Via Overnight Delivery

December 27, 2018

Hassan Bouchareb
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155

Re: **Mesabi Nugget Delaware, LLC Alternative Mercury Reduction Plan**

Dear Mr. Bouchareb:

Mesabi Nugget Delaware, LLC (Mesabi Nugget) is timely submitting the enclosed Alternative Mercury Reduction Plan pursuant to Minn. R. 7007.0502, Subpart 5(A)(2). The MPCA-prescribed form is enclosed (Attachment 1) along with a Supplemental Information narrative (Attachment 2) that could not fit within the form.

Mesabi Nugget owns and operates a currently-idled iron nugget processing plant at Hoyt Lakes, Minnesota. This facility is the first and only of its kind in the world, producing a highly metallized iron nugget using a rotary hearth furnace (RHF) process. The facility's processes are fundamentally different from those conducted at taconite or pig iron production plants.

While Mesabi Nugget has invested considerable time and money into mercury reduction possibilities and is submitting this plan pursuant to MPCA's request, Mesabi Nugget respectfully believes that the default 72% total maximum daily load (TMDL) reduction requirement should not apply to this facility. Mesabi Nugget's initial air permit already determined the "maximum achievable" control of mercury emissions through case-by-case Maximum Achievable Control Technology (MACT) authority under the Clean Air Act, included the requirement for a detailed Mercury Reduction Report (Attachment 3) to be developed after operations of this unique facility had matured, and targeted a 50% reduction in mercury emissions. *See* Air Emission Permit 13700318 – 003, Mercury Reduction Efforts, pages A-5 to A-6 (Attachment 4).

In addition, to formulate the default TMDL reduction requirements, MPCA relied on data from technology which is substantially different from Mesabi Nugget's RHF process and did not consider the feasibility of achieving a 72% reduction from the 75.336 lbs/year MACT level. The facility's proprietary technology and the 75.336 lbs/yr MACT level already amount to a 60% reduction in mercury from traditional iron making processes (average ironmaking facility emits around 183 lbs/yr of mercury), making an additional 72% reduction infeasible.

In any event, Mesabi Nugget has through its one-of-a-kind Mercury Reduction Report efforts and the detailed process culminating in a 2017 Consent Decree involving USEPA and MPCA (Attachment 5) thoroughly studied its mercury reduction options and has determined that raw material substitution is the best and only feasible approach. By switching to raw materials with lower mercury content at the RHF, the facility will be using the best controls for mercury that are technically and economically feasible. When accounting for the already-lower levels of mercury emissions as compared to traditional ironmaking technology, the 50% additional reduction (or down to 37.668 lbs/yr) amounts to an overall 80% reduction in mercury. This approach is also superior to an add-on control device because it reduces the amount of mercury entering the production process in the first instance rather than having to control mercury once it is already airborne.

Please contact me should you have any questions on this submittal.

Sincerely,

Mark Lorenz
Plant Manager

Enclosures

Attachment 1: MPCA Mercury Reduction Plan submittal form
Attachment 2: Supplemental Information narrative
Attachment 3: Mercury Reduction Report (Aug. 2013)
Attachment 4: Air Permit 13700318 – 003 (Jan. 2010)
Attachment 5: Consent Decree for Case No. 0:17-cv-1606 (June 26, 2017)

Cc: David Bednarz
David Hatchett

ATTACHMENT 1
MPCA MERCURY REDUCTION PLAN SUBMITTAL FORM

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

Mercury Reduction Plan submittal (Ferrous mining/processing)

Air Quality Permit Program
Minn. R. 7007.0502, subp. 3

Doc Type: Regulated Party Response

Instructions:

- Complete this form to meet the Mercury Reduction Plan requirements for owners and operators of ferrous mining or processing facilities subject to Minn. R. 7007.0502, subp. 3.
- Attach any additional explanatory information, for example, editable spreadsheets with calculations, stack test reports, engineering or design reports, and any other information supporting your reduction plan. Data that is considered to be confidential information must follow the procedures described in item 9 of this form.
- This reduction plan must be approved by the Minnesota Pollution Control Agency (MPCA) prior to submittal of a permit amendment application or development of an enforceable document. It is not a substitution for a permit amendment application.
- **Please submit form to:** Statewide Mercury Total Maximum Daily Load (TMDL) Coordinator, Hassan Bouchareb, Minnesota Pollution Control Agency, 520 Lafayette Road North, St. Paul, Minnesota 55155.

Mercury Reduction Plan

The goal of the Mercury TMDL is to reduce statewide mercury air emissions to 789 pounds per year. To achieve this goal, the MPCA undertook rulemaking and adopted rules regarding mercury reduction plans in Minn. R. 7007.0502. These rules established a mercury emission reduction, for ferrous mining or processing, of 72% from the amount of mercury emitted in 2008 or 2010. As stated in the Mercury TMDL Implementation Plan and reiterated in the MPCA's Response to Comments for the rulemaking, "*The technology developed to achieve the target must be technically and economically feasible, it must not impair pellet quality, and it must not cause excessive corrosion to pellet furnaces and associated ducting and emission-control equipment. Criteria for determining economic feasibility will be developed through a collaborative effort by the taconite industry and the MPCA.*"

Minn. R. 7007.0502 requires the owners or operators of a ferrous mining or processing facility to prepare a mercury reduction plan that addresses reductions for each indurating furnace or kiln of a taconite processing facility or the rotary hearth furnace of a direct-reduced iron facility. The reduction plan may accomplish reductions at each furnace, across all furnaces at a single stationary source, or across furnaces at multiple stationary sources. The mercury reduction plan submittal and compliance deadlines are shown in the table below.

Mercury Reduction Plan submittal and compliance deadlines

Type of source	Mercury Reduction Plan submittal deadline	Compliance deadline
Ferrous mining or processing	December 30, 2018	January 1, 2025

1. Facility information

1.a. Facility name: Mesabi Nugget Delaware, LLC

1.b. AQ facility ID number: 13700318

1.c. Facility contact for this reduction plan: Mark Lorenz

1.d. Agency Interest ID number: NA

1.e. Facility contact email address: Mark.Lorenz@steeldynamics.com

1.f. Facility contact phone number: 218-225-7301

2. Determination of technically achievable

Has the facility determined that the reductions listed in Minn. R. 7007.0502, subp. 6, are technically achievable by the January 1, 2025, compliance date?

☐ Yes Skip item 3. Go to item 4.

☒ No Proceed to item 3.

3. Proposal of alternative reduction

If the owner or operator determines that the mercury reductions listed in Minn. R. 7007.0502, subp. 6 are not technically achievable by the identified compliance date; an alternative plan may be submitted under Minn. R. 7007.0502, subp. 5(A)(2). If you are proposing an alternative plan to reduce mercury emissions, please complete the following:

a) Complete Steps 1 through 6 below:

Step 1. Identify all available technologies and rank in descending order of control effectiveness.

Raw Material Substitution - Lower-Mercury Carbon Sources

Gore Mercury Control System (GMC)

Sorbents - High-Temp Brominated Powdered Activated Carbon or Calcium Bromide Injection

See Mesabi Nugget's Supplemental Information (Attachment 2) and Mercury Reduction Report (Attachment 3) for more information.

Step 2. Eliminate technically infeasible technologies.

Include references and citations supporting the basis for the determination that the reductions are not technically achievable by the compliance date. If the mercury reductions are not technically achievable based solely or partly on economic factors, include references and citations supporting the basis for the determination that the reductions are not economically feasible.

Please refer to Mesabi Nugget's Supplemental Information (Attachment 2) and Mercury Reduction Report (Attachment 3) for this discussion.

Step 3. Rank remaining technologies in descending order of control effectiveness.

Raw Material Substitution is the only technology that is technically and economically feasible.

Step 4. Complete an environmental impacts analysis.

Provide an analysis of environmental impacts. Focus on impacts other than direct impacts due to emissions of mercury, such as solid or hazardous waste generation, discharges of polluted water from a control device, demand on local water resources, and emissions of other regulated air pollutants.

Material substitution should not result in additional environmental impacts but should have some ancillary off-site benefits resulting from less mining of raw materials. Conversely, HPAC or CaBr2 Injection and GMC system usage would result in unnecessary soild or hazardous waste generation. In addition, HPAC or CaBr2 Injection would lead to unnecessary discharges of polluted water from the wet scrubber. HPAC or CaBr2 Injection and GMC system usage would also incur additional equipment and operational costs, including higher electricity usage and the off-site emissions associated with electricity generation. Please refer to Mesabi Nugget's Supplemental Information (Attachment 2) and Mercury Reduction Report (Attachment 3) for more information.

Step 5. Complete a cost effectiveness evaluation.

Calculate the cost effectiveness of each control technology (in dollars per pound of mercury emissions reduced). This cost effectiveness must address both an average basis for each measure and combination of measures. If multi-pollutant control strategies were considered that have implications on cost, such as the control technology also reducing emissions of other regulated air pollutants, please provide that information as well. The costs associated with direct energy impacts should be calculated and included in the cost analysis. Direct energy consumption impacts include the consumption of fuel and the consumption of electrical or thermal energy. The emphasis of this analysis is on the cost of control relative to the amount of pollutant removed, rather than economic parameters that provide an indication of the general affordability of the control alternative relative to the source.

NA

Step 6. Of the remaining technologies, propose the best-performing control strategy. Describe the selection of the control strategy.

See Mesabi Nugget's Supplemental Information (Attachment 2) and Mercury Reduction Report (Attachment 3) for more information.

b) Provide an estimate of the annual mass of mercury emitted under the requirements of Minn. R. 7007.0502, subp. 6.

NA - see (c) below

c) Provide an estimate of the annual mass of mercury emitted and percent reduction achieved under the proposed alternative plan.

37.668 lbs/yr

d) Complete the information in items 4 through 9 for your alternative proposal.

4. Description of mercury reduction action

Complete the following table for each emission unit that emits mercury. Use a separate row for each specific control, process, material or work practice that will be employed to achieve the applicable control efficiencies, reductions or allowable emissions. Provide a written summary below as needed for context or background. Minn. R. 7007.0502, subp. 5(A)(1)(a), 5(A)(1)(b), or 5(A)(2)(a).

This table has an example of information that the MPCA is seeking for industrial boilers. The table is designed to help address each element needed when composing enforceable emission limits, control efficiencies or other conditions to meet mercury reductions. In the below example, the facility is applying control technology and fuel limits between two boilers to meet the total mercury reduction requirement of 70% with no changes proposed for the lime kiln other than tracking suppliers and fuel sampling [examples can be deleted]. To create a new row, place your cursor in the last column of the last row, hit tab.

Emission unit	Element to reduce mercury (control device, work practice, etc.)	Reduction, control efficiency, emission limit, operating limit, or work practice* (indicate units, i.e., lb. hg/ton material, % control)	Describe element in detail (include manufacturer's data** as applicable)
Rotary Hearth Furnace (EU 001)	Raw Material Substitution (work practice)	50% reduction from already-limited mercury emissions, with monitoring via sorbent trap monitor	Switch to raw materials with a lower mercury concentration. No significant RHF modifications will be required to implement this control option.

*The permit or enforceable document will include the proposed control efficiency, emission limits, or other requirements that achieve the reduction.
**Attach manufacturer's information and other resources used to document the reduction

Written description:

Switching to raw materials with a lower mercury content will reduce mercury air emissions without any significant modifications to the emission units.

5. Schedule

For each reduction element (specific control, process, material or work practice) described in Item 4 that will be employed as part of the mercury reduction plan, complete the following table. *To create a new row, place your cursor in the last column of the last row, hit tab.*

Emission unit	Reduction element	Anticipated element construction/installation date (mm/dd/yyyy)	Anticipated startup date (mm/dd/yyyy)	Anticipated date for demonstrating reduction target (mm/dd/yyyy)	Date reduction needs to be met (mm/dd/yyyy)	Anticipated date of permit application submittal (if necessary) (mm/dd/yyyy)
Rotary Hearth Furnace (EU 001)	Raw Material Substitution	NA	NA	01/01/2025	01/01/2025	NA

6. Calculation data

Include all mercury emission calculations for each emissions unit listed in item 4 in an editable electronic spreadsheet. Provide calculations showing the mercury reduction, control efficiency, or emission rate that each emissions unit will achieve once the plan for that emissions unit is fully implemented.

6a. Emission factors

Identify the emission factors and sources of the emission factors used to determine mercury emissions in item 3 in the following table. Please include the rationale behind your decision. Minn. R. 7007.0502, subp. 5(A)(1)(b) or Minn. R. 7007.0502, subp. 5(A)(2)(d). *To create a new row, place your cursor in the last column of the last row, hit tab.*

Emission unit	Emission factors for current mercury emissions rate, if applicable	Source of emission factor	Target emission rate	Source of emission factors for target emission rate
Rotary Hearth Furnace (EU 001)	0.0086 lb/hr using 30-day block average based on the hours of operation in a 30-day period.	Consent Decree (Case No. 0:17-cv-1606)	37.668 lbs/yr.	Consent Decree and Mercury Reduction Efforts under air permit

7. Operation, monitoring, and recordkeeping plan

7a. Operation and optimization plan

For each control device used to achieve the overall mercury reduction of the plan, describe how you will operate the control system such that mercury reductions are maintained. Explain how an operator might adjust the control system at the facility. Describe system alarms or safeguards to ensure optimal operation of the mercury control system. Optimization also includes training of individuals responsible for operating the control system, and the development and upkeep of operation and maintenance manuals. The MPCA is not requesting that such programs or manuals be included here, rather that they are summarized. Discuss potential variability of mercury emissions and how operations will be monitored to address variability. Minn. R. 7007.0502, subp. 5(A)(1)(c) or Minn. R. 7007.0502, subp. 5(A)(2)(c).

NA - no add-on control device is being proposed.

7b. Proposed monitoring and recordkeeping

For each reduction element (specific control equipment, emission limit, operating limit, material or work practice), describe monitoring to provide a reasonable assurance of continuous control of mercury emissions. If the plan includes control equipment, attach MPCA Air Quality Permit Forms GI-05A and CD-05. Minn. R. 7007.0502, subp. 5(A)(1)(d).

This table and following description has example material for a facility with two coal fired boilers [examples can be deleted]. To create a new row, place your cursor in the last column of the last row, hit tab.

Emission Unit	Reduction Element	Reduction, Control Efficiency or Emission Rate (include units)	Operating Parameters	Monitoring Method	Parameter Range (include units, if applicable)	Monitoring Frequency	Proposed Recordkeeping	Discussion of Why Monitoring is Adequate
Rotary Hearth Furnace (EU 001)	Raw Material Substitution	37.668 lbs/yr Hg	30-day block average based on the hours of operation in a 30-day period.	Mercury sorbent trap monitoring device and other required monitoring systems (e.g., flow rate and moisture systems).	NA	Continuously monitor emissions when dry balls are being fed to the RHF.	Site-specific monitoring plan	Continuous monitor is highest possible option.

Additional Discussion:

See Mesabi Nugget's Supplemental Information (Attachment 2) and Mercury Reduction Report (Attachment 3) for more information.

7c. Evaluation of the use of Continuous Emissions Monitoring Systems (CEMS).

Evaluate the use of CEMS for mercury, both the sorbent tube method (U.S. Environmental Protection Agency [EPA] Method 30B) and an extractive "continuous" system. Describe if either method has been used at the mercury emissions source for parametric monitoring or for compliance determination. If CEMS is selected for monitoring of mercury emissions, please include in item 6a above. If it is not selected for monitoring of mercury emissions, please discuss the evaluation of the use of CEMS below:

NA

8. Mechanism to make reduction plan enforceable.

The elements of the reduction plan will be included in your air emissions permit. If a permit amendment is needed in order to install or implement the control plan, please explain:

NA

9. Additional information

Please provide additional information that will assist in reviewing your Mercury Reduction Plan.

See Mesabi Nugget's Supplemental Information (Attachment 2) and Mercury Reduction Report (Attachment 3) for more information.

10. Confidentiality

If your mercury reduction plan submittal includes confidential information, submit two versions of the mercury reduction plan. One version with the confidential information and one public version with the confidential information redacted.

10a. Confidentiality statement

☒ This submittal does not contain material claimed to be confidential under Minn. Stat. §§ 13.37 subd. 1(b) and 116.075. Skip item 10b, go to item 11.

☐ This submittal contains material which is claimed to be confidential under Minn. Stat. §§ 13.37 subd. 1(b) and 116.075. Complete Item 10b. Your submittal must include both Confidential and Public versions of your submittal.

☐ Confidential copy of submittal attached ☐ Public copy of submittal attached

10b. Confidentiality certification

To certify data for the confidential use of the MPCA, a responsible official must read the following, certify to its truth by filling in the signature block in this item, and provide the stated attachments.

☐ I certify that the enclosed submittal(s) and all attachments have been reviewed by me and do contain confidential material. I understand that only specific data can be considered confidential and not the entire submittal. I certify that I have enclosed the following to comply with the proper procedure for confidential material:

- ☐ I have enclosed a statement identifying which data contained in my submittal I consider confidential, and I have explained why I believe the information qualifies for confidential (or non-public) treatment under Minnesota Statutes.
- ☐ I have explained why the data for which I am seeking confidential treatment should not be considered "emissions data" which the MPCA is required to make available to the public under federal law.
- ☐ I have enclosed a submittal containing all pertinent information to allow for review and approval of my submittal. This document has been clearly marked "confidential."
- ☐ I have enclosed a second copy of my submittal with the confidential data blacked out (not omitted or deleted entirely). It is evident from this copy that information was there,

but that it is not for public review. This document has been clearly marked "public copy."

Permittee responsible official

Print name: ______________________

Title: ______________________ Date ______________________

Signature: ______________________

Phone: ______________________ Fax: ______________________

Co-permittee responsible official (if applicable)

Print name: ______________________

Title: ______________________ Date: ______________________

Signature: ______________________

Phone: ______________________ Fax: ______________________

11. Submittal certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Permittee responsible official

Print name: Mark Lorenz

Title: Plant Manager Date 12/27/18

Signature: [signature]

Phone: 218-225-7301 Fax: 218-225-7318

Co-permittee responsible official (if applicable)

Print name: NA

Title: ______________________ Date: ______________________

Signature: ______________________

Phone: ______________________ Fax: ______________________

ATTACHMENT 2
SUPPLEMENTAL INFORMATION
NARRATIVE

Supplemental Information for Alternative Mercury Reduction Plan

Mesabi Nugget Delaware, LLC

Iron Nugget Facility, Hoyt Lakes, MN

Background on TMDL Rule and Application to Mesabi Nugget

The TMDL Framework Does Not Work for Limiting Air Emissions

Mesabi Nugget respectfully believes that it is not proper to limit air emissions using the Clean Water Act (CWA) authority for setting a TMDL on mercury-impaired water bodies. Although MPCA states that Minn. Stat. Sec. 116.07, subd. 4(a) is its primary source of authority and not the Clean Water Act (CWA), the rule sets a TMDL on mercury-impaired water bodies. *See* MPCA Revised RTC (July 2014), p. 22; *see also* SONAR, p. 10. The authority to set a TMDL originates from the CWA which governs point source wastewater discharges, not air emissions. Further, a TMDL is to be imposed on mercury-impaired water bodies, not on air emissions where the facility is in compliance with mercury NPDES limitations and discharges wastewater to an unimpaired waterbody. Mesabi Nugget is already subject to mercury emissions regulations under the Clean Air Act (CAA) and has an MPCA-issued air permit containing conditions to govern such air emissions.

Rule Will Not Lead to Improved Water Quality in Minnesota

The rule will likely not result in improved water quality and will likely not allow removal of the fish consumption standards in Minnesota. Per the approved TMDL Study, 90% of the mercury deposited on Minnesota waters originates from anthropogenic sources outside of Minnesota. *See* TMDL (Oct. 2009), p. 19. This means that national and international sources too must reduce their contribution to Minnesota deposition by 93% from 1990 levels to achieve the goals set forth in the TMDL Study and Implementation Plan. Yet the rule does nothing to control sources outside of Minnesota.

Default Reduction Percentage Does Not Reflect Mesabi Nugget's Technology

<u>First</u>, the rule's default emission reduction requirement of 72% does not make sense as applied to Mesabi Nugget because the facility already went through the Maximum Achievable Control Technology (MACT) process to set the 75.336 lb/yr limit found in the air permit for mercury emissions, while other regulated facilities have not undergone a permit review to reduce mercury emissions.

In accordance with Section 112 of the CAA, USEPA establishes National Emission Standards for Hazardous Air Pollutants (NESHAPs). NESHAPs are technology-based standards for major sources and certain area sources that emit hazardous air pollutants (HAPs). The facility first reviews technology and work practices currently utilized within its industry that produce the lowest HAP emissions. After considering what that industry's best controlled units achieve, an emission limit is set and control technology to meet that limit is established. This industry-specific review determines MACT.

Under its CAA authority, MPCA already determined the "maximum achievable" control of mercury emissions for Mesabi Nugget – 75.336 lbs/year with a targeted 50% reduction in the future. The review was done on a case-by-case basis because there are no similar units in the world. As a result, the current permit has a built-in approach to address mercury emissions and targets “a reduction, from the baseline determined after initial startup, of at least fifty percent of the annual mercury emissions from the rotary hearth furnace (RHF)”. *See* Permit MPCA Air Emissions Permit 13700318 – 003, Mercury Reduction Efforts, pages A-5 to A-6 (Attachment 4).

