cooperating agencies had expressed concerns about increased sulfate and its impact on mercury methylation in downstream receiving

waters which are impaired for mercury. In order to address concerns by the MPCA and others, Keetac is proposing to treat its process water (scrubber blow down).

Essar Steel, formerly Minnesota Steel, is being constructed at the site of the former Butler taconite operations. Because the Butler operations closed down long ago, there are no existing NPDES permits for discharge of mine or process water. Downstream waters are impaired for mercury and other pollutants, including Swan Lake, Swan River and the Mississippi River. Federal and state regulations prohibit a new discharge to impaired waters. See 40 CFR 122.4 (i). Faced with this prohibition, Minnesota Steel "committed to total reuse and recycling of process wastewater generated by the pellet plant, DRI (Direct Reduction Iron), EAF (Electric Arc Furnace) and steel mill operations. A comprehensive treatment system consisting of lime softening, reverse osmosis, crystallization and evaporation will be used, with water returned to the process and crystallized solids disposed of in permitted waste disposal facilities" (Application for NPDES/SDS Permits, (Minnesota Steel Industries, 2006a)).

Similarly, the mine site for the PolyMet project is located in a previously unmined area. Downstream waters, including the St. Louis River and Lake Superior are impaired for mercury (and other pollutants). There are no existing NPDES permits for the mine site, so water from the mine will be used for process water[1]. However, that water does not meet the stringent water quality requirements for metals processing. "The Wastewater Treatment Facility (WWTF) would use nanofiltration treatment for process water flows with lower concentrations of dissolved metals and sulfate, and chemical precipitation treatment for process water flows with high concentrations of dissolved metals and sulfate. The solids removed from the Mine Site process water in the WWTF would be reprocessed to recover any potential metals in the Hydrometallurgical Plant" (Draft Environmental Impact Statement (DEIS), NorthMet Project (PolyMet, 2009a)).

2. **<u>While constructed for other facilities, such as ethanol plants in Minnesota and elsewhere, evaporator/crystallizer system performance has been unreliable.</u>**

The only reverse osmosis (RO) system with an evaporator/crystallizer in Minnesota is installed at an ethanol plant in southwestern Minnesota. While ownership has changed hands and operations have been curtailed in the recent past, the plant is currently operating. However, the plant has struggled to get and keep the RO system online, particularly the evaporator/crystallizer. Currently, brine is stored

onsite, and options for managing the brine, including trucking to a sufficiently large wastewater treatment facility are being investigated, along with improvements to the treatment system.

There is concern that the only operating RO system in Minnesota has not been able to consistently operate and manage the brine. Given the operating history, such a system does not appear feasible.

3. **A wastewater treatment facility capable of treating the large volume of reject water (brine) from such systems within the Lake Superior Basin does not exist. While sufficient large wastewater treatment facilities exist in Minnesota (e.g. the Metro plant), international treaties effectively prohibit the removal of large volumes of water from the Great Lakes Basin.**

An option for operating membrane systems without an evaporator/crystallizer is to use multiple stage membrane treatments to reduce the brine stream flow to a small enough volume that it can be trucked to a nearby, larger wastewater treatment facility for 'treatment'. The physical and biological treatment processes employed at municipal wastewater treatment facilities would do nothing to remove the pollutants of concern from the brine and water quality standards would only be met through dilution with other wastewater streams. There is no known large scale treatment process implemented in Minnesota or the upper Midwest where a brine stream is trucked to a POTW for treatment. Dairies and other food manufactures in California's Central Valley transport concentrate by truck to a POTW that has an ocean discharge, and thus, no limit for TDS and salts. This option is not available in the upper Midwest.

Using membrane technologies to treat the Area 1 Pit discharge of up to 4,000 gpm, with permeate recovery in the 80% to 85% range, Mesabi Nugget would produce approximately 1.0 MGD, or approximately 150, 7,000 gallon truck loads of concentrate per day. The concentrate would have an expected TDS concentration of between 10,000 to 12,500 mg/L, and an alkalinity concentration between 2,000 and 2,500 mg/L. Concentrations of hardness, chlorides, and sulfates are also expected to be elevated.