The TMDL rule treats most sources already regulated under the NESHAP program as exempt from this TMDL rule. *See* Minn. R. 7007.0502, Subpart 3(C). However, a handful of sources including Mesabi Nugget are expected to achieve reductions that go beyond MACT – despite the lack of scientific or legal bases to support these further reductions.

Second, although Mesabi Nugget believes that some mercury reduction is feasible, a reduction down to 28% of the 75.336 lbs/yr MACT-based limit is not technically feasible. MPCA relied on data from the taconite industry and fundamentally different indurating furnace technology to develop the reduction standard. During the rulemaking process, MPCA gathered affected parties and created the Minnesota Taconite Mercury Control Advisory Committee. The affected parties developed key elements of the TMDL Implementation Plan which ultimately guided the development of the rule. *See* SONAR, pdf p. 7. The SONAR notes that many of the requirements of the rule are direct outgrowths from the stakeholder recommendations. *Id*. Accordingly, the 72% reduction was chosen based on the taconite industry’s indurating furnace data. *Id*.

At the time, Mesabi Nugget was not yet in operation and was not included in the affected party rulemaking discussion. Consequently, MPCA did not consider the technical or economic feasibility of achieving a 72% reduction from Mesabi Nugget’s particular technology. For example, unlike the taconite facilities which achieved a high rate of mercury removal during testing, Mesabi Nugget’s testing of activated carbon yielded at best only a 28% reduction of mercury. This difference in performance is a clear reminder that an indurating furnace and this RHF are not comparable. MPCA’s “Estimated Costs Related to Implementation of the Mercury Reduction Rules” document created as part of the rulemaking process offers that a “polishing baghouse” would somehow increase Mesabi Nugget’s mercury control efficiency from activated carbon from a high of 28% all the way to 72%, but Mesabi Nugget is aware of no data supporting this conclusion and believes that such a large reduction is extremely unlikely given that its mercury emissions are almost entirely in the elemental form. Mesabi Nugget is also concerned over the technical and economic feasibility of placing a baghouse after the RHF’s wet scrubber given scrubber exhaust moisture levels, among other concerns.

MPCA appears to have taken the taconite industry’s indurating furnace data and merely applied it to Mesabi Nugget, without any site-specific analysis. *See* Revised MPCA RTC (Jul. 2014), pdf p. 23. This lack of a basis for applying the default reduction percentage to Mesabi Nugget necessitates submittal of an Alternative Mercury Reduction Plan.

Third, MPCA should rely on the air permit’s Mercury Reduction Report process and the Consent Decree’s detailed monitoring plan instead of the default 72% reduction amount proposed in the rule.

During the permitting of the RHF, Mesabi Nugget noted that a traditional iron making facility would emit approximately 183 lbs/year of mercury (based upon emission estimates from existing operating facilities). The current permit limit of 75.336 lbs/year already represents a roughly 60% reduction in mercury emissions from pig iron production using traditional methods. Assuming Mesabi Nugget successfully demonstrates compliance with the 50% reduction target in the current permit, Mesabi Nugget's emissions would be 80% lower than traditional ironmaking methods. A 50% reduction in Mesabi Nugget's baseline emissions would achieve more than the 72% default reduction and would thus preserve the reductions contemplated by the TMDL.

Supplemental Description of Alternative Mercury Reduction Plan

Alternative Raw Materials Will Reduce Emissions to Lowest Feasible Levels

The main source of mercury to the RHF is the carbon. However, unlike coal fired power plants, the carbon in this iron nugget production facility does more than provide heat value to produce the iron nuggets. Carbon is used to provide the chemistry needed to produce iron nuggets, which are then used to make carbon steel. The chemical and physical properties along with other factors determine whether the process will work, and whether iron nuggets can be made with the chemical composition suitable for use in mini-mills and other iron and steel works.

The initial air permit required Mesabi Nugget to consider "changing to raw materials with a lower mercury concentration." *See* Air Permit #13700318-003, Mercury Reduction Efforts, p. A-5 to A-6 (Attachment 4). In accordance with the permit, Mesabi Nugget submitted a detailed Mercury Reduction Report to MPCA to consider material substitution and other mercury reduction options. *See* Mercury Reduction Report, Public Version (Aug. 2013) (Attachment 3). In particular, Mesabi Nugget extensively investigated switching to alternative carbon sources and reductants with lower mercury content which can still provide the correct chemistry for the nugget process and meet water quality permit standards. In particular, the facility conducted trials to determine the technical feasibility of using alternative carbon sources.

Based on the trials, Mesabi Nugget determined that lower-mercury carbon is a practical option and the sulfur content and volatility are acceptable to produce iron nuggets. In addition, Mesabi Nugget has the ability to economically secure lower-mercury carbon sources and reduce emissions to technically feasible levels. Already, the facility has considerably reduced mercury emissions by switching to low-mercury carbon sources.

After extensive research and considerable investment of time and money into mercury reduction options, Mesabi Nugget has determined that a 50% reduction from currently-permitted levels, or to 37.668 lbs/yr of mercury, is technically and economically feasible via raw material substitution.

Implementation of Plan

Mesabi Nugget plans to implement and monitor mercury reductions at the RHF consistent with the Consent Decree requirements. *See* Consent Decree, Case No. 0:17-cv-1606 (June 26, 2017) (Attachment 5). Per the Consent Decree, Mesabi Nugget committed to a new form of mercury emissions limit of less than or equal to 0.0086 lbs/hour using 30-day Block Average based on the hours of operation in a 30-day period. *See* Consent Decree (June 2017), pdf p. 11. For TMDL rule purposes, this would annualize to 37.668 lbs/yr of mercury.

To determine compliance with this limit, Mesabi Nugget is required to use a mercury sorbent trap monitoring system to continuously measure mercury emissions from the RHF at all times when dry balls are being fed to the RHF. *Id*. at pdf p. 10-11. The facility is also required to operate and maintain other previously installed required monitoring systems for flow rate and for moisture or wet oxygen at the RHF scrubber stack. *Id*.

Mesabi Nugget is also subject to a site-specific monitoring plan for the mercury sorbent trap monitoring system and any other monitoring system (i.e., flow rate and moisture systems) needed for routine operation of the sorbent trap monitoring system or to convert mercury concentrations to units of pounds per hour. The monitoring plan must contain essential information on the continuous monitoring systems. *Id*.

Mesabi Nugget's commitment to a mercury sorbent trap monitor and the extremely detailed requirements found in Section IV.A and Appendices A and B of the Consent Decree provide a complete picture for how Mesabi Nugget will demonstrate compliance with the TMDL rule and the alternative reduction percentage of 50% from the currently-permitted 75.336 lbs/yr amount.

Other Control Technologies Are Not Technically Feasible For Mesabi Nugget

Mesabi Nugget studied numerous potential control technologies as part of its Mercury Reduction Report (Attachment 3). Please refer to that Report for more detailed information. Of the potentially available technologies, the Report suggested the possible use of raw material changes, high-temperature brominated activated carbon (HPAC) injection, calcium bromide ($CaBr_2$) injection, or use of a Gore Mercury Control (GMC) Module System. As explained above, raw material substitution was chosen as the best and only feasible mercury reduction option.

HPAC was investigated for mercury control at the RHF. The addition of a sorbent into the air exhaust stream would require additional investment in equipment to feed the material and would create additional wastes and mercury reporting to the water system as the wet scrubber removes such material. Alternatively, an expensive baghouse would be required to be constructed and operated to capture the injected HPAC. At injection rates of 36 – 212 lbs/hr of HPAC, mercury reduction percentages varied from 6 – 28%. These percentages are too low to accomplish the reductions called for under the TMDL rule. And because this testing was performed before Mesabi Nugget had identified further mercury loading reductions via raw material substitution, these reduction percentages are likely to be lower with lower mercury inputs.

To investigate its effectiveness, $CaBr_2$ was injected into a carbon feed screw supplying the RHF. Test runs showed reductions in mercury of 22 – 35%, although it took a large amount of $CaBr_2$ to reach 35%. These percentages are too low to accomplish the reductions called for under the TMDL rule. Further, the testing was performed before Mesabi Nugget had identified further mercury loading reductions via raw material substitution, indicating that these reduction percentages are likely to be lower with lower mercury inputs. Finally, the addition of $CaBr_2$ into the raw material feed system would require additional investment in equipment and would create additional wastes and mercury reporting to the water system as the wet scrubber removes such material.

GMC Modules are a system of multiple fixed-bed sorbent modules located after the wet scrubber to prevent blinding by particulate. Modules would have to be placed within dedicated housing directly in the flue gas exhaust stream. The expensive sorbent modules are gradually used up and must be disposed of and replaced with new modules. The current RHF exhaust and air pollution control configuration would need to be extensively modified for compatibility of GMC Modules. Mesabi temporarily installed the GMC system on a slipstream of exhaust downstream of the RHF's pollution control equipment. There was a malfunction of the GMC system during testing, preventing the gathering of data from multiple operating scenarios and raising concerns about the technology's reliability over the long term. While the one GMC system test reduced mercury by up to 74%, this test was performed without the benefit of fully-substituted raw materials. Further, any GMC system would add in substantial costs associated with operation and cause change in pressure drop, would require installation and operation of a multi-million dollar variable speed drive fan to control pressure drop, and would increase electricity costs. Mesabi Nugget concluded that the GMC system is unproven technology, has ancillary detrimental environmental impacts, and is not economical.

ATTACHMENT 3
MERCURY REDUCTION
REPORT (AUG. 2013)

Mercury Reduction Plan

Prepared for
Mesabi Nugget Delaware, LLC

August 2013 – Public Version

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MESABI NUGGET
A new age of iron.

Mercury Reduction Plan

August 2013

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1.0 Overview

1.1 Permit Requirements

Mesabi Nugget's Air Quality Permit (MN 13700318 – 003) requires submittal of a plan describing the campaign for identifying and testing options to control mercury from the ITmk3 rotary hearth furnace (RHF) (page A-5 and A-6 of reference (1)). The plan on the mercury reduction efforts is prescribed as follows:

"1) Review technical developments in mercury control since the submittal of the facility's revised permit application in May 2005.

2) Identify options targeting a reduction, from the baseline determined after initial startup, of at least fifty percent of the annual mercury emissions from the rotary hearth furnace (RHF).

3) Evaluate the effectiveness of, at a minimum, the following options:

a) Changing to raw materials with a lower mercury concentration.

b) Installing additional control devices to the flue gas cleanup process, including the use of sorbent injection or the modification of existing control devices.

c) Enhancing the existing flue gas cleanup process to remove mercury through process modifications or chemical addition to the furnace or flue gas.

d) A combination of any or all of the above techniques.

4) Present three options to the Commissioner that can be implemented at the RHF to lower the amount of mercury emitted. To select these options, the first criterion shall be the potential for greatest removal of mercury, while the second criterion is technical feasibility.

5) Include, for each option presented, a schedule for constructing or installing new needed equipment, operating the equipment (including shakedown), and testing the mercury reduction method selected by the Commissioner for further implementation."

1.2 Plan Organization

This plan is generally organized to follow the requirements as outlined above, as well as provide other information which may be useful in understanding the mercury emissions from the RHF and the choice of alternatives.

- Mercury Emissions from RHF and Mercury Mass Balance
- Review of Mercury HG-2003 (Appendix B) from 2005 permit application
- Review technical developments in mercury control since the submittal of the facility's revised permit application in May 2005.
- Analysis of options for mercury reductions
    - Changes to raw materials with a lower mercury concentration.
    - Installing additional control devices to the flue gas cleanup process, including the use of sorbent injection or the modification of existing control devices.
    - Enhancing the existing flue gas cleanup process to remove mercury through process modifications or chemical addition to the furnace or flue gas.
    - A combination of any or all of the above techniques.
- Recommended options for mercury removal
- Schedule for implementation of mercury removal options

2.0 Mercury Emissions

2.1 Mercury Emissions from RHF – 2005 Mercury Mass Balance

A mercury mass balance was calculated based on stack tests conducted in September 2004 during the pilot plant (PDP) operation. The results were included in the May 2005 MN AQ Permit 13700318-001 application (Appendix B). Appendix B and supporting documentation indicated that the air emissions from the RHF were the ultimate fate of most of the incoming mercury to the process. Table 2-1 provides a summary of the mercury mass balance completed in August 2004. Based upon this untested mass balance, a permit limit of 75 lbs/year was established. See page A-27 of MN AQ Permit 13700318-001.

Table 2-1 Mercury Mass Balance Summary, August 2004

In	lb/year	Out	lb/year
Iron Ore Concentrate	2.2	Air Emissions	75.2
Coal	70.7	Conventional Water Treatment – Solid Waste	4.43
Fluxes/Binders	7.1	Wastewater	0.006
Natural Gas	0.8	Tailings Solid Waste	0.36
Water	0.07	Iron Nuggets and Slag	0.9
TOTAL	**80.9**	**TOTAL**	**80.9**

The primary source of mercury was expected to be the coal used to provide the chemistry needed to produce iron nuggets. However, the stack-tested baseline mercury emissions after startup (which is the baseline that must be used for this mercury reduction plan) were higher than the mass balance predicted, with one flux – Flux 3 – contributing significantly more mercury than anticipated.

2.2 Mercury Emissions from RHF – 2012 Mercury Mass Balance

A second mercury mass balance was calculated based on stack tests in January 2012. This second mercury mass balance showed that mercury air emissions were higher than anticipated in the 2005 permit application and 2005 permit. Subsequent investigations showed that while the main source of mercury to the RHF – the coal – remained a significant source of mercury, other raw materials – specifically Flux 3 – had significantly higher levels of mercury. Table 2-2 shows the percentage mercury contributed by raw materials comparing the September 2004 PDP to the January 2012 Mesabi Nugget Facility.

Table 2-2 Percentage Mercury Contribution by Source, PDP vs. Facility

Source of Mercury Emissions	September 2004 PDP	January 2012 Facility
Concentrate	2.8%	1.4%
Reductant Coal	37.6%	11.3%
Flux 1	0.2%	0.6%
Flux 2	0.1%	<0.1%
Binder	<0.1%	<0.1%
Flux 3	8.5%	56.9%
Hearth Coal	50.8%	29.8%
Total	100.0%	100.0%

3.0 Recent Technical Advancements

3.1 Taconite Mercury Reduction Research

The Minnesota Statewide Mercury Total Maximum Daily Load (TMDL) was approved by Environmental Protection Agency (EPA) on March 27, 2007 (reference (2)). The goal of the TMDL is to reduce mercury concentrations in Minnesota’s impaired waters. Atmospheric deposition accounts for 99% of the mercury load to Minnesota’s impaired waters. The atmospheric deposition contribution from anthropogenic sources within the state is approximately 10%, with the other 90% coming from sources outside Minnesota.

The Minnesota Taconite Mercury Control Advisory Committee (MTMCAC), a group of industry, state, and academic technical experts, was formed in 2009 (before Mesabi Nugget was operational) to help the taconite industry achieve a 71% reduction in industry-wide stack gas mercury emissions by 2025 in order to meet the goals of the TMDL. As part of Phase I, six studies were conducted from 2010-2012 to identify potential mercury capture technologies capable of reducing mercury emissions by 71% in existing taconite processing plants.

Phase II of this research is currently being conducted at five taconite processing plants using gas-phase brominated sorbent injection. The goal of this testing is to identify practical, feasible and cost effective technologies that will not interfere with pellet quality or create additional complex waste streams. The taconite industry hopes to learn how furnace, fuel, binder and scrubber types may influence results as well as the potential operational and capital costs.

3.1.1 Phase I Research Performed

Two of the studies tested direct injection of powdered activated and brominated carbon into process gas streams upstream from existing wet scrubbers. A third study evaluated the capability of several carbon-based sorbents to remove mercury in gases from active processing plant wet scrubbers. A fourth study used powdered activated and brominated carbon sorbents and a baghouse as a post wet-scrubber polishing process to remove mercury. A fifth study added carbon and brominated carbon to “greenballs" and heated them in a laboratory setting to determine if this method could increase oxidation and capture of mercury in process gases and wet scrubbers, respectively. A sixth study, also performed in the laboratory, evaluated the corrosive effects of bromide on grate materials used in taconite processing plants.

3.1.2 Phase I Research Results

Of the methods considered, direct carbon injection, fixed bed reactors, and post-scrubber baghouses were all found to have the potential to control mercury at levels needed for the taconite industry to achieve its 71% reduction goal. Direct injection of activated and brominated carbons into process gas streams is considered to be the least expensive of these methods; however, precise cost estimates for application of these technologies for taconite furnaces have not been determined. Future mercury control research efforts will further evaluate technical and economic feasibility of using tested technology to control mercury emissions from Minnesota's taconite industry. A summary of the results of this research work can be found at:
http://files.dnr.state.mn.us/lands_minerals/reclamation/berndt_2012_final.pdf

3.1.3 Applicability to Mesabi Nugget

The applicability of MTMCAC research to Mesabi Nugget varies between the six studies. Mesabi Nugget is not a taconite facility and has a very different furnace with very different chemical reactions. The mercury speciation of Mesabi Nugget's emissions differ from the taconite facilities that participated in the MTMCAC research study; therefore, the relative removal efficiency of elemental phase mercury is the only marginally applicable portion of the six studies. The offgas streams, processing steps, temperature and gas compositions are largely different between taconite facilities and Mesabi Nugget; therefore, removal efficiency comparisons are difficult if not impossible to predict accurately.

3.2 Potential Changes and Technologies

3.2.1 Reductant Alternatives

3.2.1.1 Reductant Switching

3.2.1.1.1 Lower-Mercury Coal

Lower-mercury coal is practical only if other coal properties, such as sulfur content and volatility, are acceptable and the coal can be secured economically. The ITmk3 technology is complex and still early in development; therefore, changing coal characteristics could negatively affect process performance. Mesabi Nugget's research of commercially available coal, such as high volatile coal, requires additional coal usage to achieve the same amount of carbon and could negatively impact the process by compromising iron nugget quality. Although difficult to evaluate at this time due to ongoing process development efforts, Mesabi Nugget is willing to conduct trials of lower-mercury coal within the ITmk3 Rotary Hearth Furnace if lower-mercury sources with promising reductant properties can be identified (reference (3), reference (4)).

3.2.1.1.2 Biomass

Biomass as a reductant requires significant process and handling modifications but may hold some promise as a means of providing the necessary chemistry to the process while lowering mercury inputs. Although difficult to evaluate at this time due to ongoing process development efforts, Mesabi Nugget is willing to conduct trials of biomass within the ITmk3 Rotary Hearth Furnace if lower-mercury sources with promising reductant properties can be identified (reference (5)).

3.2.1.1.3 Commercial Natural Gas

Mesabi Nugget currently uses natural gas as the base case heating source for the RHF, and for startup of the pellet dryer. However, to function properly, a carbon-based reductant must be used as the reductant for the process. Therefore, replacing the current reductant source with natural gas is technically infeasible (reference (6)).

3.2.1.1.4 Synthetic Gas (Cleaned)

Using an alternative base case fuel such as synthetic gas assumes the gas is "cleaned" and mercury content is similar to natural gas. As with natural gas, synthetic gas cannot be used as the reductant. Mesabi Nugget would consider the use of synthetic gas for heating the RHF if a source becomes available and is technically and economically feasible, although the overall mercury reduction, if any, would not be significant since the mercury content is similar to the current natural gas supply, and the mercury contribution of natural gas is small compared to other sources (reference (6)). Therefore, replacing the current reductant with synthetic gas is technically infeasible.

3.2.1.2 Reductant Blending

3.2.1.2.1 Coal/biomass/tire-derived fuel/pet coke/gas/oil

The reductant coal could potentially be blended with alternative carbon sources, such as biomass, tire-derived fuel, pet coke, gas or oil. However, the ITmk3 technology is complex and still early in development; therefore, changing the reductant source could negatively affect process performance. Reductant blending remains technologically feasible if the reductant contains other carbon sources, the properties (sulfur content, ash, and higher heating value, etc.) remain acceptable and long term contracts and material can be secured. The biomass, oil, and tire derived fuels are untested. Reductant blending alternatives are not currently recommended by this plan but can be evaluated after the process is stable (reference (6)).

3.2.1.3 Reductant Cleaning

3.2.1.3.1 Conventional Reductant Cleaning (physical, chemical, biological)

Coal cleaning is an option for removing mercury from the coal prior to use. Physical cleaning methods are most effective for removing trace elements associated with major inorganic elements and are largely ineffective for those that have strong organic affinities. Although mercury is thought to have strong inorganic association in most coals, the mercury removal efficiencies reported for physical cleaning have varied widely. This option is considered technically feasible, but due to the uncertainty of the mercury removal performance of the technology, this option is less attractive when compared to other reductant alternative options; therefore, this option is not currently recommended by this plan but may be pursued pending future developments (reference (6)).

3.2.1.3.2 Advanced Reductant Cleaning

Advanced coal preparation processes can remove marginally more mercury than conventional cleaning. Froth flotation, selective agglomeration, advanced cyclone designs, and several chemical methods are being investigated by researchers (reference (6)).

However, the small potential additional mercury removal in relation to the significantly higher additional treatment cost appears to make the economics unfavorable for wide applicability at this time; therefore, this undeveloped technology is not presently being pursued further.

3.2.2 Control Technology Systems

3.2.2.1 Wet Lime or Wet Limestone Scrubber

Mesabi Nugget currently operates a wet scrubber without the direct addition of limestone, although lime is present within the scrubber water because it is used for pH and acid gas control within the Wastewater Treatment Facility. The existing wet scrubber controls emissions of particulate matter, sulfur dioxide, acid gases, and inorganic hazardous air pollutants, including oxidized forms of mercury.

3.2.2.2 Dry Flue Gas Desulfurization (FGD)

Dry FGD removes primarily the soluble (oxidized) mercury and performs best with eastern bituminous coal. Dry FGD systems also remove mercury that is associated with particulate. The primary form of mercury emitted from the Mesabi Nugget RHF is elemental mercury. Therefore, dry FGD is technically feasible, but is not efficient due to RHF mercury speciation and is much less efficient than the existing wet scrubber (reference (3)). This technology is not recommended by this plan.

3.2.2.3 Dry System – Electrostatic Precipitator or Fabric Filter

With some exceptions, dry emission control systems primarily remove mercury associated with particles. There is a distinct difference in mercury removal between cold-side systems (e.g., cold-side electrostatic precipitator or fabric filter) and hot-side systems and fabric filter material, such as Gore-Tex Filter Bags or similar bags (reference (7)).. Very little particle bound mercury is removed by a hot-side electrostatic precipitator because particle-bound mercury is not present at high temperatures, while virtually all particle-bound mercury is removed by a cold-side electrostatic precipitator or fabric filter. With respect to the effect of stack gas temperature on mercury removal, indications are that the threshold temperature for enhanced mercury removal is in the range of 300°F or less. A dry system is technically feasible, but is not efficient for the iron nugget process due to high operating temperatures, low particle-bound mercury emissions, and this technology would not provide a noticeable increase in particle removal compared to the current wet scrubber (reference (6)). This technology is not recommended by this plan.

3.2.2.4 Wet System – Wet Scrubber or Wet Electrostatic Precipitator

Mesabi Nugget currently operates a wet scrubber. It is technically feasible to combine the existing wet scrubber operation with a wet electrostatic precipitator. A wet electrostatic precipitator aids in removal of particulate-bound mercury where the majority of the mercury emitted is oxidized. Given the already low emissions of particulate-bound mercury and the wet electrostatic precipitator's lack of control of elemental mercury, operating the existing wet scrubber in combination with a wet electrostatic precipitator is considered not efficient and is not recommended by this plan.

3.2.2.5 Gore Mercury Control System

The Gore Mercury Control (GMC) System consists of multiple fixed-bed sorbent modules located after the wet scrubber (reference (8)). The modules are placed within dedicated housing directly in the flue gas. The sorbent material, Sorbent Polymer Composite (SPC), developed by W.L. Gore & Associates, reportedly has a high capacity for mercury capture, is insensitive to mercury speciation, and does not require regeneration. SPC reduces re-emission of mercury from the modules by oxidizing the absorbed mercury and preventing re-entrainment. Acid gas present in the flue stream condenses on the outer surfaces of the SPC and provides a sulfur dioxide emission reduction co-benefit. Sorbent modules are gradually used up and must be disposed of and replaced with new modules. This technology is considered technically feasible for iron nugget production.

3.2.2.6 Selective Catalytic Reduction

Selective catalytic reduction (SCR) can have a limited co-benefit when added to a process; in addition to NO_X control, it can assist in converting some elemental mercury to oxidized mercury. SCR operates effectively within a flue gas temperature range of 480°F to 800°F (reference (9)). SCR is technically infeasible for the iron nugget process due to the RHF's high temperatures, and the presences of sulfides within the gas stream leading to the formation of ammonium sulfide, which would cause corrosion with the process equipment. Also, SCR has not been studied for its effectiveness on mercury removal. This technology is not recommended by this plan.

3.2.2.7 Selective Non-Catalytic Reduction

Selective non-catalytic reduction (SNCR) may have a limited co-benefit of additional mercury removal of particle bound mercury, but does not have a measureable impact on mercury oxidation (reference (10)). SNCR was tested by Mesabi Nugget pursuant to the permits terms, and found not to be efficient for NOx control due to low NOx inlet concentrations. Therefore, this technology is not efficient due to the low particle-bound mercury, and the lack of mercury oxidation would not increase the efficiency of the current wet scrubber operation. This technology is not recommended by this plan.

3.2.2.8 Sorbents

Sorbent injection technologies introduce a sorbent into the process exhaust gas stream to capture or enhance the mercury removal. The sorbent adsorbs gas phase mercury and is later captured, with the mercury, downstream in a particulate control device.

3.2.2.8.1 Activated Carbon Injection

Activated carbon injection (ACI) can be used either by injecting before the wet scrubber, where the powdered activated carbon is removed during normal wet scrubber operation, or injected after the wet scrubber which requires additional particulate matter control equipment. The MTMCAC research demonstrated some effectiveness of ACI technology in the taconite industry. This technology is considered technically feasible, though the MTMCAC research has shown ACI's sensitivity to temperature, residence time, and other factors (reference (11)). As stated previously, the temperature and composition of Mesabi Nugget's offgas differ significantly from taconite facilities; therefore, conclusions from MTMCAC research are only marginally applicable. This technology was tested by Mesabi Nugget at pilot-scale, using high temperature brominated powdered activated carbon (HPAC). Results are presented in Section 4.2.2.

3.2.2.8.2 Chem Mod™

Chem-Mod™ is a dual injection sorbent system that uses a liquid agent and solid sorbent injection (reference (12)). The liquid agent oxidizes the mercury and adsorbs the mercury to the surface of the non-carbon based sorbent creating a nearly non-leachable compound. For use in coal-fired power plants, the liquid agent is introduced in the boiler and the solid sorbent is injected into the duct and removed at the wet scrubber. Sulfur dioxide and nitrogen oxide removal are potential co-benefits of the system. This technology is considered not technically feasible because it has never been applied to a similar operation, and in any event mimics elements of other control systems like $CaBr_2$and sorbent injection and would be significantly more expensive than those other technologies. This technology is not recommended by this plan.

3.3 Other Technologies Not Commercially Available

Several technologies that are considered to be emerging (pilot-scale demonstrations) or research and development (bench-scale testing), but are not considered to be commercially available technologies, are summarized in Table 3-1. Since these technologies are not commercially available, they cannot be implemented by Mesabi Nugget to reduce mercury emissions. Brief descriptions of each of the potential technologies are provided in Appendix C.

Table 3-1 Technology Not Commercially Available

Status	Name	Technology
Emerging Technologies/Pilot Demonstration	Multi-pollutant control	Electro-Catalytic Oxidation (Powerspan Corp)
		J-POWER ReACT System
		Enviroscrub / Pahlman
		Airborne Process
		APTECH Technology
	Sorbent bed/filter	Carbon fixed bed
		Gold honeycomb ("MerCAP")
	Sorbent injection	Limestone-and Trona-based SO_2 and Mercury Control
		Amended silicates
		TOXECON (Hg/NOx/SOx sorbent injection with baghouse)
		TOXECON II (Hg/NOx/SOx sorbent injection with ESP)
		Dry Pahlman™ Process NOx/SOx/Hg/$PM_{2.5}$/HCl/H_2S scrubbing technology
		Calcium-based and clay-based
	Process modification	Flue gas cooling prior to ESP capture (CONSOL Energy)
	Particulate control	Plasma-enhanced electrostatic precipitation (PEESP)
	Oxidizing agents	Coal additive
		Pellet additive
Research & Development	Enhancing existing systems	Photochemical oxidation (PCO)
	Adsorption R&D	Sodium-based, Metal oxide-based, Iodine impregnated, Sulfur impregnated
		Novel mercury sorbent
		Titanium-based nanostructured sorbent agglomerate
		Solid selenium filter

3.4 Process Modifications

3.4.1 Combustion Optimization

3.4.1.1 Overfire Air and Coal Reburn

Overfire air and reburn are techniques used typically for NO_X control, but they can also have the co-benefit of increased mercury removal by conventional control equipment when coal is used as a fuel. These techniques are commercially available within other industries, but coal is consumed as a raw material within the Mesabi Nugget RHF; therefore, both techniques are not feasible for RHF operation.

4.0 Results of Mercury Testing

4.1 Normal Operation Testing Results

Stack tests have been conducted on three occasions since the RHF began operations: January 2012, December 2012, and March 2013. Table 4-1 summarizes the results of mercury air emission stack testing conducted in 2012 and 2013.

4.1.1 January 2012

Pace Analytical tested the RHF for mercury on January 24, 2012 (reference (13)). Three runs were performed using EPA Method 29. The average emission rate was found to be 0.019 lb/hr. Mesabi Nugget's annualized mercury emissions remained under 75 lb/yr throughout operation despite process instabilities (Figure 1). Detailed test results can be found in the report submitted to the state.

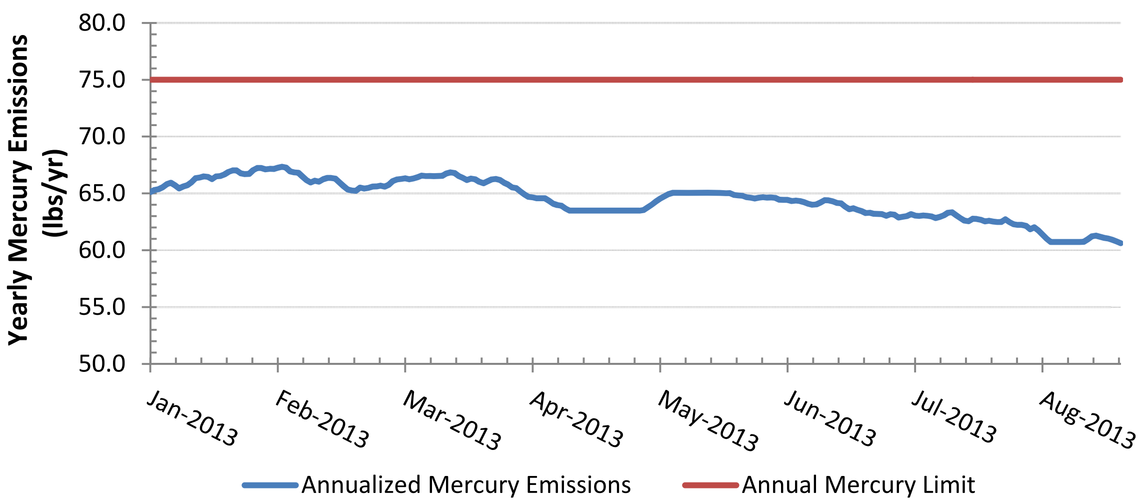

Figure 1 2013 Annualized Mercury Emissions

4.1.2 December 2012

Barr Engineering (Barr) tested the RHF for mercury on December 18, 2012 (reference (14)). Three runs were performed using EPA Method 30B (Method 30B). The average emission rate was found to be 0.024 lb/hr but, again, annualized emissions remained below 75 lb/year. Detailed test results can be found in the report submitted to the state.

4.1.3 March 2013

Barr tested the RHF for mercury on March 20, 2013, while operating with the new lower mercury Flux 3 raw material (reference (15)). Three runs were performed using Method 30B. The average emission rate was found to be 0.011 lb/hr, for a reduction of over 50%. Detailed test results can be found in the report submitted to the state.

Table 4-1 Mercury Test Results Summary

	January 2012(1)	December 2012(2)	March 2013(3)
Concentration, µg/dscm	14.9	21.8	10.3
Emission Rate, lb/hr	0.019	0.024	0.011

(1) reference (13)
(2) reference (14)
(3) reference (15))

4.1.4 Facility Mercury Air Emissions: Comparison of Mass Balances with Method 30 B Test Results

When comparing the results of the stack tests to the results of the updated mercury mass balances, the stack tests report higher mercury emissions than are calculated by the updated mass balances (Table 4-2). As Mesabi Nugget's process does not generate mercury, this observation among others has caused Mesabi Nugget to question the accuracy of the stack testing results. The low concentration of mercury that is present in the stack gas, the field blank preparation methodology, the very small sample size (much less than one millionth of the total stream), and the very small quantity of contamination that can affect the result, make an accurate analysis associated with method 30B extremely difficult. Mesabi Nugget continues to investigate whether it is possible to increase the quality of the data generated by Method 30B, but feels that regular sampling of process inputs supports the use of a mercury mass balance as being more representative of actual facility mercury emissions than stack testing results.

Table 4-2 Mass Balance and Method 30B Comparison

Calculation Method	Emission Point	Mercury Emissions, lb/hr	
		January 2012[1]	December 2012[2]
Mass Balance	In - Solids	0.0117	0.014
	Out -Solids	0.009	0.0002
	Out -Water	Not Measured (Assume 0.0028)	0.0028
	Out – Stack	0.008	0.0075
Method 30B	Out - Stack	0.019	0.024

*(Out – Stack)= (In – Solids) – (Out - Solids) – (Out – Water)
(1) reference (13)
(2) reference (14)

4.2 Mercury Reduction Study Testing Results

4.2.1 Testing with Calcium Bromide ($CaBr_2$) Addition

Mesabi Nugget investigated the mercury reduction effectiveness of injecting Calcium Bromide ($CaBr_2$) into the RHF. $CaBr_2$ was injected into one of the hearth coal feed screws prior to consumption in the furnace. Four test runs were performed. The first established the baseline, with no $CaBr_2$ injection, and then three different injection concentrations were tested: 500 $\frac{\text{lb CaBr}_2}{\text{lb Hg}}$, 1500 $\frac{\text{lb CaBr}_2}{\text{lb Hg}}$ and 2000 $\frac{\text{lb CaBr}_2}{\text{lb Hg}}$. The vendor, ADA Carbon Solutions (ADA), used a real-time continuous mercury monitor (CMM) from Thermo Scientific to record mercury concentrations throughout the testing. The mercury monitor was located on the outlet of the South RHF scrubber. The RHF operation rate changed from 90 tons/hr to 87.5 tons/hr during testing at 1500 $\frac{\text{lb CaBr}_2}{\text{lb Hg}}$, and remained at 87.5 tons/hr during testing at 2000 $\frac{\text{lb CaBr}_2}{\text{lb Hg}}$. A summary of the $CaBr_2$ injection testing results is presented in Table 4-3, and the detailed test results can be found in the ADA report located in Appendix D.

Table 4-3 $CaBr_2$ Injection Testing Results Summary

Time Period	$CaBr_2$ Injection Concentration $(\frac{lb\ CaBr_2}{lb\ Hg})$	CMM Mercury Results (µg/wscm)	Mercury Removal Percentage
07:00-08:30	0 (Baseline)	11.34	- (Baseline)
12:00-13:30	500	8.82	22.2%
15:30-17:00	1500	7.36	35.1%
18:00-19:15	2000	7.32	35.4%

During the ADA $CaBr_2$ injection, Barr conducted mercury testing using Method 30B to compare Method 30B results with the CMM results. Four 30-minute test runs were performed within the ADA testing windows. The four 30-minute test runs do not coincide with the $CaBr_2$ injection periods because the Method 30B testing was not performed to determine mercury removal efficiency due to $CaBr_2$ injection. The concentrations from the Method 30B test runs and the CMM data collected during those 30 minute windows are summarized in Table 4-4. The CMM one-minute data was averaged for the time periods of the Method 30B sampling. Method 30B results are corrected from dry to wet assuming moisture saturation at the recorded stack temperature. Reference (15) includes detailed test information, results, and supporting data.

Table 4-4 $CaBr_2$ Injection Testing; Comparison of CMM Results and Method 30B Results

	Run 1	Run 2	Run 3	Run 4	Average
Sample time	13:02-13:32	15:09-15:39	15:57-16:27	18:14-18:44	---
CMM, µg/wscm	8.1	7.6	7.0	7.4	7.5
Method 30B, µg/wscm	6.3	5.3	4.5	5.8	5.5

Reference (15)

4.2.2 Testing with HPAC Injection

Mesabi Nugget investigated the mercury reduction effectiveness of injecting high temperature brominated powdered activated carbon (HPAC). HPAC was injected into the inlet of the south air preheater. Four test runs were performed. The first established the baseline, with no HPAC injection, and then three different injection rates were tested: 36 lb/hr, 90 lb/hr and 212 lb/hr. ADA used the CMM to record mercury concentrations throughout the testing. The RHF throughput was at 75 tons/hr during testing at injection rates of 0 lb/hr, 36 lb/hr, and 90 lb/hr. Due to process issues, the RHF throughput rate dropped from 75 tons/hr to 45 tons/hr during testing at the injection rate of

212 lb/hr. A summary of the HPAC injection testing results is presented in Table 4-5, and the detailed test results can be found in the ADA report located in Appendix D.

Table 4-5 HPAC Injection Testing Results Summary

Time Period	HPAC Injection Rate (lb/hr)	CMM Mercury Concentration (µg/wscm)	Mercury Removal Percentage
09:00-10:05	0 (Baseline)	12.00	- (Baseline)
10:20-11:10	36	11.26	6.2%
13:15-14:40	90	10.49	12.6%
15:23-16:15	212	8.64	28.0%

During the ADA HPAC injection, Barr conducted mercury testing using Method 30B to compare Method 30B results with the CMM results. Four 30-minute Method 30B test runs were performed, although, the four 30-minute test runs do not coincide with the HPAC injection periods because the Method 30B testing was not performed to determine mercury removal efficiency due to HPAC injection. The concentrations from the Method 30B tests and the CMM data are summarized in Table 4-6. The CMM one-minute data was averaged for the time periods of the Method 30B sampling. Method 30B results are corrected from dry to wet assuming moisture saturation at the recorded stack temperature. Reference (15) includes detailed test information, results, and supporting data.

Table 4-6 HPAC Injection Testing: Comparison of CMM Results and Method 30B Results

	Run 1	Run 2	Run 3	Run 4	Average
Sample Time	12:30-13:00	13:10-13:40	14:15-14:45	16:30-17:00	---
CMM, µg/wscm	11.3	10.4	10.5	7.9	10.0
Method 30B, µg/wscm	8.6	6.6	7.1	5.1	6.8

Reference (15)

4.2.3 Testing with GMC System

Mesabi Nugget investigated the mercury reduction potential using the GMC system on a slip stream of the RHF exhaust. The GMC system was temporarily installed downstream of pollution control equipment on the RHF exhaust duct. Barr collected Method 30B samples from the inlet and outlet of the GMC system to determine mercury removal. One data set was collected from the inlet and the outlet with the results displayed in Table 4-7. The RHF throughput was at 130 tons/hr. Volumetric airflow rates measured at the inlet and outlet were used with Method 30B concentrations to determine mercury mass loading rates. Mercury removal is calculated using the mass rates of mercury. Air infiltration into the unit resulted in an increase in volumetric flow rate. The effect on the results will be investigated in the future. A malfunction of the GMC system air handling fan prevented additional test runs. Reference (16) includes detailed test information, results, and supporting data (reference (16)). Additional testing should be performed to further evaluate the effectiveness of the GMC system.

Table 4-7 GMC System Testing Results; Method 30B

GORE Mercury Control System	INLET	OUTLET	Mercury Removal, %
Sample time	1658-1728	1738-1808	---
Method 30B, µg /dscm	10.41	1.72	---
Volumetric Airflow Rate, dscfm	810	1,280	---
Hg, lb/hr	$3.2 \cdot 10^{-5}$	$8.2 \cdot 10^{-6}$	74

5.0 Mercury Reduction Options Analysis

5.1 Raw Material Change

The permit requirement for the Mercury Reduction Efforts states that this plan must:

> *2) Identify options targeting a reduction, from the baseline determined after initial startup, of at least fifty percent of the annual mercury emissions from the rotary hearth furnace (RHF)."* (reference *(1)*)

Baseline emissions after startup are defined by the January 2012 (reference (13)) and December 2012 (reference (14)) performance tests. In both the January and December 2012 performance tests Flux 3, which was also utilized in the PDP and was found to contain more mercury than anticipated, was used in forming the green balls processed in both these tests. Consistent with the permit's language, Mesabi Nugget has taken the baseline to be the average of the January and December 2012 performance tests. This is shown in Table 5-1.

Table 5-1 Baseline RHF Mercury Air Emissions

Performance Test	Average Mercury Emissions (lb/hr)
January 2012[1]	0.019
December 2012[2]	0.024
Average, baseline	0.022

(1) reference (13)
(2) reference (14)

Mesabi Nugget changed its Flux 3 supplier to obtain Flux 3 materials which are lower in mercury than the Flux 3 used in the January 2012 and December 2012 tests. Another performance test was conducted in March 2013 with the new, lower mercury Flux 3 material. This test shows that the change in Flux 3 material resulted in a marked reduction (e.g. > 50%) of mercury emissions from the RHF (Table 5-2).

Table 5-2 Lower Mercury Flux 3: RHF Mercury Emissions

Test	Average Mercury Emissions (lb/hr)
March 2013 (new flux)[1]	0.011
Percent Reduction	50%

(1) reference (15)

Mesabi Nugget certainly recognizes the permit's goal for further mercury reduction and is fully committed to taking additional steps beyond the change to lower-mercury Flux 3. Development of the ITmk3 process continues to be difficult and time consuming, but serious progress is being made over the past few months. As shown in Figure 2, Mesabi Nugget's hard work has recently resulted in the process reaching stable feed rates approaching design capability and acceptable plant availability levels. These recent breakthroughs will allow the plant to further refine the mercury reduction technology options and determine if additional raw material changes can in fact be implemented.

This figure contained confidential business information, meeting the definition in Minn. Stat. 13.37 Subd. 1(b) and 40 CFR 2.201(c), and has been redacted in accordance with Minn. Stat. 116.075 Subp. 2 and 40 CFR 2.203(b).