The largest wastewater facility in the Lake Superior Basin is the Western Lake Superior Sanitary District (WLSSD) located in Duluth. However, this amount of high-strength concentrate would cause or contribute to an exceedance of water quality standards at WLSSD for the following pollutants: hardness, chloride, and TDS. Also, WLSSD currently does not have infrastructure in place to facilitate the off-loading of 150 tanker trucks of wastewater per day. If implemented, a new truck off-loading station would need to be constructed somewhere in WLSSD's collection system.

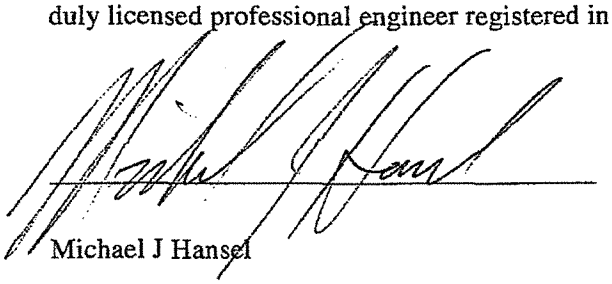
There is a larger wastewater treatment facility in the region: the Metropolitan Wastewater Plant in the St. Paul, MN operated by the Metropolitan Council Environmental Services. That plant, which treats 251 million gallons per day (MGD), could at least in theory, take the brine solution from a membrane treatment facility in Hoyt Lakes. The Mississippi River, to which the Metro Plant discharges, is not an ORVW or OIRW (although it is part of the National Park System). However, the "Annex 2001"of – the Great Lakes Compact—St. Lawrence River Basin Water Resources Compact – effectively prohibits the diversion of water from the Lake Superior Basin (in which is located the Project).

Since it is not feasible for any POTWs in the area to treat concentrate from Mesabi Nugget, costs to truck or pipe the concentrate were not further explored. Undoubtedly, the costs to truck such a large quantity of wastewater would be exorbitantly high.

Given these constraints, it would not be feasible to operate a membrane treatment system, without an evaporator/crystallizer. Evaporator/crystallizers have not yet been proven to be effective to dewater brine.

Professional Engineer Statement

I concur that the information and conclusions contained in this section are true and accurate. I am a duly licensed professional engineer registered in the State of Minnesota.



Michael J Hansel

13936

Registration Number

2.1.7 Other Data or Information Required By Rule or Standard

G. Other additional data or information that is required by any applicable agency rule or standard.

No additional data has been required by the MPCA.

2.1.8 Other Relevant Data or Information

H. Any other relevant data or information that the agency or the commissioner deems essential to a determination on the application, including, but not limited to the following:

1. **a general description of the materials handled or processed by the applicant that are pertinent to the project application, and a statement of the nature and quantity of the materials being discharged, emitted, or disposed of, and that can reasonably be expected to be discharged, emitted, or disposed of during the period of the proposed variance, and proposed methods for the control of these materials;**

A general description of the LSDP process is provided in Section 1.1.3.

2. **a comprehensive proposed plan indicating the steps to be taken by the applicant during the period of the variance, even if the applicant is seeking a permanent variance, to reduce the emission levels or discharges to the lowest limits practical;**

At the time that the variances were granted, it was assumed that the LSDP would be built and operated for several years, providing additional data for permit and variance reissuance. However, the LSDP was not built until 2009, and did not begin operating until January, 2010. As a result, there is currently minimal additional operational data to inform decisions regarding reissuance of variances.

During the interim, several other changes have occurred which change the premises under which the original variances were granted. Toxicity testing conducted in 2008 and 2009 have shown that the discharge from Area 1 Pit, prior to operation of the LSDP, has an intermittent chronic toxicity for Ceriodaphnia Dubia. The effluent is not acutely toxic to either fathead minnows or the daphnia, and is not chronically toxic to fathead minnows or to the daphnia, except on occasion during the late summer.

In February, 2010, the MPCA announced that it had a new interpretation of a nearly 40 year old water quality standard for protection of wild rice in production. MPCA advised Mesabi Nugget that effective immediately, the MPCA would require that wherever wild rice is present, water quality must meet a 10 mg/L sulfate standard. During the summer of 2009, a wild rice survey (required by the MPCA) discovered wild rice in the Partridge River, just downstream from the confluence of Second Creek.

Mesabi Nugget proposes to reduce the magnitude and duration of the variances as originally granted in 2005. Mindful of the need to protect the wild rice in the Partridge River, and mindful of the need

to protect the aquatic life uses in Second Creek and the Partridge River, Mesabi Nugget proposes to reduce the magnitude of the variances for TDS and specific conductance, and to limit the time during the year when the variances will be needed.