Figure 2 Redacted - Mesabi Nugget RHF Monthly Production, January 2010 to July 2013

Due to the percentage contribution from reductant coal and the hearth coal following the Flux 3 change, and the development of the ITmk3 process to a point where alternative reductants can be considered, Mesabi Nugget plans to investigate whether alternative hearth coal and reductants can be economically obtained, and to conduct trials to determine the technical feasibility of using alternative coal. These trials would address the lower-mercury coal and biomass alternatives discussed in Section 3.2.1.

5.2 Additional Control Devices

The permit requires that additional control devices be investigated:

> *"3) Evaluate the effectiveness of, at a minimum, the following options:*
>
> > *…b) Installing additional control devices to the flue gas cleanup process, including the use of sorbent injection or the modification of existing control devices."* (reference *(1)*)

Mesabi Nugget tested activated carbon (HPAC) injection, and this treatment resulted in preliminary reductions in mercury of up to 28% (Section 4.2.2 and Appendix B).

Mesabi Nugget had used the same contractor, the same testing skid, and the same type of activated carbon as the work conducted at the taconite furnaces (reference (17)). While the taconite furnaces were able to obtain nearly 90% removal (at a carbon injection rate of 210 lb/hr), Mesabi Nugget was only able to obtain a preliminary 28% removal rate at similar injection rate (212 lb/hr).The reduced effectiveness may be attributable to the design and operational differences between a taconite facility and the RHF. Nevertheless, Mesabi Nugget intends to continue testing HPAC injection in September 2013.

The GMC test module provided the most encouraging preliminary results (Section4.2.3) other than Flux 3; therefore Mesabi Nugget intends to continue testing as early as September, 2013, to investigate whether the GMC system can be economically and technically feasible at full-scale operation.

5.3 Improve Existing Technology Performance

The permit also requires that Mesabi Nugget investigate improvements to the existing control technology on the RHF:

> *"3) Evaluate the effectiveness of, at a minimum, the following options:*
>
> > *…c) Enhancing the existing flue gas cleanup process to remove mercury through process modifications or chemical addition to the furnace or flue gas.* (reference *(1)*)

Mesabi Nugget has submitted a Scrubber Optimization Work Plan and a Selective Non-Catalytic Reduction (SNCR) Report to the agency and agency review is pending. However, it is unlikely that SNCR (or any other NOx control technology) will result in meaningful reduction in mercury emissions. Because the overwhelming majority of mercury is in the elemental form, it is unlikely that further optimization of the scrubber will result in any meaningful reduction in mercury emissions.

Mesabi Nugget investigated the injection of calcium bromide into the furnace. This treatment resulted in reductions in mercury of up to 35% (Section 4.2.1 and Appendix C). This chemical addition to the furnace holds some promise but has shown lower than expected mercury removal percentages to date.

Mesabi Nugget intends to continue to investigate the use of $CaBr_2$ to assess whether its mercury removal effectiveness can be improved.

5.4 Process Modifications

There are no other identified modifications to the ITMk3 technology to reduce mercury emissions. As noted above and in Section 6.0, Mesabi Nugget intends to investigate other raw materials to determine if lower mercury materials can reduce emissions, while providing the needed metallurgical properties.

6.0 Recommendations

The permit calls for Mesabi Nugget's plan to recommend three options from the discussion of changes to raw materials, installation of additional control devices, and enhancement of flue gas cleanup processes.

6.1 Raw Material Changes

Changes to a lower mercury Flux 3 reduced mercury emissions by 50% from baseline emissions and proved to be an effective change to raw materials. Mesabi Nugget intends to continue to use the lower mercury Flux 3, and to require suppliers to demonstrate that the material continues to be low mercury. Mesabi Nugget recommends that this option be pursued.

Mesabi Nugget also intends to test other coals and/or biomass to determine whether substituting these raw materials can provide further incremental reductions in mercury emissions.

6.2 HPAC or $CaBr_2$ Injection

On a preliminary basis, injection of HPAC reduced mercury by up to 28% and injection of $CaBr_2$ reduced mercury by up to 35%, as measured by the CMM employed by ADA. These reductions may be overestimated because the RHF was operating at a lower rate of production due to process issues at the time.

Mesabi Nugget intends to test again in September 2013 to determine whether activated carbon or calcium bromide injections can achieve a greater reduction in mercury emissions.

6.3 GMC System

The GMC system, on the basis of one test, reduced mercury by 74%. While encouraging, Mesabi Nugget intends to conduct additional testing as early as September 2013 to demonstrate whether this result is reproducible and sustainable.

7.0 Implementation Schedule

The permit calls for Mesabi Nugget to present a schedule for testing the recommended options for further implementation, for installing equipment, and for shakedown. The permit also contemplates additional data gathering and engineering testing of the chosen option(s), with a performance test taking place within 60 to 180 days after final implementation.

7.1 Raw Material Changes

7.1.1 Flux 3

After working hard to locate and procure a long-term supply and test its effectiveness, Mesabi Nugget will continue to use the lower mercury Flux 3. This change that resulted in a proven 50% reduction in mercury emissions is already implemented.

7.1.2 Alternative Reductants

Mesabi Nugget also intends to trial potentially lower-mercury coals and biomass as alternative reductants. The proposed schedule for such trials is attached in Figure 3. Similar to other schedules MPCA has applied to the Mesabi Nugget facility and to allow for downtime of this still-developing technology, this schedule uses a production level (complete planned trials before 200,000 metric tons of production following submittal of this plan) to set the various implementation timeframes. A production level milestone allows sufficient time for these recommended options to be evaluated since the process must be up and running steadily in order for such trials to occur. Of course, no mercury is being emitted during periods of downtime.

7.2 HPAC or CaBr2 Injection

7.2.1 HPAC Injection

Additional pilot scale testing of HPAC injection will be conducted before the 200,000 ton production milestone to determine if different conditions can feasibly provide additional mercury removal. The proposed schedule is attached in Appendix A, Figure 3.

7.2.2 $CaBr_2$ Injection

Additional pilot scale testing of $CaBr_2$ Injection will be conducted before the 200,000 ton production milestone to determine if different conditions can feasibly provide additional mercury removal. The proposed schedule is attached in Appendix A, Figure 3.

7.3 GMC System

Additional testing of the GMC system appears warranted. Mesabi Nugget will conduct additional evaluation of the GMC system during the next 200,000 tons of production, starting from this report submittal date to confirm the feasibility and viability of the technology for long-term use. The proposed schedule is attached in Appendix A, Figure 3.

7.4 Select Control System

Upon reaching the 200,000 ton production milestone, Mesabi Nugget will submit the additional results from the refined testing of these mercury reduction efforts

7.5 MPCA Approval of Control System

Within 365 days following Minnesota Pollution Control Agency (MPCA) approval of the proposed control system, Mesabi Nugget will design, procure, and install all necessary mercury control equipment.

7.6 Testing of Approved Control System

Following commissioning and startup of the approved mercury control system, the following items will be addressed.

7.6.1 Development of Test Plan

An appropriate test plan, following MPCA guidelines, will be prepared and will include:

- Name and address of facility
- Permit number and AQ file number
- Contact information for facility including responsible person, phone number, and email address
- All contact information for the testing company
- All contact information for the person conducting the testing
- Test dates
- Test parameters
- Control equipment identification
- Sources to be tested
- Expected process rates
- Reason for testing

7.6.2 Submittal of Test Plan

A test plan will be submitted to the MPCA 30 days prior to test date.

7.6.3 Approval of Test Plan

Testing will not begin until receipt of MPCA approval of the test plan.

7.6.4 Testing

Testing will be performed as described in approved test plan.

7.6.5 Submittal of Test Report

A complete test report will be submitted to the MPCA on or before the 45th day from the last test day.

8.0 References

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15. —. Results of the March 20, 2013 Mercury Emissions Compliance Test on the Rotary Hearth Furnace Exhaust Stack (EU001/SV001) at Mesabi Nugget Delaware, LLC Facility Located in Hoyt Lakes, Minnesota. April 2013.

16. —. *Results of the July 15, 2013 EPA Method 30B Engineering Testing in Support of a Mercury Reduction Study at Mesabi Nugget Delaware, LLC Facility Located in Hoyt Lakes, Minnesota.* Hoyt Lakes, MN : Mesabi Nugget Delaware, LLC, 2013.

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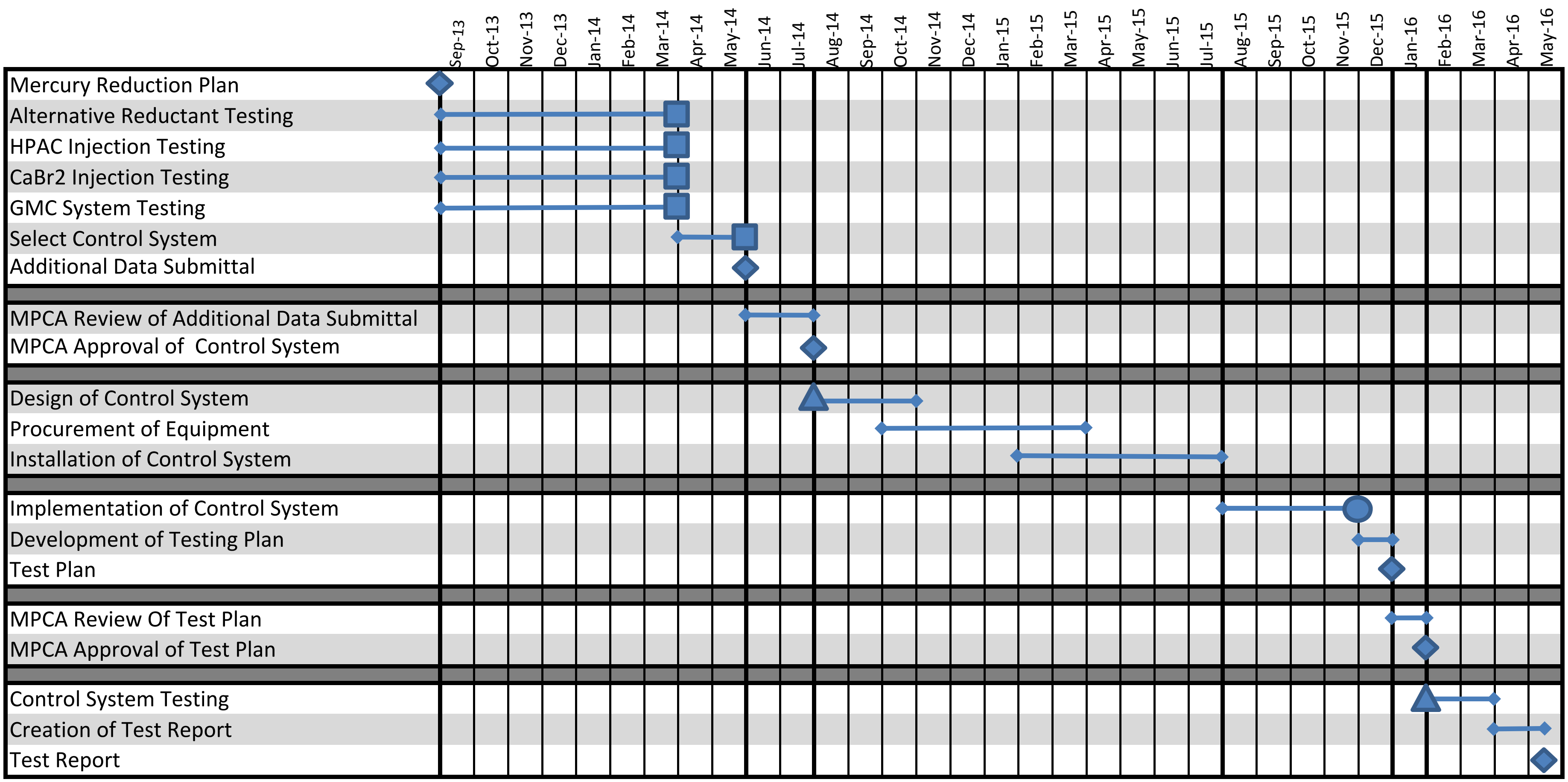
Appendices

Appendix A

Oversized Figures

Figure 3 - Proposed Schedule



Note: Actual start and end dates are variable due to the uncertainty associated with reaching 200,000 ton production milestone.

Key

- ◆ Submitted Deliverable
- ■ Date is dependent upon reaching the 200,000 ton production milestone.
- ▲ Start date is dependent upon MPCA Approval
- ● Control System Final Implementation Date is subject to change

Appendix B

HG-2003 - Assessing Impacts of Mercury Release to Ambient Air

MINNESOTA POLLUTION CONTROL AGENCY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

HG-2003
ASSESSING THE IMPACTS OF MERCURY RELEASES TO AMBIENT AIR

11/24/03

Mesabi Nugget, LLC is proposing to construct a 600,000 metric ton/year iron nugget production facility at the Cliffs Erie site (formerly LTV Taconite) at Hoyt Lakes, Minnesota. The nuggets will be 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.

The following is a description of the proposed facility to aid in understanding the project and permit application. Please see the permit application for a complete description of the project.

The process consists of the following 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 the Northshore taconite facility in Silver Bay, Minnesota, various coals, fluxes and binders. All raw materials are delivered by rail, pneumatic truck, or in bulk supersacks with iron ore concentrate stored in an indoor storage pile or a tank/bin and other raw materials stored in outdoor storage piles and/or storage bins. The coals and fluxes will be pulverized on-site. Air emissions from indoor material transfers and pulverizing will be controlled by baghouses where necessary. Fugitive dust emissions from storage piles, roadways, and material handling by heavy equipment will be controlled by procedures specified in a fugitive dust plan.

Iron Nugget Production and Product Separation

Coals, fluxes, binders and iron ore concentrate will be mixed and formed into green balls (similar to taconite operations). The balls will be dried and fed to a rotary hearth furnace, where they are converted to metallic iron and slag material. The iron and slag are cooled and separated.

Product Handling and Shipping

The iron nuggets will be directly loaded into rail cars or stored in baghouse controlled storage bins for shipment at a later date. The slag will initially be stored in a baghouse controlled storage bin and subsequently trucked over a paved road to a slag storage pile area for shipment at a later date.

Emergency Diesel Generator

An emergency diesel generator may be installed to provide power during disruption of electrical power supply. Hours of operation will be limited to 100 hours per year (emergency generator status), low sulfur diesel fuel (< 0.05 % S), and good combustion practices will be used to control emissions of NO_x, SO2, CO, VOC and PM-10.

Air Emissions

The project will generate air emissions as shown in the table below.

MESABI NUGGET AIR EMISSIONS	Max. Controlled Emissions (tons/yr)
TOTAL VOC EMISSIONS	166.9
TOTAL PM10 EMISSIONS WITH FUGITIVES	513.9
TOTAL FUGITIVE PM10 EMISSIONS (W/O NEW SOURCES)	11.5
TOTAL PM10 (NON-FUGITIVE EMISSIONS + NEW FUGITIVE)	502.4
TOTAL CO EMISSIONS	449.2
TOTAL SO2 EMISSIONS	416.7
TOTAL NOx EMISSIONS	953.6
TOTAL HAP EMISSIONS	95.4
LARGEST SINGLE HAP EMISSIONS (HCl)	19.7

Source: MNC Public Calculations May 2005

Air Pollution Control

CO, VOCs and organic HAPs from the rotary hearth furnace will be controlled by oxidation using an air infiltration system. This system will allow 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 will pass through emission control devices to control sulfur dioxide, acid gases, inorganic HAPs (metallic HAPs and mercury) and particulate matter. A wet scrubber will be used to control these pollutants. RHF Staged Combustion inherent to the process (with Low Excess Air in some zones) and low NOx burners will be used to control NO_x emissions. Particulate matter generated during pellet/product drying, product separation and material handling will be controlled by fabric filters or baghouses. NOx from pellet drying will be controlled by low NOx burners. CO and VOC from pellet drying will be controlled by good combustion practices.

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

Water Supply and Treatment

MNC proposes to use water from an abandoned mine pit (Area 1 pit) for the water supply for process temperature control (contact and non-contact cooling) and for process water (e.g. scrubber water supply). The wastewater generated from the contact cooling water and the process water will be treated prior to return back into the Area 1 Pit. MNC will employ chemical coagulation and precipitation to remove sulfates, fluorides, solids and metals, followed by a microfilter, and an MNC Mercury filter. The treated wastewater will be discharged back into Area 1 Pit. An impermeable barrier will be installed on the east end of Pit 1 to allow for a controlled introduction of Pit 1 water into a second MNC Mercury filter. The discharge from the second MNC mercury filter will be piped for direct discharge through an existing outfall (Cliffs Erie NPDES Permit, SD003) to Second Creek.

Water Treatment Materials

Materials required for water treatment will be 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, totebin, or other suitable containers for each material. It is possible that larger volumes of some materials may be delivered hydraulically by pipeline.

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

Regulatory Analysis
This source is a major new source of PSD pollutants (Prevention of Significant Deterioration). Best Available Control Technology will be installed. See the BACT Report for complete details.

Because the source is a major source of PSD pollutants, air dispersion modeling has been conducted to demonstrate that the National Ambient Air Quality Standards (NAAQS), Minnesota Ambient Air Quality Standards (MAAQS) and PSD increments are protected. See the Class II Modeling Report for complete details.

Additional modeling has been conducted to demonstrate that Air Quality Related Values (AQRVs) are protected in Class I Air Quality Areas – Voyageurs National Park, Boundary Waters Canoe Area Wilderness Area, Isle Royale National Park and Rainbow Lakes Wilderness Area. See the Class I Modeling Report for complete details.

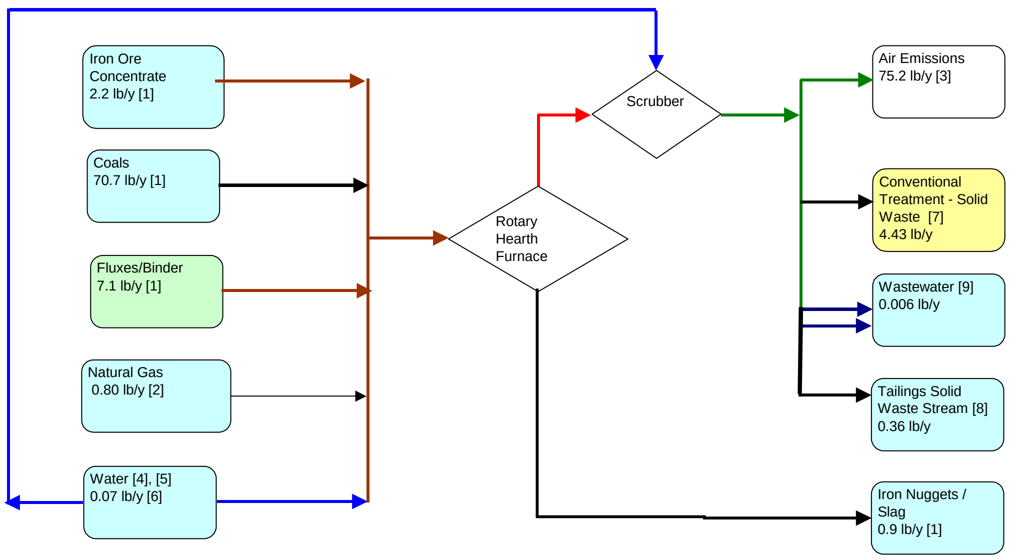
This source is a major new source of Hazardous Air Pollutants (HAPs). Since it does not fall into one of the listed major HAP source categories, a case-by-case Maximum Achievable Control Technology (MACT) Determination is required. MACT controls will be installed. See the MACT Report for complete details.

An Air Emission Risk Analysis (AERA) has been conducted to assess potential incremental inhalation risks. The AERA also includes a screening assessment for pollutants with potential indirect exposure affects through the ingestion of local garden produce, beef, and dairy products. Mesabi Nugget also independently conducted a screening fish pathway assessment for mercury and dioxins/furans. See the AERA Report for complete details.

Figure 1. Mesabi Nugget LLC, Hoyt Lakes, Minnesota Commercial Scale Iron Nugget Production

Mercury Flow Diagram, May, 2005 *(Note: This balance is for reference only.)*

Mercury Flow Diagram
Mesabi Nugget Company
Hoyt Lakes, MN Facility



Total in: 80.9 lb/yr

Total out: 80.9 lb/yr

[1] Per Hg Balance 101004 file, Case 2.1 column, multiply % contribution times total Hg into control device.

[2] Table 1.4-2 AP-42 emissions factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion. From Section 1.4 of report dated July 1998. This value multiplied by amount of NG combustion expected in RHF.

[3] 6% removal at Scrubber. --> 94% of incoming mercury reports to air. (80.9 - 0.9) *.94 = 75.2 lb/yr

[4] Concentration of incoming water from Colby Lake is 7.5 ng/liter per NTS analysis. File dated 060904. Assume water source utilized for PDP is similar to Colby Lake wa

[5] Nominal incoming water supply is 457.3 m3/h per Midrex spreadsheet file dated 100404 line 530. => 457300 l/h = 4006 million liters / yr

[6] Product of [4] times [5] converted from ng to lb. -> 4.54 e 11 ng / lb

[7] Amount of mercury removed by conventional water treatment which includes lime and soda ash softening followed by sulfide precipitation of the mercury. The scrubber removes about 6% of the mercury from the offgas system. The conventional treatment, wastewater, and tailings solids when combined are equivalent to 6% of the offgas stream.

[8] Almost all of the Hg mass will be removed via Hg Filter #1. Assuming 200 ng/l input to Hg #1 and 20 ng/l leaving Hg#1 at a flow rate of 103 m3/hr would be equivalent to a recovery of 0.36 lb/yr of mercury.

water stream

Figure 2. Mesabi Nugget LLC, Hoyt Lakes, Minnesota Commercial Scale Iron Nugget Production

Mercury Mass Balance Summary, August, 2004

In	**lb/year**	**Out**	**lb/year**
Iron Ore Concentrate	2.2	Air Emissions	75.2
Coals	70.7	Conventional Water Treatment – Solid Waste	4.43
Fluxes/Binders	7.1	Wastewater	0.006
Natural Gas	0.8	Tailings Solid Waste	0.36
Water	0.07	Iron Nuggets and Slag	0.9
TOTAL	80.9	**TOTAL**	80.9

Table 1. Emissions associated with a new MNC Commercial Scale Nugget Production Facility at Hoyt Lakes MN

Source Name/Id	potential to emit (pounds per year) (2)(3)				current actual emissions (pounds per year) (4)				future estimated actual emissions (pounds per year) (5)			
	particulate-bound	ionized	elemental	total	particulate-bound	ionized	elemental	total	particulate-bound	Ionized	elemental	total
RHF SV 201 (1)	0.08	0.5	74.5	75				83	0.06	0.4	61.6	62

Notes:

(1) RHF = Rotary Hearth Furnace, Emission Unit ID EU 001. All other emission unit sources are ambient temperature mechanical processing of ore, coal, fluxes, slag or nuggets, which will generate only particulate-bound mercury and which are controlled to BACT and/or MACT standards.

(2) Based on mercury mass balance (see Figures 1 and 2 above).

(3) Speciation per the July, 2004 stack test.

(4) From LTV Steel Mining Company Title V permit application, based on mass balance of taconite operations

(5) Per Hg balance 101004 case 1.2. Speciation scaled based on PTE percentages.

Phase 1 – Feasibility Analysis of Mercury Treatment Alternatives

Appendix A reviews and discusses the technical feasibility of 41 possible methods of mercury emission controls for the proposed Mesabi Nugget iron nugget plant at Hoyt Lakes, Minnesota. The control technologies are classified into three categories of availability according to the assessment of Barr Engineering Co. and these classifications are subject to reconsideration. Table 4-1 in the appendix is a summary of all control methods evaluated in this study, and their technical feasibility.

The report is organized into three sections that follow the classification regarding availability. The first section includes technologies that are commercially available and viable. Section two includes technologies that are emerging or in pilot demonstration mode. Section three covers technologies that are regarded as new research and in early development stages.

This phase summarizes the technical feasibility of each control method and reduces the list of known technologies to those that can be considered applicable to the Mesabi Nugget project. The technologies identified for further consideration are those that will be the subject of a review for economic feasibility.

As shown in Appendix A, several technologies are already included in the design of the iron nugget project. These include:

- Use of commercial natural gas (as a portion of the fuel for the process)
- Conventional coal cleaning (as part of the pulverization process)
- Conventional wet scrubber

As shown in Appendix A, the following technologies may be feasible for the Mesabi Nugget project in Hoyt Lakes, MN:

- **Commercially Available Development Stage**
  - Fuel blending
  - Wet Electrostatic precipitator
  - Fuel switching: lower mercury coal

Phase 2 – Cost Effectiveness of Mercury Treatment Alternatives

This phase addresses the feasibility of each the alternatives discussed above and in Appendix A for the iron nugget process.   Please keep in mind that the iron nugget process, as proposed by Mesabi Nugget, LLC, has only been tested at the pilot scale. As such, not as much is known about process variables and operating conditions as for coal-fired power plants, on which much of the mercury treatment testing has been done. Thus, some technologies which may be feasible for coal-fired power plants and other operations may not be feasible, or it may not be possible to determine feasibility for the iron nugget process.

Using literature values, Mesabi Nugget estimated the mercury removal costs for the two commercially available technologies which were determined to be feasible for the iron nugget process. Note that for the commercial available processes, costs are based on actual costs at power plants and other installations. For those technologies which are in the emerging /pilot plant and research and development stage of development, costs should be considered order of magnitude costs.

Of the alternatives evaluated, the cost per pound of mercury removed by Wet ESP was exorbitant.

Fuel blending might eventually be shown to be a cost effective way to prevent the release of mercury, by using coals or other solid fuels which are lower in mercury than the coals proposed for the project. However, unlike coal fired power plants, the coals in an iron nugget production facility do more than provide heat to form the iron nuggets. The chemical and physical properties along with other factors determine whether the process will work, and whether iron nuggets can be made with the chemical composition suitable for use in mini-mills and other iron and steel works. Once the commercial scale facility is operating, and if the commercial scale facility proves technically and commercially viable, Mesabi Nugget will consider optional coals or other solid fuels which can provide the correct chemistry for the nugget process and meet air and water quality permit limitations.

For the emerging/pilot scale development and research and development stage, it is not possible at this time to determine the amount of mercury removed or the cost per pound to do so.

Table 2-2. Feasible alternative methods to reduce mercury emissions from a new MNC Commercial Scale Nugget Production Facility at Hoyt Lakes MN

Alternative Description	**Development Stage**	**Total Mercury Emitted (lb)**	**Reduction Potential (lb)**	**Annualized Cost ($)**	**Cost Effectiveness ($ per lb Hg)**
Fuel Blending of other coals (1)	Commercially available	71.2	48 [I estimate 33% reduction with lower Hg coal usage]	$ 200,000	$ 8,600
Wet ESP (2)	Commercially available	75	7.5	$4,000,000	$533,000

Notes:

(1) Blending coals will only reduce coal component of mercury inputs. Coal must still be combusted to produce sufficient temperature, correct atmosphere and chemistry to produce nuggets. Practical only if other coal properties (sulfur content, ash, higher heating value, etc.) are acceptable and long term contracts can be secured at acceptable costs. Costs based on coal blending at 25% premium over baseline coals, for logistics of handling multiple coals and/or off-site blending.

(2) Will replace scrubber planned as part of project. Because mercury is more than 99% elemental, wet ESP removal efficiency is likely similar to wet scrubber (<10%, based on July, 2004 stack tests at pilot plant). Costs based on wet ESP.

Appendix A to
Form HG-2003

Analysis of Mercury Control Options
Mesabi Nugget Corporation LLC,
Hoyt Lakes, MN Commercial Scale Plant

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Introduction

This report reviews and discusses the technical feasibility of 41 possible methods of mercury emission controls for Mesabi Nuggets Large Scale Demonstration Project (LSDP) iron nugget plant. The control technologies are classified into three categories of availability according to the assessment of Barr Engineering Co. and these classifications are subject to reconsideration. Section 4 includes a summary of the control technologies identified and evaluated in this report.

The U.S. Department of Energy's Office of Fossil Energy has set two goals for developing improved mercury control technologies: [3]

- A near-term goal to develop mercury controls that can achieve 50 to 70 percent mercury capture at 75 percent or less of the cost of current powdered activated carbon injection (current cost estimates for activated carbon technology are in the range $50,000 to $70,000 per pound of mercury removal). These technologies would be available for commercial demonstration by 2005 for bituminous plants and 2007 for lignite and sub-bituminous coal plants.

- A longer-term goal is to develop advanced mercury control technologies that can achieve 90 percent or greater capture at one-half to three-quarters the cost of existing technologies and that would be available for commercial demonstration by 2010.

An EPRI presentation in January 2004 suggested that multi-pollutant control technologies are three to five years from being commercially available. Individual control technology vendors tend to have more optimistic timelines. A Department of Energy presentation in August 2004 suggested that, while activated carbon injection is in large scale testing now, other contending technologies are one to two years behind. [4]

This report is organized into three sections that classify the availability of technologies. The first section includes technologies that are commercially available and viable. Section two includes technologies that are emerging or in pilot demonstration mode. Section three covers technologies that are regarded as new research and in early development stages.

This phase of the overall mercury control technology review effort summarizes the technical feasibility of each control method and, through the categorization, seeks to reduce the list of known technologies to those that can be considered applicable to the Mesabi Nugget LSDP iron nugget plant. The technologies identified for further consideration are those that will be included in the HG-2003 form for review of economic feasibility.

This report does not elaborate on mercury chemistry during combustion or stack gas reactions. Mercury in coal and ore exists primarily as sulfide compounds, which decompose in the furnace to form vapor phase elemental mercury (Hg°). Flue gas chemistry and conditions subsequently dictate the final speciation of mercury released from the stack. Hg° can react with other flue gas constituents to produce $HgCl_2$, $HgSO_4$, and Hg° (oxidized mercury). Both elemental and oxidized mercury can become particulate bound. The form of mercury present at the point of control is a key factor in designing a control strategy. In broad terms, oxidized and particulate-bound mercury are more easily captured by conventional control technologies than elemental mercury and many study activities are focusing on maximizing the conversion of elemental mercury to oxidized mercury and to increase the particulate-bound mercury fraction. Based on pilot plant studies, over 98% of the mercury in the stack gas of an iron nugget plant is elemental mercury, which is not as susceptible to removal as the other forms (just over 80% of the mercury at the scrubber inlet is in the form of elemental mercury.). Thus, technologies which may be technically and economically feasible for the relatively low temperature, oxidative atmosphere of a coal-fired power plant may not be technically or economically feasible for the relatively high temperature, reducing atmosphere of an iron nugget facility. Further, the Mesabi Nugget LSDP iron nugget plant is the first of its scale and size to be built anywhere in the world. Scaling up from bench and pilot scale projects to a large scale demonstration plant is difficult in and of itself, and adding controls which have not been tested at the pilot scale plant would make the entire project infeasible. Again, unlike an existing coal fired power plant, some technologies may not be technically or economically feasible on a first of its kind LSDP.

1.0 Commercially Available Mercury Control Technologies

1.1 Fuel-Related Alternatives

Reducing mercury emissions from combustion sources may be accomplished by considering the mercury content of the various fuel options. The actual reduction may occur through outright fuel switching, fuel blending or fuel cleaning. This strategy for the ore processing units of the Mesabi Nugget facility addresses the segment of mercury emissions that originate from fuel-born mercury only. Mercury emissions that originate from ores and other additives are not affected by fuel switching.

1.1.1 Fuel Switching

1.1.1.1 Low-Mercury Coal[1,2]

Low-mercury coal is practical only if other coal properties are acceptable and material can be secured at acceptable costs. It is unlikely that a single coal supply will be able to provide the necessary chemistry to form iron nuggets. Although this may seem simple on the surface. The ITmk3 technology is very complex and a host of various coal characteristics can affect the process. Any alternative coals can only be evaluated after the Large Scale Demonstration Plant (LSDP) has shown both technical and economic viability.

1.1.1.2 Biomass[3]

Requires significant process and handling equipment modifications, and is untested at the pilot level. Biomass use in the ITmk3 Rotary Hearth Furnace is not feasible

1.1.1.3 Gas – Commercial Natural Gas[4]

Mesabi Nugget intends to use natural gas as the base case heating source for the RHF, and for startup of the pellet dryer. However, in order for the process to work, coal must be used as part of the process.

1.1.1.4 Gas – Synthetic Gas (Cleaned)[4]

Using an alternative fuel such as synthetic gas assumes the gas is "cleaned" and Hg content is similar to natural gas. MNC would consider the use of synthetic gas to the RHF if a source becomes available and is technically and economically feasible.

1.1.2 Fuel Blending

1.1.2.1 Coal/biomass/tire-derived fuel/pet coke/gas/oil[4]

Fuel blending may be a feasible method of controlling mercury emissions for the MNC project, provided it is limited to mixing coals and/or other carbon sources. The coal / carbon sources properties (sulfur content, ash, and higher heating value, etc.) must be acceptable and long term contracts and material must be secured. The ITmk3 technology is very complex and a host of various coal characteristics can affect the process.

As noted above, biomass has not been tested and will not be feasible, nor will use of oils or tire derived fuel. This technology may be feasible, and will be investigated if the Large Scale Demonstration Plant (LSDP) proves technically and commercially feasible.

1.1.3 Fuel Cleaning

1.1.3.1 Conventional (physical, chemical, biological)[4]

Coal cleaning is an option for removing mercury from the fuel prior to combustion. Approximately 77% of all bituminous coals currently sold are washed, primarily for removal of pyritic sulfur and ash.

However, only 10% to 15% of western coals are cleaned. Physical cleaning methods are most effective for removing trace elements associated with major inorganic elements and are largely ineffective for those that have strong organic affinities. Although mercury is thought to have strong inorganic association in most coals, the Hg removal efficiencies reported for physical cleaning have varied widely. MNC will pulverize the coal prior to use, and to the extent that pyrite removal results in additional mercury removal, MNC intends to remove at least a portion of the pyrite in the pulverizing process.

1.1.3.2 Advanced Fuel Cleaning [4]

Marginally higher mercury reductions can be achieved using advanced coal preparation processes. Froth flotation, selective agglomeration, advanced cyclone designs, and several chemical methods are being investigated by researchers.

However, the small additional Hg removed in relation to the additional treatment cost appears to make the economics unfavorable for wide applicability at this time. Given the already low Hg emissions from the project this technology is not feasible.

1.2 Control Technology Systems

1.2.1 Conventional Scrubber

1.2.1.1 Wet Lime or Wet Limestone scrubber[i]

As demonstrated in the Pilot Demonstration Plant (PDP), the wet scrubber removed a majority of the particle bound and oxidized mercury The proposed LSDP uses a water scrubber to control emissions of particulate matter, sulfur dioxide, acid gases, and inorganic HAPs, including mercury. The LSDP will maintain the alkalinity at suitable levels to enhance oxidized mercury removal. However, the PDP demonstrated that a caustic scrubber was sufficient to remove sulfur dioxide, acid gases and inorganic HAPs, including mercury, without the addition of limestone.

1.2.1.2 Dry Flue Gas Desulfurization[5.0]

Dry FGD removes primarily the soluble (oxidized) mercury and performs best with Eastern bituminous coal. FGD systems also remove mercury that is associated with particulate. The primary form of mercury emitted from the MNC LSDP is elemental mercury. Dry FGD is not technically feasible. See the BACT analysis for further details on the infeasibility of dry FGD for the LSDP iron nugget facility.

1.2.2 Particulate Control

1.2.2.1 Dry System – Electrostatic Precipitator or Fabric Filter[4]

With some exceptions, dry emission control systems primarily remove mercury associated with particles. There is a distinct difference in mercury removal between a cold side system (e.g., CS-ESP or fabric filter) and a hot-side system because of temperature. Very little particle bound mercury is removed by a HS-ESP because particle bound mercury is not present at high temperatures, while virtually all particle bound mercury is removed by a cold-side ESP or fabric filter. With respect to the effect of stack gas temperature on mercury removal, indications are that the threshold temperature for enhanced mercury removal is in the range of 300^{o}F or less.[5]

Flue gas chlorine content above 200 ppm does not affect ESP performance but will improve mercury removal by a fabric filter and its associated dust cake. Units burning lower chlorine sub-bituminous or lignite coals can be expected to emit a higher percentage of the mercury entering their system. As noted in the BACT report, a dry flue gas desulfurization system is not feasible for the iron nugget process.

1.2.2.2 Wet System – Wet Scrubber and Wet Electrostatic Precipitator[6]

Wet scrubbers are used for flue gas desulfurization on coal-burning systems. Wet systems remove primarily soluble (oxidized) mercury and do not remove the elemental mercury as effectively. The amount of mercury equal to the vapor pressure (at the scrubber water temperature) will pass through the scrubber. Therefore, if the partial pressure of the mercury at the scrubber inlet exceeds the vapor pressure (at the scrubber water temperature), then some removal of elemental mercury should be expected. However, if the partial pressure is less than or equal to the vapor pressure at the scrubber water temperature, then no removal of elemental mercury will be observed. In the Mesabi Nugget pilot plant, the amount of partial pressure of mercury at the scrubber inlet was lower than the vapor pressure. As such, no removal of elemental mercury was observed. As demonstrated in simulated scrubber systems there is evidence that some desorption of mercury occurs in a wet scrubber when $HgCl_2$ reverts back to Hg^o. Generally speaking, simulated wet scrubber mercury removal efficiency is less than 70% and less than 50% for mercury originating from combined sub-bituminous and lignite coals.

A wet electrostatic precipitator provides good control for acid mists, fine particulate and opacity control. In a power plant setting, a wet ESP is typically follows a wet FGD and collects $PM_{2.5}$ and liquid droplets in the flue gas, including acid mist. Croll Reynolds installed a pilot wet ESP in this polishing configuration at a large coal plant in 2001 to treat an 8,000 cfm slip stream. Mercury removal seems to track PM2.5 and SO3 removal, which was in the mid-ninety percents. Also elemental mercury removal in the 40 percent range is of particular interest for sub-bituminous fired units. EPRI and Croll Reynolds intend to test a 10,000 cfm unit that will follow a dry ESP and SCR.

Re-emission of mercury in some wet scrubber systems is currently under investigation and possibly tied to low sulfite concentrations in the scrubbing liquor.[7] The conversion of oxidized mercury back to elemental mercury in these systems is not well understood; however, the result is the loss of mercury through the stack. This phenomenon has been noticed as an inconsistent effect in short term tests and there is concern that some promising short-term results could be overly optimistic regarding effectiveness if longer operation would observe the conversion back to elemental mercury. Also, proposals for wet systems to control mercury should expect extra scrutiny regarding the transfer of mercury between media. Mercury transfer from a flue gas stream to water must be accompanied by water treatment that provides effective mercury removal prior to discharge.[8]

1.3 Enhancing Existing Systems – Sorbents

In the power industry, sorbents are being widely tested for mercury control on coal-fired boilers. Test results are showing mercury control as high as 96% for some technologies. Differing opinions on the availability status of sorbents are indicative of a technology that is very close to commercialization. The opinion of the EERC, Grand Forks, ND, is that all sorbent technologies currently being studied as mercury control for coal-fired power plants are strictly in the developmental phase only; however, at least one vendor is commencing commercial-scale sorbent production and sale.[9]

Most mercury sorbent materials are not commercially available at this time for the purpose of mercury emissions control, but they are the technology closest to being commercialized.

Sorbent technologies analyzed for the MNC project are summarized below.

1.3.1 Sorbent Injection

1.3.2 Activated Carbon Injection[3, 10]

Injection of activated carbon (ACI) upstream of either an electrostatic precipitator or a fabric filter baghouse is the retrofit technology that has the widest potential application for controlling mercury emissions for power plants without FGD scrubbers. According to the DOE, (ACI) is already in long-term, large-scale testing to determine commercial-scale demonstration the Holcomb, Meramac, Conesville, Nanticoke and Yates 1&2 sites. The test results are based on the combustion of either eastern bituminous coal or PRB sub bituminous coal and ESP or fabric filters for control.[11]

Studies show that flue gas temperature also affects the quality of adsorption. Temperatures between 107 deg C and 163 deg C (224^{o}F - 325^{o}F) have higher sorption rates and the adsorption rate of carbon decreases as the temperature increases. The presence of acid gases also directly affect adsorption capacity. Sorbent enhancing additives that add mercury oxidizing capability are being studied.[12] The combination of sorbent injection with a baghouse also enhances mercury capture because of improved gas to solid contact in the filter cake.

ACI tests have shown mercury capture efficiencies as high as 90% and the technology is regularly regarded as showing the most promise; however, ACI is still in its early stages of application. Currently, costs are considered to be in the range of $40,000 to $60,000 per pound of mercury removed.[13]

Sorbent Technologies Corporation has announced the building of a brominated powdered activated carbon (B-PAC) production plant to supply power plants on a routine, full-scale basis. Sorbent Technologies' testing at seven different power plants with different fuels and control equipment configurations produced good results with less sorbent injection. Sorbent Technologies cites costs ranging from $2,000 to $20,000 per pound of mercury removed.[14]

The ongoing study of activated carbon has been performed primarily on power plants. The use of activated carbon at ore processing facilities would require similar pilot and scaled-up phases to demonstrate full-scale effectiveness. This technology will be considered once the LSDP is operational on a consistent basis.

2.0 Emerging/Pilot Demonstration

2.1 Control Technology Systems

2.1.1 Multi Pollutant Control

Many ideas have been presented to address mercury control as an integrated part of more conventional emissions control systems or new systems. These ideas expect cost savings when compared to the cost of separate mercury control systems. The economics for several systems depend on a good market for fertilizer by-product. It is unclear if large fertilizer markets are sufficiently close to the MNC iron nugget LSDP.

2.1.1.1 Electro-Catalytic Oxidation (Powerspan Corp)[15,16]

Electro-Catalytic Oxidation (ECO) is an integrated multi-pollutant control technology for coal-fired plants which is currently under a 50 MW equivalent demonstration at First Energy's R.E. Burger Plant using 2-4% sulfur bituminous coal. ECO pilot test results at a 1 MW equivalent achieved reductions in emissions of NOx (90 percent), SO2 (98 percent), fine particulate matter (95 percent), and mercury (80 to 90 percent). In commercial application, ECO units will be installed downstream of a power plant's existing electrostatic precipitator or fabric filter.