Mesabi Nugget will stop discharging from Area 1 Pit to Second Creek, holding the water in Area 1 Pit, during the following time periods:

1. April through June: During periods when wild rice, present downstream in Partridge River, is sensitive to impacts of sulfate; and
2. August through September: When water in Area 1 pit has exhibited intermittent toxicity characteristics based on previous toxicity tests. Future testing may provide information to minimize this discharge period.

Thus, discharging will occur only during the months of July and October through March.

Operation of the LSDP and associated process water treatment plant, alkalinity and hardness levels will decrease in Area 1 Pit (see Table 1-1). Because it is difficult to predict the rate at which levels will decrease, Mesabi Nugget is requesting that the variance limits for these constituents remain the same. For the other constituents, TDS and specific conductance, Mesabi Nugget is requesting lower variance limits in this application.

3. **a concise statement of the effect upon the air, water, and land resources of the state and upon the public and other persons affected, including those residing in the area the variance will take effect, which will result from agency approval of the requested variance;**

Air Impacts

Because hardness, total dissolved solids and specific conductance are all the result of dissolved minerals in the water, there are no expected air impacts. The minerals will remain dissolved in the water at the temperatures and chemistry at which Second Creek, the Partridge and St. Louis Rivers flow.

There are no municipal or industrial users of Second Creek. The only user of the Partridge River is the city of Hoyt Lakes (see water impacts below), but their withdrawal point is upstream of the entrance of Second Creek and so is unaffected by the discharge. The closest industrial user of downstream water is the United Taconite located in Forbes, MN which appropriates water from the

St. Louis River over 35 miles downstream of the Mesabi Nugget facility. It is not likely that air emissions from that facility would be impacted by the water quality of the discharge at SD001.

Thus, there does not appear to be significant impact on air resources which will result from the agency's approval of the requested variance.

Water Impacts

Because of the relatively high concentration of dissolved solids and hardness in Area 1 Pit, discharging water from the pit into Second Creek will affect the water quality in the creek. It will also affect the water quality in the Partridge River, into which Second Creek drains. Given the large flows in the St. Louis River (into which the Partridge River flows), it is unlikely that the volume of water from Area 1 Pit, especially after its flow is reduced by its use for the Mesabi Nugget facility, will significantly impact the water quality in the St. Louis River. Section 8.3.1 of the Dissolved Solids and Chemical Balance report (Barr, 2009a) and Section 5.1.1 of the Partridge River Water Quality report, (Barr, 2009f) address the potential impacts that the changes in water quality may have on users of the water from Second Creek and the Partridge River.

With respect to hardness, the Mesabi Nugget project will actually reduce the hardness of the water in the Area 1 Pit, and thus reducing any impact on the wetland and downstream waters. The effect of increased dissolved solids (and associated specific conductance) is addressed below.

For this study, the river water users were separated into four groups: (1) Municipal water treatment facilities, (2) Industrial river water users, (3) Other permitted river water users, and (4) Non-permitted river water users. A separate analysis was conducted for each of the four groups. While the analysis was general, the data presented are based on existing water quality data available on the MPCA and DNR websites.

Municipal Water Treatment Facilities - Based on a review of the water appropriation permits issued by the Minnesota DNR,[2] the only municipal user of water in the vicinity of Mesabi Nugget is the City of Hoyt Lakes. However, they appropriate water from a point on Partridge River that is located upstream of the confluence of Second Creek. Thus, the City of Hoyt Lakes is not affected by the discharge. There are no municipal users of water downstream of the Mesabi Nugget facility on the Partridge River or the St. Louis River to Lake Superior.

[2] www.dnr.state.mn.us/waters/watermgmt_section/appropriations/wateruse.html

Industrial Water Users - Based on a review of the water appropriation permits issued by the Minnesota DNR, there are no industrial uses of Second Creek or the Partridge River downstream of the discharge. The only appropriations permits noted are United Taconite, Tate & Lyle Citric Acid, Inc., USG, Minnesota Power, Sappi, Heathmark, Inc. and WLSSD, which all appropriate water from the St. Louis River located far down stream of the SD001 discharge point.

Other Permitted River Water Users - There are no appropriations permits for using the water for agricultural irrigation (either crop or livestock watering), or for other uses.