ECO treats flue gas in three steps to achieve multi-pollutant removal. First, a reactor exposes flue gas to a high-voltage discharge which oxidizes gaseous pollutants to higher oxides. The next step is an ammonia scrubber, which removes the sulfur dioxide not converted by the reactor and nitrogen dioxide produced from the NO in the reactor. In the third step, a wet electrostatic precipitator (WESP) follows the scrubber to capture acid aerosols, fine particulate matter and oxidized mercury. The evaporation of water that occurs in quenching the gas concentrates the dissolved salts to just below the point at which the ammonium sulfate begins to crystallize. At this concentration, a liquid stream is drawn off this loop and sent to the co-product processing system to produce fertilizer. There is no liquid discharge from an ECO system. As noted in the BACT report, dry ESP or fabric filter is not feasible for the MNC iron nugget LSDP.

A full-scale installation at the 510 MW Ameren UE Sioux Plant is planned pending DOE cost-sharing funds and successful operation of the 50 MW demonstration. ECO indicates an expectation to begin accepting commercial orders for their technology by the end of 2004 or early 2005.

2.1.1.2 Plasma-Enhanced Electrostatic Precipitation (PEESP)[17]

MSE Technologies and Croll-Reynolds are piloting a similar technology to also enhance wet ESP performance for mercury. Newly patented Plasma Enhanced ESP technology has demonstrated 80% oxidation of elemental mercury in a lab-scale simulated flue gas. The PEESP technology has been incorporated within a 5,000 slip-stream pilot Hybrid Dry-Wet ESP at Southern Company's Alabama Power's Plant Miller at the plant's dry ESP outlet. The pilot was commissioned in July of 2004 with testing scheduled for August 2004. The ability of this configuration to oxidize elemental mercury within a wet ESP field on low-sulfur coals and then capture the oxidized mercury along with PM2.5, SO3 mist is seen as a cost-effective alternative to activated carbon injection with fabric filter collection. Although a wet ESP has similar removal characteristics for sulfur dioxide, particulate matter and acid gases, a wet scrubber has been determined to be BACT – see the BACT study.

2.1.1.3 EnviroScrub/Pahlman

The EnviroScrub technology uses a manganese-based sorbent to control several pollutants in one process. This technology is included in the discussion of sorbents (Section 2.2.4.7)

2.1.1.4 Airborne Process [18, 19]

Airborne uses sodium bicarbonate to remove SOx, NOx and oxidized mercury in a combined wet and dry scrubbing system. Similar to the EnviroScrub approach though with a different sorbent, the sodium bicarbonate in this case is regenerated in the process, to operating costs, increase efficiency, reduce waste and convert the sulfur and nitrogen pollutants into a granular fertilizer. Airborne also incorporates the LoTox process (BOC Gases), which controls NOx with ozone and subsequent wet scrubbing. The sodium bicarbonate regeneration and fertilizer processing steps require significant process equipment, which could be owned and operated by a second party.

Airborne has successfully operated a 5 MW pilot plant at the LG&E's Ghent, KY power plant and received funding in 2003 to install a full-scale (524 MW) project at the same facility. However, that project was withdrawn and re-proposed to DOE as a Clean Coal Power Initiative Round 2 project to be implemented at the 300 MW Mustang Energy facility in New Mexico. DOE's project selections will be announced by December 2004. Additional pilot and commercial scale testing on both power plants and iron nugget facilities are needed to determine whether this technology could be technically feasible.

2.2 Enhancing Existing Systems – Sorbents

In the power industry, sorbents are being widely tested for mercury control on coal-fired boilers. Test results are showing as high as 99% for some technologies. However, as noted by the Energy & Environmental Research Center in Grand Forks, ND, all sorbent technologies currently being studied as mercury control for coal-fired power plants are strictly in the developmental phase only.

With the exception of the Sorbent Technologies product, sorbents are not commercially available at this time, but they are the technology closest to being commercialized. Sorbent technologies analyzed for the MNC project are summarized below.

2.2.1 Carbon Fixed Bed [3, 20]

Carbon fixed bed technologies tend to have moderate to high capture efficiency for mercury in the power industry. Actual test results were not available at the time of this study, but summaries indicate that temperature is an important part of capture efficiency. As temperature increases sorption capacity decreases. Tests have also shown that the oxidation state of the mercury and the composition of the flue gas are significant factors affecting absorption.

The EERC indicated that fixed bed technology in the power industry works well, but is costly especially due to the high pressure drop across the module. Carbon fixed bed technologies are still undergoing bench and pilot-scale studies. Time of commercial availability is unknown. Once carbon fixed bed technologies are commercially available, Mesabi Nugget will further evaluate this technology.

2.2.2 Fluidized Bed Modifications [3, 20]

Power plant testing on technologies applied to fluidized bed combustion (FBC) has resulted in relatively high mercury removals (e.g., 66-99%), averaging 86%, in FBC units with fabric filters (FF). These test results were attributed to mercury capture on high-carbon fly ash. The category of FBC with FF on average represented the highest mercury removals as stated on EPA's Information Collection Request (ICR) website for coal-burning utilities.

Elemental mercury emissions from a fluidized-bed combustor with fabric filtration are higher than other types of boilers equipped with FF alone, averaging 56% versus 23%. This is possibly due to rapid removal of chlorine from the combustion gas by bed calcium in an FBC before it can promote the oxidation of mercury.

Fluidized bed related technologies are still undergoing bench and pilot-scale studies. The timeline for commercial availability is unknown. Because the iron nugget LSDP requires a reducing atmosphere, a fluidized bed modification is not technically feasible.

2.2.3 Gold Honeycomb ("MerCap") [21, 22, 23]

MerCAP™ (Mercury control Adsorption Processes) is a regenerable, gold-coated fixed-structure sorbent that is placed in the duct work after an electrostatic precipitator (ESP) and prior to flue gas desulfurization (FGD). The mercury is recovered upon regeneration and no waste is generated MerCAP™ effectiveness is not dependent upon mercury's ionic state and is a prospective elemental mercury control method.

The first phase of a large-scale demonstration is applying MerCAP™ technology downstream of a spray dryer-baghouse (SD-BH) combination treating North Dakota (ND) lignite flue gas. The technology is retrofitted into a single compartment in the baghouse at Great River Energy's (GRE's) Stanton Station Unit 10, treating a 6 mega-watt (MWe) equivalence of flue gas. At the completion of the six-months planned demonstration (early 2005), the second phase of this program will demonstrate the technology downstream of a wet scrubber at a boiler burning Eastern bituminous coal. .

Demonstrations of the technology are planned for Great River Energy, Stanton Station (ND lignite) and Southern Company, Yates Plant (bituminous). The Stanton Station, which burns a lignite coal, had mercury removal as high as 89%. Data for GRE and the Yates plant was not readily available for this summary. The MerCAP plates were exposed to flue gas temperatures as high as 375 deg F during testing.

Questions exist regarding the overall durability of the gold substrates due to an episode of early deactivation during screening test series. Under certain plant operating conditions and possibly fuel compositions more rapid deactivation of the gold substrates has occurred. Analysis and characterization to better understand the mechanisms affecting longevity are being further investigated. As noted by EPRI, MerCAP™ testing has fairly recent data, but it is not publicly available and MerCAP™ will not be commercially available for some time.

Temperatures in the RHF exhaust may not be conducive to the use of this technology, and the presence of other metals may interfere with the operation. Mesabi Nugget does not consider this technology to be feasible.

2.2.4 Sorbent Injection

2.2.4.1 Sorbent injection plus Advanced Hybrid Particulate Collector (AHPC) [24, 25]

An advanced hybrid particulate collector is a fabric filter placed between ESP fields for high efficiency particulate control. The AHPC controls mercury when combined with sorbent injection and the use of GORE-TEX® membrane filter material.

A 2.5 MW pilot-plant demonstration of this technology is on-going at Otter Tail Power's Big Stone Plant. The Big Stone Plant combusts PRB sub-bituminous coal and testing in combination with sorbent has demonstrated mercury control as high as 96.6%. The pilot testing also investigated co-firing with tire-derived fuel, which increases the fraction of oxidized mercury entering the control system. Supplemental injection of 10 ppm HCl upstream of the Advanced Hybrid™ filter had no perceptible benefit on the level of mercury removal with activated carbon.

The AHPC technology is commercially available for particulate control, but not for mercury control pending final development of the sorbent. However, as noted in the BACT study, a dry ESP control system is not technically feasible for the iron nugget LSDP.

2.2.4.2 Limestone- and Trona-based SO_2 and Mercury Control (Mobotec USA) [26, 27]

Mobotec has demonstrated 90-plus percent reduction of SO_2 and mercury with limestone and trona sorbents at the 154 MW Cape Fear Generating Station in North Carolina. Low percentage reductions in NOx were also recorded. An 80 MW commercial installation is due to be operational in early spring 2005. The demonstration project exhibited problems with slagging on the superheater tubes. Both limestone and trona lower the ash fusion temperature, with the trona induced slag being more difficult to remove.

The slagging problem, to be addressed by adjusting the sorbent injection location to a point that is below the ash fusion temperature and more frequent soot blowing, will make this technology uncertain in the technical feasibility evaluation. The iron nugget process produces a molten slag, and it is unclear what affect the limestone and trona sorbents would have on the quality of the slag, the quality of the iron nuggets and the process itself. Therefore, this technology is considered infeasible for the iron nugget LSDP.

2.2.4.3 Amended Silicates™ [20, 28, 29]

Created by ADA Technologies, amended silicates are a non-carbon clay-based sorbent for the capture of mercury from combustion gas streams. They are injected upstream of ESP and fabric filter technologies.

Amended Silicates™ represent an advantage for power plants that wish to sell their fly ash to concrete manufacturers. Like other clay-based sorbents, amended silicates do not contaminate the ash like activated carbon sorbents, which preserves fly ash value for beneficial use. Amended Silicates™ are also cost-competitive with activated carbon and have achieved capture efficiencies of 70 – 96%.

Currently amended silicates are in pilot plant testing only. Demonstration prototypes are planned for Cinergy Power, Miami Fort Plant, Unit 6 (Eastern bituminous) and Xcel Arapahoe, Unit 3 (PRB sub-bituminous). The pilot test results have suggested that Amended Silicates™ would work well in a plant equipped with an ESP. Even low injection rates, 20 to 40%, demonstrated mercury capture in the range of 90%.

A variant of the sorbent was shown to capture mercury at 770 deg F and 200 psig, conditions representative of coal gasification systems. In a gasifier, mercury removal system could use Amended Silicate sorbent in either a pressure-swing or disposable sorbent bed configuration. The mercury capacity of the sorbent in the high-pressure, high-temperature tests was as almost five times the capacity at ambient temperature, and as a pressure-swing sorbent, released as much as 30% of the captured mercury upon depressurization.

Amended Silicates™ are not available commercially. In addition, the ESP has been shown in the BACT study to be technically infeasible to the process. As such, this technology is being removed from further consideration.

2.2.4.4 Sorbent injection/ ESP/Wet scrubber (for small ESPs) [30, 31]

Studies are also in progress for sorbent injection used in conjunction with a small ESP with a small specific collection area. The sorbent injected occurs upstream of a small area electrostatic precipitator (ESP) followed by a wet scrubber.

According to EPRI, this technology is still in the demonstration phase. Full-scale testing conducted by URS is currently taking place at Southern Company Services', Yates Plant Unit 1 and Unit 2 in Atlanta, GA. Both Yates units burn bituminous coal, but use different control technologies. Yates unit #1 uses ESP and wet FGD control. Yates unit #2 uses ESP and NH3/SO3 conditioning technologies.

No further information, including test data, was available at the time of this evaluation. This technology is not commercially available and continues to be tested. Because this technology utilizes an ESP, which was shown in the BACT analysis to be infeasible, this technology will be removed from consideration for the Mesabi Nugget LSDP.

2.2.4.5 TOXECON (Mercury/NOx/SOx sorbent injection with baghouse) [32, 33]

TOXECON is a technology involving sorbents injected downstream of a primary (existing) particulate control system. The facilities undergoing large-scale testing place TOXECON after an ESP and before a pulse jet FF. This configuration preserves salable fly ash quality. Large-scale testing of the TOXECON concept has been ongoing at the Alabama Power's Plant, Gaston. Short-term test results with low air-to-cloth ratios indicated up to 90% mercury removal.

The NETL stated that work to install TOXECON at We Energies' Presque Isle Plant was started in spring 2004. When completed in 2007, the Presque Isle unit is expected to have reduced mercury emissions by 90% (or 80 lbs mercury/year), SO2 by 70% and NOx by 30%.

Even though large-scale testing is showing positive results, it is unknown when the technology may become commercially available. This technology is commercially available for particulate control, but not mercury control. As indicated in the BACT study, a baghouse is infeasible for the MNC RHF, therefore, this technology will be removed from further consideration.

2.2.4.6 TOXECON II (Mercury/NOx/SOx sorbent injection with ESP)[34]

To avoid the fly ash contamination problem in conventional ACI, TOXECON II injects carbon between designated ESP collecting fields. The majority of the fly ash is collected in the inlet ESP fields upstream of carbon injection while collecting carbon with adsorbed mercury in the downstream ESP fields. This concept is undergoing a full-scale test at Great River Energy's Coal Creek Station. The plant fires North Dakota lignite.

Short-term testing indicated a 70% mercury control efficiency and success in preserving the quality of fly ash. Additional testing is suggested; however, no plans were indicated. This technology is commercially available for particulate control, but not mercury control. As indicated in the BACT study, an ESP is infeasible for the MNC RHF, therefore this technology is removed from further consideration.

2.2.4.7 Pahlman™ Process NOx/SOx/Mercury/PM2.5/HCl/H2S Scrubbing Technology [35, 36]

Pahlman™ is a multi-pollutant control system designed by EnviroScrub Technologies Corporation. This technology uses a single-stage, proprietary, dry, manganese-based sorbent system with a fabric filter, to essentially replace three separate control technologies - wet FGD for SOx-scrubbing, SCR for NOx-scrubbing, and activated carbon injection for mercury reduction.

The manganese-based sorbent quickly adsorbs SOx compounds and uses the added residence time afforded by the build up of a filter cake to adsorb NOx and mercury. Like MerCAP™ , the Pahlman Process is successful in removing elemental mercury. Minnesota Power's Boswell Energy Center was tested because the plant fires (PRB) sub bituminous coal and the gas stream contains elemental mercury where the Rouge Power Plant does not. Flue gas from the 570 MW boiler's main exhaust duct was diverted and routed to the mobile pilot unit. Independent third party testing has verified the Pahlman Process'™ ability to capture 99% of SOx, 98% of NOx, and up to 99% of elemental mercury and 84% total mercury. Other testing included DTE Energy's River Rouge Power Plant in June 2003. The plant burns a blend of PRB sub-bituminous and Eastern bituminous coal. Test results indicated up to 80% total mercury removal and 97%oxidized mercury removal. Other pollutants were controlled at rates of 98% for NOx, and near 100% for SO2.

The Pahlman sorbent is regenerated with a process that produces fertilizer by-product. The by-product revenue is included in EnviroScrub's cost estimate; however, such revenue may not be consistent. Control costs for a 500 MW power plant are $168/MW (capital) and $3.40/MW (operating).

To this point, the EnviroScrub systems have been batch processes. Development of a complete closed-loop capture, regeneration, and by-product production pilot unit is currently under design and EnviroScrub anticipates its operation in early 2005. However, because the BACT study showed SCR to be infeasible for the iron nugget process, this technology is being removed from further consideration.

2.2.4.8 Calcium-based and Clay-based Sorbent Injection [4, 10]

Calcium-based sorbents are rated as low to moderate for mercury control effectiveness. The EERC states that calcium-based sorbents work very well as mercury control for eastern coal burning units. Most of these sorbents include calcium oxides, calcium hydroxide and slaked lime. Calcium-based sorbents do not work as well with western coal burning power plants (lignite and sub bituminous). Bench- and pilot-scale testing is on-going, but calcium-based sorbents are not ready for commercialization. The estimated time to commercialization is not known.

Clay-based sorbents are a mercury control option considered by facilities that sell their ash to concrete facilities. The clay-sorbents do not contaminate the ash like activated carbon, thus making it a useful byproduct to be sold to concrete manufacturers. Test facilities and mercury capture efficiencies for clay-based sorbents were not available at the time of this study.

The ongoing study of calcium-based and clay-based sorbents has been performed primarily on power plants. The use of these sorbents at ore processing facilities would require similar pilot and scaled-up phases to demonstrate full-scale effectiveness.

2.3 Process Modification

2.3.1 Combustion Optimization

2.3.1.1 Overfire Air and Coal Reburn [3, 37]

The practice of using overfire air and reburn, typically NOx control strategies, can also optimize mercury removal by conventional control equipment. Combustion optimization and combustion modification impacts are dependent on coal characteristics, but also have an effect on the ability of the resulting ash to capture mercury. While these techniques are commercially available, and air staging and reburn have been shown to lower mercury emissions, additional testing is on-going to better document the effectiveness. Overfire air and reburn have been applied to utility and industrial boilers for NOx control.

However, because a reducing atmosphere is required to produce the iron nuggets in the RHF, overfire air, and air staging are not feasible for the MNC project. Similarly, in order to precisely control the temperatures and atmosphere in the RHF, coal reburn is not feasible.

2.3.2 Process Modification

2.3.2.1 Gore-Tex Filter Bags [38, 39]

Created by W.L. Gore & Associates, GORE-TEX® membrane filter bags are a mercury control technology targeted for the coal fired power industry. The GORE-TEX® material is imbedded with additives and manufactured with properties that capture over 90% of mercury from coal combustion gases. The system can be retrofitted into an existing fabric-filter baghouse, which reduces or eliminates additional infrastructure or space requirements for mercury control. Like clay-based sorbents and TOXECON, GORE-TEX® also allows for salable fly ash.

Pilot-scale testing for this technology has been performed at EPA's Research Triangle Park and was conducted using both PRB and lignite coals. Results showed mercury capture rates consistently in excess of 90%. Testing occurred at a temperature much higher than that of typical baghouse conditions (185 deg C or 365 deg F) and an inlet mercury level of 1-PPM. Results showed that GORE-TEX® had out performed activated carbon.

This technology has progressed to pilot-scale study, but the date of commercial availability is unknown. Several plant operators have volunteered their facilities as locations for future field tests. Because wet scrubbers have been shown to be BACT in this application and a baghouse cannot be used in conjunction with a scrubber in this process, this option is infeasible and will be removed from further consideration.

2.3.2.2 Flue Gas Cooling Prior to ESP Capture (CONSOLE Energy) [40]

CONSOL Energy R&D, a primarily Eastern bituminous coal supplier, in cooperation with NETL, is developing a mercury control technology designed to be less expensive than the current leading prospective technologies. The objective of the project is to demonstrate that mercury can be effectively removed from the flue gas by absorption on power plant fly ash as a result of reducing the flue gas temperature. The demonstration at Allegheny Energy Supply - Mitchell Station will test various flue gas temperatures and will define the injection rate of $Mg(OH)_2$ needed for SO_3 removal, the impacts of the process on the performance of plant components, and the mobility of the captured mercury. CONSOLE is expecting 80-90 percent mercury removal at costs that are an order of magnitude lower than powdered activated carbon injection.

The construction of the pilot plant was completed in February 2003. Pilot plant start-up began in March 2003. MNC has included flue gas cooling prior to the wet scrubber as an inherent part of the design of the LSDP. However, since MNC does not have fly ash as a component in the offgas system, this process is not applicable.

3.0 Research and Development

3.1 Fuel-Related Alternatives

3.1.1 Fuel Cleaning

3.1.1.1 Hydrothermal[5.0]

Only preliminary results exist concerning hydrothermal fuel cleaning. Additional pilot scale testing information is needed before a determination can be made regarding potential applicability to MNC's iron nugget LSDP.

3.1.1.2 Advanced

Research continues on advanced coal cleaning practices. Techniques include: fine coal cleaning and treatment, novel dewatering technologies, and advanced flotation (Microcel). Costs for treating fine coal are approximately 3 - 4 times higher than that to clean coarse coal. Additional pilot scale testing information is needed before a determination can be made regarding potential applicability to MNC's iron nugget LSDP.

3.1.2 Chlorine-based Additive to Coal [41]

Adding chlorine-based additives to coal increases Hg oxidation upstream of an ESP and wet scrubber. Demonstrations are planned at Minnkota Power Cooperative, Milton R. Young Unit 2 (ND lignite) and TXU Monticello Unit 3 (TX lignite). The potential of this technique is of interest for sources that emit primarily elemental mercury, such as ore-processing units. Any amounts of chlorine added to the MNC Coal will result in undesirable refractory wear that is unacceptable to the process. As such, this technology is removed from consideration.

3.2 Enhancing Existing Systems

Catalyst research is focused on conversion of elemental mercury to its water-soluble oxidized state, which can then be removed by a down stream wet control system. Catalysts are grouped into high and low temperature applications. High-temperature catalysts are applied in the 650^{o}F to 850^{o}F flue gas temperature range, while low-temperature catalysts are applied in the 300^{o}F range. While catalysts are effective in achieving the conversion to oxidized mercury in the laboratory, there are challenges posed by the composition of the gas stream and catalyst poisoning by some gas constituents and questions regarding catalyst service life.

3.2.1 Mercury oxidation catalyst followed by Wet FGD [41]

Large-scale testing of a honeycomb catalyst to oxidize elemental mercury is planned by TXU, Monticello station (TX lignite) and Duke Energy, Marshall Station (low sulfur bituminous). Additional pilot scale testing information is needed before a determination can be made regarding potential applicability to MNC, but the technology addresses the form of mercury expected to be emitted by the iron nugget LSDP.