Non-Permitted River Water Users - A principal difficulty in characterizing the potential effects on non-permitted users was locating those users; agency listings of such users are unavailable, and local officials are wary of providing the names of persons using the river water without a permit. Permits for river water use are required only when certain withdrawal thresholds are reached; therefore, reluctance to identify non-permitted users is probably unfounded. No unpermitted users are known to use either Second Creek or the Partridge River. Much of the property surrounding Second Creek is owned by Cliffs Erie, which has no plans to appropriate the water.

Fish - Salinity Sensitivities - In accordance with NPDES permit MN0067687, Mesabi Nugget, is required to perform chronic whole effluent toxicity (WET) tests in August of each year with water from outfall SD001. Test species prescribed by the permit include *C. dubia* and fathead minnow. For fathead minnows the primary endpoint by which toxicity is judged is the weight of the minnows (a decline in weight indicates toxicity). For *C. dubia*, the primary endpoint is the number of young that are produced during the test. Area 1 Pit water has not been toxic to fathead minnows in any tests; however, this water has been chronically toxic to *C. dubia* in just over 50% of the tests conducted.

Toxicity identification and evaluation (TIE) testing was initiated in October 2008 for Area 1Pit water (Outfall SD001). Focused ongoing TIE evaluations will be continued to understand and mitigate the intermittent toxicity.

Land Resources

Because there are no permitted water appropriations for agricultural purposes (see above), and because there is little if any agriculture in the area, it is unlikely that there will be impacts on row crops, small grains or livestock irrigation. However, there may be unpermitted uses, so impacts on a variety of crops, trees and grasses are noted below.

The threshold levels for selected garden crops and fruits that have been studied extensively were computed based on the plant's listed tolerance and the soil types in the study area in the GRI Freshwater STR Model and Computer Program: Overview, Validation, and Application. The range of threshold levels by soil type is listed in the table below. The average value for the range was used as the threshold level for this study. Table 1-3 provides a listing of growing garden crops and fruits that are the most sensitive to salinity: beans, carrots, onions, radishes, strawberries, and raspberries (threshold levels ranging from 400 to 1,000 mg/L). Cabbage, lettuce, peppers, spinach, sweet potatoes, tomatoes, apples, pears, grapes, plums, blackberries, and boysenberries are moderately sensitive to salinity with threshold levels of 500 to 1,300 mg/L.

Table 1-3 Relative Salt Tolerance of Various Cultivated Plants*

Non Tolerant (0–1,400 mg/L)	Slightly Tolerant (1,400–2,800 mg/L)	Moderately Tolerant (2,400–5,600 mg/L)	Tolerant (5,600–11,200 mg/L)
Nurseries			
azalea cottoneaster red pine rose sugar maple viburnum white pine	apple forsythia linden Norway maple red maple	black locust boxwood beet red oak white ash white oak	arborvitae juniper Russian olive
Truck Gardening			
begonia blueberry carrot green bean onion pea radish raspberry strawberry	cabbage celery cucumber grape lettuce pepper potato snapdragon sweet corn	broccoli chrysanthemum geranium marigold muskmelon spinach squash tomato zinnia	asparagus Swiss chard
Golf Courses			
	creeping bentgrass Kentucky bluegrass perennial ryegrass red fescue	nugget Kentucky bluegrass seaside creeping bentgrass	alkaline grass

*Source: Rosen et al "Soil Test Interpretations and Fertilizer Management for Lawns, Turf Gardens, and Landscape Plants"

According to this list, there are several trees and shrubs that are described as "non-tolerant" with plant damage expected at TDS concentrations of 0 to 1,400 mg/L. All other listed trees and shrubs are tolerant of salinity levels over 1,400 mg/L. The list also shows that all grasses are tolerant of salinity levels of over 1,400 mg/L.

Given the relatively low population in the area and the short growing season, there does not appear to be a major impact on the land resources which will result from the agency's approval of the requested variance.