3.2.1.1 Photochemical Oxidation [42]

A newly patented mercury oxidation process known as the "GP-254 Process" is currently being tested at the Department of Energy's National Energy Technology Laboratory (NETL). GP-254 exposes flue gas from a coal-fired boiler to ultraviolet light and oxidizes elemental mercury causing it to react with oxygen and sulfur dioxide forming mercurous sulfate and mercuric oxide. Both mercurous sulfate and mercuric oxide are readily removed by particulate collectors or wet scrubbers typically found at coal-fired power plants. Photochemical oxidation is expected to be especially attractive to power plants that burn low-rank coals (sub bituminous and lignite). Development of the GP-254 process is ongoing; however, the process is not yet demonstrated. Additional pilot scale testing information is needed before a determination can be made regarding potential applicability to MNC, but the technology addresses the form of mercury expected to be emitted by the iron nugget LSDP.

3.2.1.2 Enhanced Mercury Control in Wet FGD [43]

The goals of this project are 90% total mercury removal with existing FGD systems, costs below ¼ to ½ of today's commercially available activated carbon mercury removal technologies and a stable form of sequestered mercury. Babcock and Wilcox and McDermott Technology, Inc's (B&W/MTI's) will demonstrate their wet scrubbing mercury removal technology, using very small amounts of a liquid reagent to achieve increased mercury removal, at two high-sulfur bituminous coal plants. These facilities are the 55MW Michigan South Central Power Agency's Endicott Station and Cinergy's 1300 MWe Zimmer Station.

Additional testing information is needed before a determination can be made regarding the oxidizing reagent’s reliability.

3.2.1.3 SCR+FGD (co-benefit for Mercury) [4, 44, 45]

Selective catalytic reduction (SCR) assists in converting elemental mercury to oxidized mercury, which can be removed by downstream flue gas desulfurization. This conversion by SCR appears more likely to occur with eastern bituminous coals. PRB coals have not shown a high conversion to oxidized mercury by SCR. The conversion is believed to be dependent upon the presence of chlorine, which is higher in eastern bituminous coal and lower in PRB coal.

The indications to date regarding the co-benefit aspect of SCR are based on a small data set. More study is ongoing to build a supporting database. Data gaps to be addressed include PRB coal-firing, SCR/FGD combinations, PRB/Bituminous blends, and evaluation of catalyst age impacts. The impact of SCR on mercury control is potentially significant; however, at this time additional studies are needed to demonstrate reliable mercury removal rates. In addition, the BACT study concluded that SCR is not feasible for the iron nugget LSDP.

3.3 Sorbent Injection

3.3.1 In-situ Adsorption with Maghemite (Iron mineral formed during taconite production)[46]

The Minnesota Department of Natural Resources (DNR) is currently studying mercury emissions from wet scrubbers at four taconite processing facilities in northern Minnesota. This study includes an analysis of the formation of maghemite and hematite during the induration step of taconite pellet production and its potential to oxidize mercury.

The formation of maghemite in coal-fired power plants has been shown to be a strong oxidant for reduced mercury when it exists in the flue-gases. This iron form is also expected to occur during moderate heating of taconite pellets (approximately 750^{o} F). If maghemite is actually formed and released as particulate into the process gases, it may potentially impact the oxidation state of mercury and the mercury capture rate experienced by wet scrubbers in the taconite industry.

The DNR performed a Mossbauer spectroscopy study to determine if high amounts of maghemite negatively affect the capture efficiency of wet scrubbers at the four taconite processing facilities.

DNR tests at two taconite facilities, specifically designed to evaluate temperature, mercury capture, and amount of maghemite dust produced under normal mineral processing conditions, indicated higher mercury concentrations in a temperature zone where maghemite formation is expected to occur, between air temperatures of 400 to 750 deg F.

The data collected may suggest a possible link between maghemite formation and mercury capture in taconite processing facilities. If proven, a technique to reduce mercury emissions in high temperature iron ore processes may involve control and distribution of maghemite and hematite dust in process gases. Since this testwork is still ongoing and the phenomenon is in the process of being better understood, it is not yet known if this technology will be applicable to Mesabi Nugget. As such, MNC will consider this technology once it is better understood.

3.3.2 Sodium-based, Metal Oxide-based, Iodine Impregnated Carbon, Sulfur Impregnated Carbon[3, 20]

At this time, little information is available for sodium-based sorbents. This sorbent is still in the development phase with low to moderate capture efficiency ratings.

Minimal information is available for metal oxide-based sorbents. The EERC pointed out that there is little experience with metal oxide-based sorbents and economics are an issue. However, some data suggests that they have a moderate to high capture efficiency for mercury. This science potentially supports the MN DNR investigation of maghemite in taconite processing.

Iodine impregnated carbon does work effectively for elemental mercury control for power plants burning western coals, as noted by the EERC. However, the technology is costly and developers of this technology continue to work to improve the economics.

The EERC reports that sulfur impregnated carbon performs much like that of iodine impregnated carbon. This technology is effective in the removal of elemental mercury from power plants firing Western coal. Like the iodine-impregnated carbon, this technology is also costly and developers of this technology continue to work to improve the economics.

All of the above technologies are developing. It is unknown how far they are from being commercially available. No other data was available at the time of this evaluation.

3.3.3 Enhancing Activated Carbon Reactivity[20, 22]

The EERC is currently developing an enhanced activated carbon and chemical treatment for mercury control from lignite-fired power plants. Enhancing the effectiveness of activated carbon involves one of two options: 1) use of chlorine-based additive to coal and activated carbon sorbent, or 2) use of chemically treated sorbents.

The effectiveness of enhanced carbon reactivity technology has been tested at four power plants; Basin Electric’s Leland Olds Station Unit 1 (Equipped with ESP), Basin Electric’s Antelope Valley Station Unit 1 (Equipped with SDA/FF), Great River Energy’s Stanton Station Unit 1 (equipped with ESP), and Great River Energy’s Stanton Station Unit 10 (Equipped with SDA/FF). Bituminous and sub bituminous coals have also been tested, but results were not readily available for this report.

Test results to date are showing positive results for control of mercury using enhanced activated carbon and other chemical treatments such as calcium chloride ($CaCl_2$); however, these sorbents are not yet commercially available. .

3.3.4 Novel Mercury Sorbent [47]

Some novel mercury sorbents are derived from carbon-based industrial wastes and are cost effective. Alternatives to activated carbon sorbents for mercury control in coal-fired power plants.

Bench-scale test results presented by KEPRI (Korean Electric Power Research Institute) showed the novel sorbent to have removal efficiencies higher than common activated carbon at the same operating conditions. However, the novel sorbent had lower efficiencies than chemically treated activated carbon. Bench-scale studies of the novel sorbent showed capture efficiencies of 40 to 50%.

A second novel process designed by ADA captures mercury on a regenerable sorbent with small amounts of a noble metal on a substrate. Bench-scale tests have shown 95% recovery of both elemental and oxidized mercury. However, pilot test results on a full-scale coal-fired boiler were not as efficient. The results showed that mercury removal is severely degraded with time by the action of acid gases present in the flue gas.

Novel sorbent testing is scheduled for Duke Energy's Buck station or Allen station. Both facilities burn bituminous coal. The Buck station is equipped with a hot-sided ESP and the Allen station is equipped with a cold-sided ESP. Detroit Edison's St. Clair Station will also be tested. This station burns a mixture of bituminous and sub-bituminous coal and is equipped with a cold-side ESP.

Results of the testing at the Duke plants are presently unknown. Novel sorbents will require further development before becoming commercially available.

3.3.5 Titanium-Based Nanostructured Sorbent Agglomerate [3, 48, 49]

Bench-scale testing has shown titanium-based nano-structured sorbent agglomerate is very effective in the capture of mercury in combustor exhausts, such as those used in coal-fired power plants. The in situ-generated nano-size titania particles are activated by UV light. The activated particles then capture the heavy metal species (e.g., mercury).

The bench-scale systems are noted to have mercury removal efficiencies as high as 81 % with Eastern bituminous coal. It is also noted that water vapor plays a major role in the processes capture efficiency. As water vapor increases, the capture efficiency of the particles increases. However, if the water vapor is too high, capture efficiency may decrease due to competitive absorption with other elements in the gas stream.

The process is designed and retrofitted to existing coal combustion systems, which improves cost effectiveness. Large-scale testing for this technology is in progress. No new data is currently available.

3.3.6 Solid Selenium Filter [20, 41]

Solid selenium filters are a high cost technology with no US experience to date. They are rated at moderate to high levels of mercury capture efficiency. However, no test data is available to verify this rating.

TABLE 4-1: MERCURY CONTROL TECHNOLOGY SUMMARY

Status	Name	Technology	Conclusion
Commercially Available and Viable	Fuel switching	Lower-mercury coal	Will be investigated further when LSDP is Economically and Technically Viable.
		Biomass	Not Technically Feasible
		Gas - commercial natural gas	Included in Design
		Gas - synthetic gas (cleaned)	Will be considered when Commercially Available
	Fuel blending	Coal/biomass/tire-derived fuel/pet coke/gas/oil	Under consideration for carbon sources once the LSDP is economically and technically viable
	Fuel Cleaning	Conventional (physical, chemical, biological)	Included in coal pulverizer design. The physical removal of pyrites is inherent to the pulverizer design.
		Advanced	Not feasible
	Conventional scrubber	Caustic Addition Wet limestone Wet lime Dry flue gas desulfurization	Wet scrubber included in design. The water alkalinity will be adjusted to obtain increased removal effectiveness. Dry FGD not feasible.
	Particulate Control	Dry system - ESP, Fabric Filter Wet system - Wet Scrubber or ESP	Included in design (wet scrubber)
	Sorbent Injection	Activated carbon	To be considered when LSDP is operational
Emerging/Pilot Demonstration	Multi-pollutant control	Electro-Catalytic Oxidation (Powerspan Corp)	Will be investigated further when LSDP is Economically and Technically Viable.
		Plasma-enhanced Electrostatic Precipitation (PEESP)	Will be investigated further when LSDP is Economically and Technically Viable.
		Enviroscrub / Pahlman	Not Technically Feasible (SCR is not feasible, per BACT analysis)
		Airborne Process	Will be investigated further when LSDP is Economically and Technically Viable.

Status	Name	Technology	Conclusion
	Sorbent Bed/Filter	Carbon fixed bed	Will be investigated further when technology becomes commercially available.
		Fluidized bed Modifications	Not Technically Feasible
		Gold honeycomb ("MerCAP")	Not Technically Feasible
	Sorbent injection	Sorbent injection plus Advanced Hybrid Particulate Collector (AHPC)	Not Technically Feasible
		Limestone- and Trona-based SO2 and Mercury Control (Mobotec USA)	Not Technically Feasible
		Amended silicates	Not Technically Feasible (dry PM collection not feasible – see BACT analysis)
		Sorbent injection/ ESP/Wet scrubber (for small ESPs)	Not technically Feasible (dry PM collection not feasible - see BACT analysis).
		TOXECON (Hg/NOx/SOx sorbent injection with baghouse)	Not technically Feasible (dry PM collection not feasible - see BACT analysis).
		TOXECON II (Hg/NOx/SOx sorbent injection with ESP)	Not technically Feasible (dry PM collection not feasible - see BACT analysis).
		Dry Pahlman™ Process NOx/SOx/Hg/PM2.5/HCl/H2S scrubbing technology	Not technically Feasible (SCR not feasible - see BACT analysis).
		Calcium-based and clay-based	To be considered once commercially available
	Combustion optimization	Overfire air and coal reburn	Not technically Feasible (see BACT analysis for NOx control)
	Process modification	Gore-Tex filter bags	Not Technically Feasible
		Flue Gas Cooling Prior to ESP Capture (CONSOL Energy)	Fly ash not present in offgas. Process is not applicable.
Research & Development	Fuel-Related	Hydrothermal Cleaning	Will be considered when commercially available
		Advanced Cleaning	Will be considered when commercially available
		Chlorine-based additive to coal	Not Technically Feasible.
	Enhancing Existing Systems	Hg oxidation catalyst followed by Wet FGD	
		Photochemical Oxidation (PCO)	Will be considered when commercially available

Status	Name	Technology	Conclusion
		Enhanced Mercury Control in Wet FGD	Will be considered when commercially available
		SCR + FGD (co-benefit for Mercury)	Not Technically Feasible (SCR not feasible per BACT analysis)
	Adsorption R&D	In-situ Adsorption with Maghemite	Will be considered when phenomenon better understood and technology further developed
		Sodium-based Metal oxide-based Iodine impregnated carbon Sulfur impregnated carbon	Will be considered when commercially available
		Enhancing Activated Carbon Reactivity	Will be considered when commercially available
		Novel mercury sorbent	Will be considered when commercially available
		Titanium-based nanostructured sorbent agglomerate	Will be considered when commercially available
		Solid selenium filter	Will be considered when commercially available

NOTE: Table A-1 summarizes the Hg control technologies researched by Barr Engineering Co. and evaluated for applicability to MNC's Iron Nugget LSDP.

5.0 References

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Appendix C

Mercury Control Technologies Not Commercially Available

Description of Mercury Control Technologies

This appendix provides an additional description of mercury control technologies not commercially available, as shown on Table 3-1.

Multi-pollutant Controls

Multi-pollutant control strategies are available to reduce emissions of SO_2 and/or nitrogen oxides (NO_x) in addition to mercury. Some multi-pollutant control strategies are based on the mercury emission control technologies such as sorbent injection and/or oxidizing agents, while installing low-NO_X burners with over-fired air systems and flue gas desulfurization for NO_X and SO_2 control, respectively. Others use injection of urea as an oxidizing agent for both NO_X and mercury control, and either sorbent injection or flue gas desulfurization for SO_2 control. A few examples of specific multi-pollutant control strategies that are currently being tested in other industry sectors are J-POWER ReACT system, Powerspan Electro-Catalytic Oxidation (ECO), Airborne Process and APTECH technology. Low Temperature Oxidation (LoTOx) is another multi-pollutant control strategy that is currently being tested that relies on use of a wet scrubber for particulate control.

Sorbent Bed/Filter

Activated carbon fixed-bed adsorption units consist of a vessel packed with activated carbon. The carbon contains many pores with active adsorption sites, which capture mercury as the flue gas flows though. The MTMCAC studies demonstrated that activated carbon fixed beds are not economically feasible when compared to other commercially available technologies (reference (18)).

MerCAP™ (Mercury Control Adsorption Processes) is a regenerable, gold-coated fixed-structure sorbent that is placed in the ductwork after an ESP and prior to flue gas desulfurization (FGD). Mercury is recovered upon regeneration and no waste is generated (reference (19)).

Sorbent Injection

There are sorbent injection techniques that are still in the developmental stage. These technologies include limestone- and trona-based sorbents, amended silicates, TOXECON, and the Pahlman Process.

Mobotec USA has developed limestone- and trona-based sorbents for SO_2 and mercury control. These sorbents are injected into coal-fired boilers and have been shown to achieve a high percentage reduction of both SO_2 and mercury for those particular units.

Amended Silicates™ are a non-carbon clay-based sorbent that adsorbs mercury from the process flue gas stream. They are injected upstream of an ESP or Fabric Filter. Pilot-plant test results have suggested that amended silicates work well with an ESP (reference (20).

TOXECON is multi-pollutant control technology that involves injecting sorbent after a particulate control device. The sorbent then adsorbs gaseous phase mercury which is then captured downstream in a fabric filter. The sorbent includes activated carbon for mercury control and lime- or sodium-based products for SO_2 and NO_X control (reference (3)). Adding the sorbent after a particulate control device allows for the fly ash to be collected before any contamination from the activated carbon can occur.

Pahlman™ is a multi-pollutant control system designed by Enviroscrub Technologies Corporation that uses a single-stage, proprietary, dry, manganese-based sorbent system with a fabric filter. The manganese-based sorbent adsorbs SO_2 and uses the added residence time to build up filter cake to adsorb NO_X and mercury (reference (21)).

Research into calcium- and clay-based sorbents is still in the preliminary stages and a minimum amount of data is available at this time.

Process Modification

CONSOL Energy R&D is attempting to demonstrate that mercury can be effectively removed from the flue gas by adsorption onto the fly ash from coal-fired boilers by reducing the flue gas temperature (reference (22)). This technology could be applied by cooling the stack gas before it enters the wet scrubber. However, the technology has not been proven as an effective control option.

Enhanced Particulate Control

MSE Technologies and Croll-Reynolds are working on a Plasma Enhanced ESP technology to enhance wet ESP performance for mercury control. The purpose of this technology is to oxidize elemental mercury within the wet ESP field and then capture it downstream in a fabric filter (reference (23)). This technology does not use existing operating equipment.

Oxidizing Agents

Oxidizing agents convert elemental mercury to ionic mercury through an oxidation reaction. Oxidizing agents are typically halogens, ozone, or permanganates. These agents work in the same manner as naturally occurring chlorine to oxidize the mercury following combustion. The oxidized mercury can then be captured in common particulate control devices. Oxidizing agents can be applied to iron ore or coal in the feeder system or they can be injected into the flue gas stream. Applying an oxidizing agent to a feeder system has not been demonstrated when combusting biomass or natural gas. The source of mercury emissions when burning biomass or natural gas is the mercury from the ore being released during firing. Oxidizing agent injection technology can be used in conjunction with other technologies such as activated carbon injection; in this case the ionic mercury is adsorbed onto carbon particles and is then captured in the particulate control device (reference (24)).

The EERC study for the MTMCAC taconite mercury reduction research investigated the corrosion potential of halogen injection at taconite facilities (reference (25)). This study included short term testing on the addition of chloride and bromide salts to operating induration furnaces in order to convert elemental mercury to its oxidized state, which can then be captured in a particulate control device. In order to determine the effectiveness of this control technique, mercury measurements were taken from a single stack at the outlet of a wet scrubber with and without the addition of chloride and bromide salts.

Initial short-term test results have shown that mercury emissions were decreased from 5% to 13% with the addition of chloride salts in a straight-gate furnace and a 18% to 32% decrease in a grate-kiln (depending on the application rate). Bromide salts were found to be more effective in a straight-gate furnace, resulting in mercury reduction of 62% to 64%.

Another oxidizing agent injection system currently being researched is Nalco Mobotec's MerControl® technology. MerControl® is a patented technology that treats flue gas by injecting a molecular halogen, such as calcium hypochlorite or calcium bromide, which is able to decompose to form a molecular halogen at flue gas temperature. The molecular bromine then converts elemental mercury to mercuric bromine, which is absorbed by alkaline solids, such as sub-bituminous or lignite coal ash, and then captured by a particulate control device. This technology can be used in conjunction with activated carbon, if the use of MerControl® alone can't meet a required emission limit.

Enhancing Existing Systems

Research here is focused on converting elemental mercury to oxidized mercury, which can then be captured in a particulate control device. A patented photochemical oxidation process (GP-254 Process) exposes flue gas to ultraviolet light and oxidizes the elemental mercury. The oxidized mercury then reacts with oxygen and sulfur dioxide to form mercurous sulfate and mercuric oxide, which are captured in a particulate control device (reference (26). This technology has not been demonstrated commercially; more testing needs to be completed in order to determine the reliability of this process.

Adsorption R&D

Sodium-based sorbents are thought to have low to moderate capture efficiencies, while metal oxide-based sorbents have the potential to have moderate to high capture efficiencies (reference (6). There needs to be more testing completed on each of these technologies for either one to be considered technically feasible.

Iodine and sulfur impregnated carbon have been shown to work effectively for elemental mercury control (reference (6). These technologies are costly and developers are still working to improve the economics.

Some novel sorbents are derived from carbon-based industrial wastes and are a cost effective alternative to activated carbon sorbents. A different novel process involves the capture of mercury on a regenerable sorbent with small amounts of a noble metal on a substrate. Both of these technologies have been shown, on a bench-scale, to achieve higher control efficiencies than activated carbon. However, pilot-test results have shown that mercury removal is severely degraded with time for the regenerable sorbent option (reference (27). These technologies require further testing in order for them to become commercially available.

Titanium-based nano-structured sorbent agglomerate has been shown in bench-scale testing to be an effective option for the capture of mercury. The in-situ-generated nano-size titania particles are activated by UV light, and the activated particle then captures the mercury (reference (28)). This process is not commercially available at this time.

Solis selenium filters are rated at moderate to high levels of mercury control. However, this is a relatively high cost technology and is not commercially available.

Appendix D

Mercury Mitigation Demonstration at Mesabi Nugget

Mercury Mitigation Demonstration at Mesabi Nugget

Draft Final Report

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1.0 EXECUTIVE SUMMARY

In anticipation of the state of Minnesota regulating mercury emissions for the iron production industry, Mesabi Nugget Delaware, LLC contracted ADA-ES, Inc. (ADA) to perform testing at the Mesabi Nugget facility. ADA was contracted to investigate and test the viability of activated carbon injection and Calcium Bromide ($CaBr_2$) injection.

In March of 2013, ADA conducted half-scale mercury (Hg) capture tests on the Mesabi Nugget facility. Testing included injection of Albemarle HPAC, high temperature brominated powder activated carbon (PAC), as well as $CaBr_2$ (Hg oxidizer).

HPAC was injected at the outlet of the south air preheater. $CaBr_2$ was injected into one of the coal feed screws prior to combustion in the furnace to increase the presence of halogens in the exhaust gas which helps oxidize vapor-phase mercury and can increase natural removal across the scrubber.

The mercury sampling location was established on the south side gas path, immediately before the ID fan, approximately 30 feet above grade. Mercury measurements were obtained at this location using a Thermo Scientific Freedom System™ continuous emissions monitoring system (CEMS), see Appendix A. The mercury measurements were conducted continuously through the test duration. Baseline measurements were collected prior to the coal additive and sorbent injection periods. Unit operating data and stack compliance CEMS data were recorded by the Mesabi control system. This information was used to calculate the mercury emission rate data presented.