4. a statement of the alternatives to the proposed operation under the variance which have been considered by the applicant;

The source of many of the constituents in Mesabi Nugget's manufacturing process are from the coals and fluxes that are used in the technology. (Pollutants also enter the water from the processed mine ore which cannot be replaced with an alternative source.) Since the key to the process technology involves the use of coals and fluxes, there is no alternative available to remove the source. Mesabi Nugget has committed, as part of the air quality permit, to pursue and test, after stabilization of initial plant operations using the base case raw materials and fuels, the use of alternative raw materials and fuels, including other types of coal and process inputs that may reduce both air and water emissions of the pollutants for which a variance is being sought. Mesabi Nugget has requested authorization to use a variety of coals and alternative fuels and process inputs and will test such alternatives in the nugget process to determine if such alternative inputs can be successfully used and applied to the new technology of manufacturing iron nuggets. To the extent that these alternative fuels result in lower constituent concentrations in the process exhaust gases, it may be possible to reduce loading to the scrubber, wastewater treatment system, and ultimately the permitted water discharge.

When determining the best technology for protecting the environment as a whole, several interrelated factors must be considered. In some cases, those options that provide a positive benefit in one area may be less beneficial in another. Mesabi Nugget is in the process of selecting this equipment, considered several different categories including air emissions, water discharge, solid waste, process experience, and costs. Table 1-4 provides a summary of these considerations.

Table 1-4 Equipment Environmental Considerations

Category	Considerations
Air Emissions	PM_{10} Acid Gases (SO2/F) NOx Mercury Heavy Metals Visible Plume
Water Discharge	Water quality at discharge
Solid Waste	Quantity and composition of waste
Experience	Technically proven Probability of success
Costs	Capital costs Operating costs

Air Emissions:

The most important factor for Mesabi Nugget's control system selection for the LSDP is the demonstrated ability of the control system to remove pollutants from the offgas of the rotary hearth furnace (RHF) system used to manufacture the iron nuggets. The Pilot Demonstration Plant (PDP) that Mesabi Nugget constructed and operated at Silver Bay, Minnesota was used to collect data on the RHF emissions control system for the ITmk3 Process. A comparison was made of the control system performance data collected from the PDP against performance data relative to use of a dry baghouse using lime injection applied in similar applications. This examination indicates that a wet scrubber provides higher removal efficiencies than a dry baghouse system for PM_{10}, acid gases, and mercury. A baghouse is more efficient at PM_{10} removal relative to the filterable component of PM_{10}, but for total PM_{10} removal relative to filterable and condensable components, the scrubber is significantly superior in PM_{10} removal. The superior performance of PM_{10} removal is one of the major reasons for Mesabi Nugget's selection of a wet scrubber as the most appropriate control method for the RHF of the LSDP. Achievement of ambient air quality standards for Class II modeling requires the use of the wet scrubber for the LSDP.

Like PM_{10} removal, the wet scrubber removes more mercury from the RHF offgas than a dry baghouse system. Although the mercury removal technology and resulting removal efficiency as it exists today for either system is not particularly high, the removal efficiency of the wet scrubber for those types of mercury that tend to deposit locally (particle bound and oxidized forms) is much higher for a scrubber when compared to a baghouse. Moreover, Mesabi Nugget has also concluded that the use of a wet scrubber offers greater opportunity to advance the state of technology for removal of elemental mercury and reduction of overall process system mercury emissions. Mesabi

Nugget believes that the wet scrubber system selected for the LSDP allows for additional experimentation with proprietary reagents or mercury fixation additives to the water used in the scrubber. Mesabi Nugget is developing certain proprietary technology relative to mercury removal by use of a wet scrubber and subsequent proprietary water treatment technology which will be applicable to the LSDP and offer the potential to increase the overall mercury removal capabilities beyond that which exists today for any control system.

For heavy metals, the removal efficiencies between a wet scrubber and a dry baghouse are nearly equal. NOx removal does not occur with either system. Acid gas removal by the scrubber system is superior to a scrubber and further reinforces our conclusion that a scrubber is the superior control system for the LSDP RHF.

With a dry system, in order to reduce the temperature of the offgas to a level necessary to protect the bags of the baghouse, significant amounts of evaporative water must be added to the offgas stream prior to the baghouse. This water condenses upon discharge from the stack resulting in a highly visible wet plume. With a wet scrubber system, the quantity of moisture in the offgas stream is substantially lower and a visible plume would not exist under normal atmospheric conditions. This is the reason that a visible plume was not observed during pilot plant operation.

A wet scrubber is operationally and technologically superior to a dry baghouse system due to the specifics of the iron nugget process. For this reason and the expectations of superior performance on total emissions, the Mesabi Nugget PDP in Silver Bay utilized a wet scrubber for pollution control from the RHF. Since this is the only plant of its kind in the world, all other control equipment relative to the ITmk3 Process is unproven technology and therefore high risk technology. The stakeholders of Mesabi Nugget are primarily concerned with the complexities of scale up of the Rotary Hearth Furnace from pilot plant to production scale. The additional complexities associated with unproven offgas control technologies would add an unacceptable level of risk to the LSDP. As such, the wet scrubber system is clearly preferred with regard to the factors of experience and risk minimization.

Water Discharge:

A dry system, although inferior with regard to air emissions, does minimize the contact of the pollutants with water. As such, water quality is minimally impacted when using a dry system. However, the use of a wet scrubber and its inherently superior air emissions capabilities can be beneficially used because conventional water treatment technologies exist that allow for a substantial

amount of the pollutants in the water to be removed. This includes mercury precipitation. In addition, Mesabi Nugget will implement a proprietary technology that removes a substantial amount of the mercury from the discharge.

In the Executive Summary of the Area 1 Pit Water Treatment Evaluation Report in Support of the Non-degradation Analysis (Barr, 2009c), a summary of the evaluation of several potential water treatment technologies and the estimated cost of implementation to demonstrate that "additional control measures [which] are not reasonable", per MN Rules 7050.0185, subpart 8. This evaluation concluded that implementation of reverse osmosis (RO) with solids disposal containing no moisture (zero liquid discharge) is the only potential alternative that could be implemented to consistently achieve applicable water quality standards. It was estimated that implementation of this treatment option would cost over $113 million dollars (net present worth) over the 20-year design life of the facility.

The proposed treatment system includes the best practices for mercury and metals reduction from the process wastewater.

5. **a concise statement of the effect on the establishment, maintenance, operation, and expansion of business, commerce, trade, traffic, and other economic factors that may result from approval and from denial of the requested variance.**

The Mesabi Nugget facility provides a unique opportunity for the Minnesota iron range area for new jobs and economic growth in an area that has otherwise suffered a long economic decline. The construction and operation of the Mesabi Nugget facility provides a much-needed economic stimulus in the local economy. The plant employed over 800 workers for construction of facilities. The plant currently to employs over 70 full time employees. The additional tax paid to the local governments could be on the order of $40 million over the next 30 years. In addition, this technology will provide additional steel to the US markets at costs that can compete with other sources of imported iron.

While Mesabi Nugget is committed to using the most advanced technology available, it is not technically feasible at this time to meet the water quality standards. While a technology exists which could meet the standards – a "zero discharge" system including Reverse Osmosis with evaporation and crystallization of the reject water is not a technically feasible alternative to meet water quality standards for hardness, specific conductivity and total dissolved solids (TDS).

1.2 Variance Requirements Relative to Minn. Rule Part 7052.0280 and 7052.0320

In order to receive a variance for a new or expanded discharge in the Lake Superior Basin, relative requirements in Minn. Rules 7052.0280 and 7052.0320 must be met.

Because a variance is not being requested for a GLI-pollutant, MN Rule 7052.0280 does not apply. Because a variance is not being requested for any bioaccumulative chemicals of concern (BCC) or bioaccumulative substances of immediate concern (BSIC), the requirements of MN Rules 7052.0320 are not applicable.

2.0 References

Barr Engineering Company. 2009(a). Dissolved Solids and Chemical Balance. December 2009.

Barr Engineering Company. 2009(b). Mine Pit Hydrogeology and Water Balances. October 2009.

Barr Engineering Company. 2009(c). Area 1 Pit Water Treatment Evaluation in Support of the Non-Degradation Analysis. December 2009

Barr Engineering Company. 2009(d). Greenhouse Gas Emission Inventory Report. June 2009

Barr Engineering Company. 2009(e). Climate Change Evaluation Report. October 2009

Barr Engineering Company. 2009(f). Partridge River Water Quality Report. December 2009.

MN DNR. 2009(a). Draft Environmental Impact Statement (DEIS), Keetac Taconite Expansion Project. December 2009

U. S. Steel, 2009(a). Application for Reissuance of NPDES/SDS Permit #MN0057207 for the Minntac Tailings Basin. March 2009.

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PolyMet. 2009(a). Draft Environmental Impact Statement (DEIS), NorthMet Project. November 2009.