Barr Engineering performed EPA Method 30B mercury measurements at the Hg-CEMS location.

The following are the results from ADA's parametric testing:

Table 1. Complete ADA Testing Results

Date	Time	Condition	Injection Rate (lb/hr)	HgT (µg/wscm)	HgT (lb/hr)	Oxidation	Removal
3/20/2013	12:00-21:00	BL	-	12.36	0.0070	4%	-
3/21/2013	7:00-8:30	CaBr2 BL	0	11.34	0.0059	4%	-
3/21/2013	12:00-13:30	CaBr2 R1	100	8.82	0.0046	4%	22.2%
3/21/2013	15:30-17:00	CaBr2 R2	300	7.36	0.0038	6%	35.1%
3/21/2013	18:00-19:15	CaBr2 R3	400	7.32	0.0038	9%	35.4%
3/23/2013	9:00-10:05	HPAC BL	0	12.00	0.0072	6%	-
3/23/2013	10:20-11:10	HPAC R1	36	11.26	0.0066	6%	6.2%
3/23/2013	13:15-14:40	HPAC R2	90	10.49	0.0057	11%	12.6%
3/23/2013	15:23-16:15	HPAC R3	212	8.64	0.0040	14%	28.0%

The data suggests neither $CaBr_2$ nor HPAC alone will be able to provide the 75% removal desired.

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2.0 INTRODUCTION

Mesabi Nugget Delaware, LLC contracted ADA Environmental Solutions (ADA) to assist in evaluating options to reduce mercury emissions at their iron producing facility to a level below the expected State of Minnesota regulation. This report from ADA describes the details of the mercury control evaluation for the Mesabi Nugget facility.

This demonstration was intended to determine if high levels of mercury control were achievable. The demonstration included the following mercury control technologies: brominated Powdered Activated Carbon (PAC) and coal additive $CaBr_2$.

It is known that mercury is more readily captured in its oxidized state than in its elemental state. Once vapor-phase mercury becomes ionic, or has shifted from elemental (Hg^0) to oxidized (Hg^{2+}) states, it can be either adsorbed by powdered activated carbon (PAC) injected into the waste gas or captured by wet scrubbers. Accordingly, brominated sorbents and coal additives such as $CaBr_2$ were selected for the Test Plan as alternative means to achieve the benefit of higher vapor-phase mercury removal through increased oxidation.

ADA installed and operated one Thermo Scientific Mercury Freedom System™ continuous emissions monitoring systems (Hg-CEMS). The Hg-CEMS sampled from the south side duct at the ID fan inlet. The Hg-CEMS measurements were the basis for the mercury measurements and emission profile characterization for the duration of the test program.

Table 2. Personnel List

ADA personnel involved in the execution and coordination of this test:

Role	Name	Office Phone	Cell Phone	E-mail
Project Manager	Paul Johnson	(303) 962-1931	(720) 384-6111	paul.johnson@adaes.com
Project Engineer	Drew Bertelson	(720) 889-6222	(720) 369-1810	drew.bertelson@adaes.com
Project Director	Tom Campbell	(303) 339-8864	(303) 981-7287	tom.campbell@adaes.com
Project Operations Manager	Robin Stewart	(303) 339-8863	(303) 748-3889	robin.stewart@adaes.com

2.1 Unit Description

The Mesabi Nugget facility is located in Aurora, Minnesota and is the only one of its size in the world. The facility produces high-purity pig iron nuggets using an innovative direct-reduction process. It was designed to have a max output of 140 tons/hr.

The facility uses coal as a heat source for the production process. As the gas exits the furnace, it is split into two gas paths. Each gas path has an air preheater and a wet scrubber for particulate removal. Figure 1 provides a process schematic flow diagram.

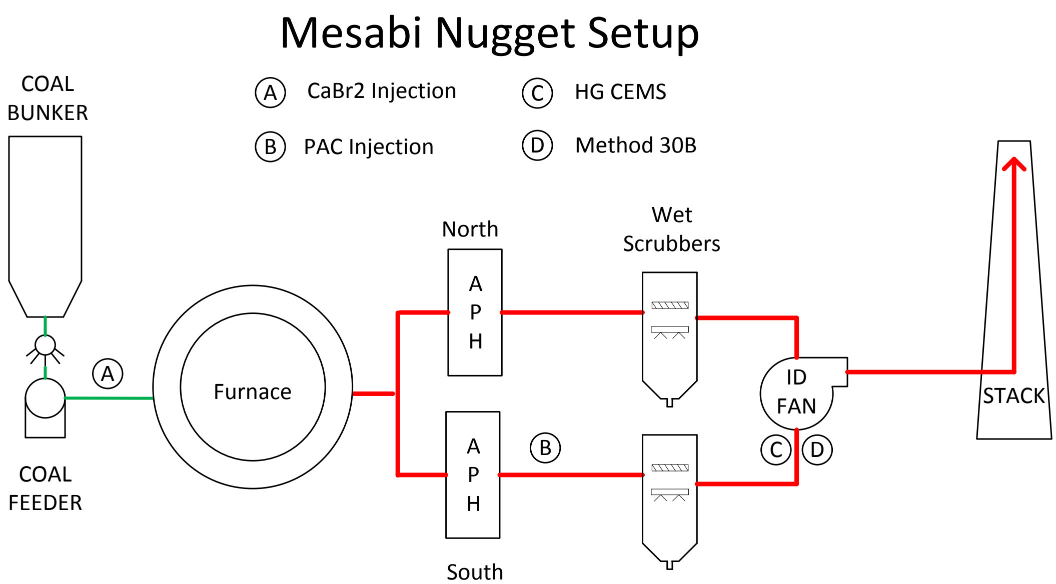

Figure 1: Mesabi Nugget Process Flow Diagram

3.0 EQUIPMENT AND METHODS

The Equipment and Method section of this report gives a brief description of the measurement equipment, locations and methods, as well as the injection equipment and locations.

3.1 Flue Gas Mercury Measurement

3.1.1 Location and Equipment

ADA installed and operated one Thermo Scientific Mercury Freedom System™ continuous emissions monitoring system (Hg-CEMS). The Hg-CEMS was installed on the south side gas path immediately prior to the ID fan approximately 30 feet above grade. Barr Engineering ran Method 30B verification tests for this location but this data was not made available for this report.

3.1.2 Data Collection

The Hg-CEMS operated continuously and unmanned at the ID fan inlet from March 15 through March 24. Due to plant outages and power supply issues for the Hg-CEMS, baseline data was collected on March 20 only. Method 30B sampling runs were conducted by Barr Engineering during baseline and testing days for Hg-CEMS verification. The total vapor-phase mercury emissions data collected during baseline and testing were used to assess the response to injected sorbents and reagents.

3.1.3 Independent Measurement

Barr Engineering was contracted by Mesabi Nugget to perform independent Method 30B testing throughout the baseline, $CaBr_2$, and ACI tests. Two Method 30B tests were typically run for each of the different injection rates for Hg-CEMS verification. Barr Engineering's data was not made available for this report.

3.2 Mercury Mitigation

3.2.1 Albemarle HPAC

The HPAC powdered activated carbon is designed especially for high temperature applications up to 800 °F. It is also treated with a halogen to promote mercury oxidation and capture.

3.2.2 Activated Carbon Injection (ACI) Location and Equipment Description

For this demonstration, ADA installed a temporary activated carbon injection system to be operated on the unit. The Bulk Bag Unloader (BBU) was installed at grade, on the south side of the south air preheater(Figure 2). A blower supplied motive air for the injection skid to the eductor nozzle inlet. A 3-inch concrete hose was attached to the outlet of the eductor and ran up 30 feet to a 6-way splitter (Figure 3). Mesabi had two 4-inch ports installed downstream of where the two outlet ducts of the south air preheater recombine. These ports were 90 degrees offset of each other on the south side of the duct. Two lances were installed into each port at staggered lengths to try to optimize distribution. Four hoses, 1.25 inch in diameter, were connected to the 6-way splitter, leaving 2 legs of the splitter unused.

The convention for describing the injection concentration of injected sorbent is "pounds of sorbent per million actual cubic feet of flue gas", or "lb/MMacf". However, due to receipt of hourly average stack flow data, it was difficult to accurately describe the injection in terms of lb/MMacf. The injection will remain described in terms of lb/hr.

Figure 2: Bulk Bag Unloader location and setup

Figure 3: Location of 6-way splitter prior to ports installed

3.3 Coal Additive Injection - Hg Oxidizer

3.3.1 $CaBr_2$

$CaBr_2$ coal additive increases the presence of halogens in the waste gas which helps oxidize vapor-phase mercury and increase the capture efficiency of wet scrubbers or injected mercury sorbents.

3.3.2 Injection Location and Equipment Description

ADA installed a temporary coal additive system consisting of a pump skid and several containers of additive. The skid and containers were located at grade in the center of the furnace ring near the coal feeders. The CaBr2 additive was pumped from the containers through the pump skid, through ¼-inch tubing, and into a ¼-inch stainless steel tube that feed directly into the coal feed screw. The flow was metered by the pump to treat the entire unit.

The convention used for describing the concentration of coal additive to be applied onto the coal is "parts per million of bromine by weight of coal," or ppm_m. This value is referred to herein as the "additive concentration." The actual feed rate of chemical in terms of gallons per hour (gph) is therefore dependent on the total coal feed rate at the application point.

4.0 TESTING

The first week on site was focused on the installation and calibration of the Hg-CEMS. During this time, the power supply for the Hg-CEMS was lost on two separate occasions. A more reliable power supply was connected at the start of the second week of testing. The splitter and hoses were hung while still waiting on the injection ports to be installed. The Bulk Bag Unloader was installed in the middle of the second week following the installation of the ACI ports. The ports had to be installed first as the location of the BBU would have interfered with the port installation.

Initial baseline measurements were taken on March 20 with the Hg-CEMS. Barr Engineering ran three (3) Method 30B tests during this time. This data was not immediately available and was not provided for this report. Following the baseline test, parametric tests were performed by injecting $CaBr_2$ and HPAC on March 21 and March 23, respectively. ADA's approach to parametric testing is to begin low and increase injection with subsequent test runs. During both parametric test days, Barr Engineering performed Method 30B tests during each of the injection rates. Upon completion of both parametric tests, demobilization of the measurement and injection equipment commenced and ADA was off-site March 26.

4.1 Test Matrix

Mesabi Nugget Test Matrix	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	3/19	3/20	3/21	3/22
	M	T	W	Th	F	S	Su	M	T	W	Th	F
ADA Travel	X											X
Equipment Setup		X	X	X	X							
Baseline						X						
CaBr2 Parametric							X					
HPAC Parametric								X				
CaBr2 and HPAC Parametric									X			
Demobilize										X	X	

Figure 4: Test Matrix

4.2 Baseline

4.2.1 Test Data

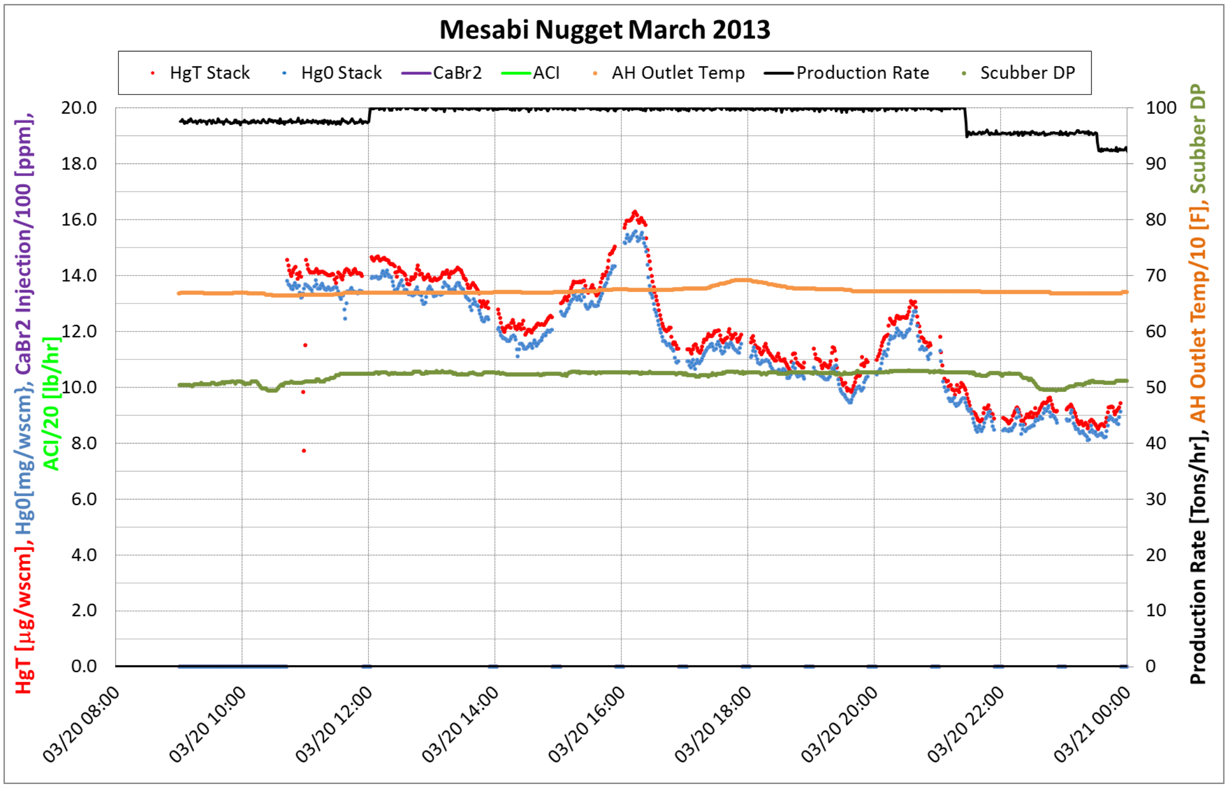

Figure 5: Baseline Testing Data

Table 2. Hourly Average Plant CEMS Data

3/20/2013	NOx	SO2	Flow
Time	lb/hr	lb/hr	kdscfh
9:00-10:00	153.9	20.9	20716
10:00-11:00	155.9	19.7	20434
11:00-12:00	155.8	19.1	20383
12:00-13:00	145.8	15.4	19196
13:00-14:00	145.0	14.8	19494
14:00-15:00	136.1	15.8	19119
15:00-16:00	135.6	15.8	19308
16:00-17:00	132.6	14.4	19053
17:00-18:00	136.8	14.1	19390
18:00-19:00	133.0	10.8	19165
19:00-20:00	132.3	8.9	19132
20:00-21:00	129.2	7.2	18628
21:00-22:00	122.1	6.8	18566

4.2.2 Analysis

Baseline data was collected on March 20. Prior to this day, the unit had been off for two days for maintenance. The lack of waste gas caused the Hg-CEMS probe to lose its conditioning. During the morning of March 20, a calibration of the Hg-CEMS was required prior to starting testing.

The unit was at a production rate of 100 tons/hr during the day on March 20 for compliance testing. Unfortunately, this production rate was not achieved during the parametric testing which made it difficult to comparatively assess each test.

While the production rate stayed steady at 100 tons/hr during baseline, the stack data would indicate something else changing in the process. NO_X, SO_2, flow, and Hg all steadily decreased throughout the test. This change makes it difficult to know what an accurate baseline is. For the parametric testing, a baseline will be calculated with the data immediately prior to starting testing for that day.

A baseline mercury average of 12.36 μg/wscm, or 0.0070 lb/hr, was measured between 12:00 and 21:00 with data from 15:30 to 17:00 not used. The spike in Hg from approximately 15:30 to 17:00 was due to the doorto the trailer housing the Hg-CEMS accidentally opening. The Hg-CEMS temperatures dropped causing inaccurate Hg data for that time period. Once the temperatures returned to normal, the Hg data was accurate.

Conversion calculations can be found in Appendix F.

4.3 $CaBr_2$ Parametric Testing

4.3.1 Test Data

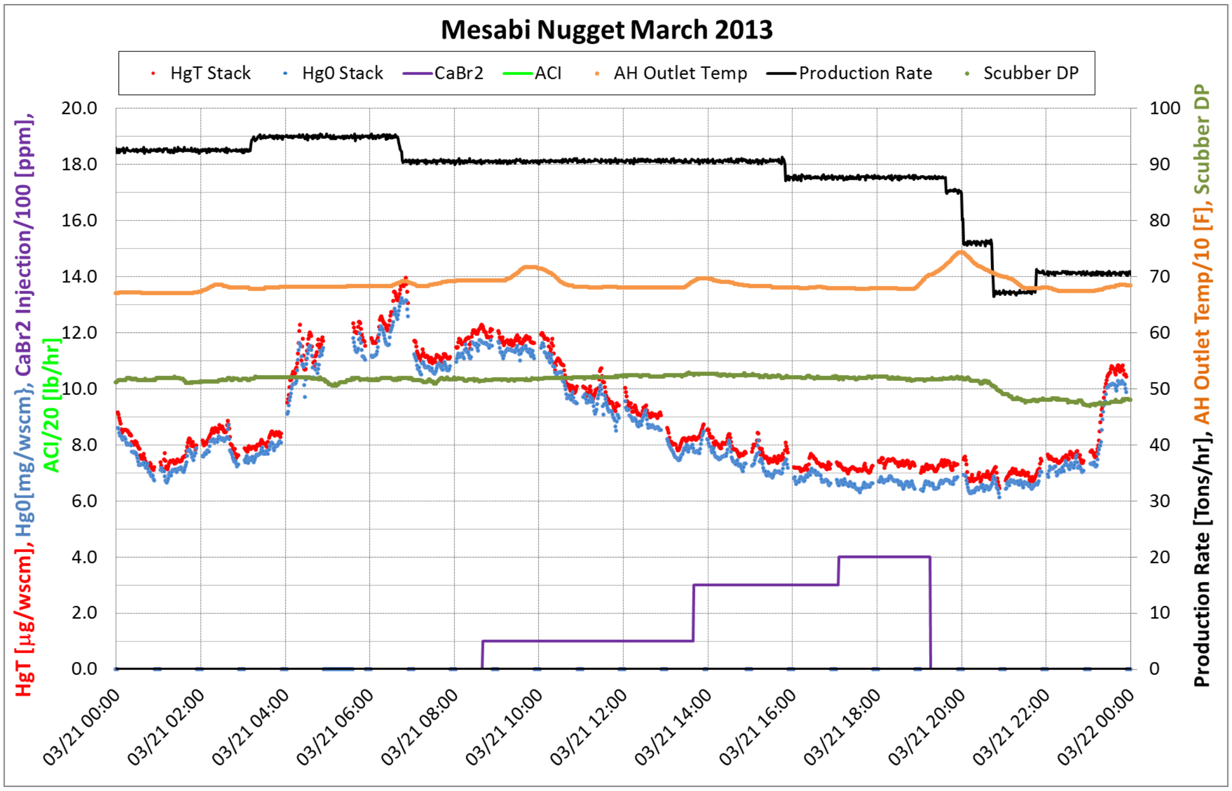

Figure 6: CaBr2 Parametric Testing Data

Table 3. Hourly Average Plant CEMS Data

3/21/2013 Time	NOx lb/hr	SO2 lb/hr	Flow kdscfh
7:00-8:00	124.8	11.7	17840
8:00-9:00	125.9	10.8	17842
9:00-10:00	121.4	4.4	17741
10:00-11:00	123.7	4.1	17733
11:00-12:00	126.7	6.9	17653
12:00-13:00	126.0	5.0	17616
13:00-14:00	126.5	4.5	17656
14:00-15:00	123.9	4.0	17612
15:00-16:00	128.2	3.6	17637
16:00-17:00	130.8	3.0	17562
17:00-18:00	127.4	3.2	17495
18:00-19:00	121.9	2.8	17512
19:00-20:00	119.6	2.7	17307
20:00-21:00	119.2	2.9	17002

Table 4. CaBr2 Parametric Testing Results

3/21/13 Time	Injection Rate (ppm)	HgT (µg/wscm)	HgT (lb/hr)	Oxidation	Removal
7:00-8:30	0	11.34	0.0059	4%	-
12:00-13:30	100	8.82	0.0046	4%	22.2%
15:30-17:00	300	7.36	0.0038	6%	35.1%
18:00-19:15	400	7.32	0.0038	9%	35.4%

4.3.2 Analysis

$CaBr_2$ parametric testing took place on March 21. The unit was at 90±3 tons/hr during testing. The stack CEMS data appears to be much more consistent except for the drop in SO_2 early in the morning. The drop could be associated with the change in production at that time.

As stated previously, the baseline for this parametric testing was taken immediately before the start of injection.

It appears the $CaBr_2$ takes a while to work into the system and effects to be seen. It took almost an hour for the Hg to start decreasing. Due to the limited amount of chemical and time, allowing the Hg to level off was not possible at the earlier injection. It is apparent at the 400 ppm injection rate, that the CaBr2 is having an effect since the Hg oxidation increased. However, it seems to have diminishing returns as the removal did not improve as compared to the 300 ppm injection rate. The oxidation is occurring, but the capture of the oxidized Hg appears to be limiting the removal.

The data collected from this test suggests that injection of $CaBr_2$ only would not achieve the 75% removal regulation.

4.4 HPAC Parametric Testing

4.4.1 Test Data

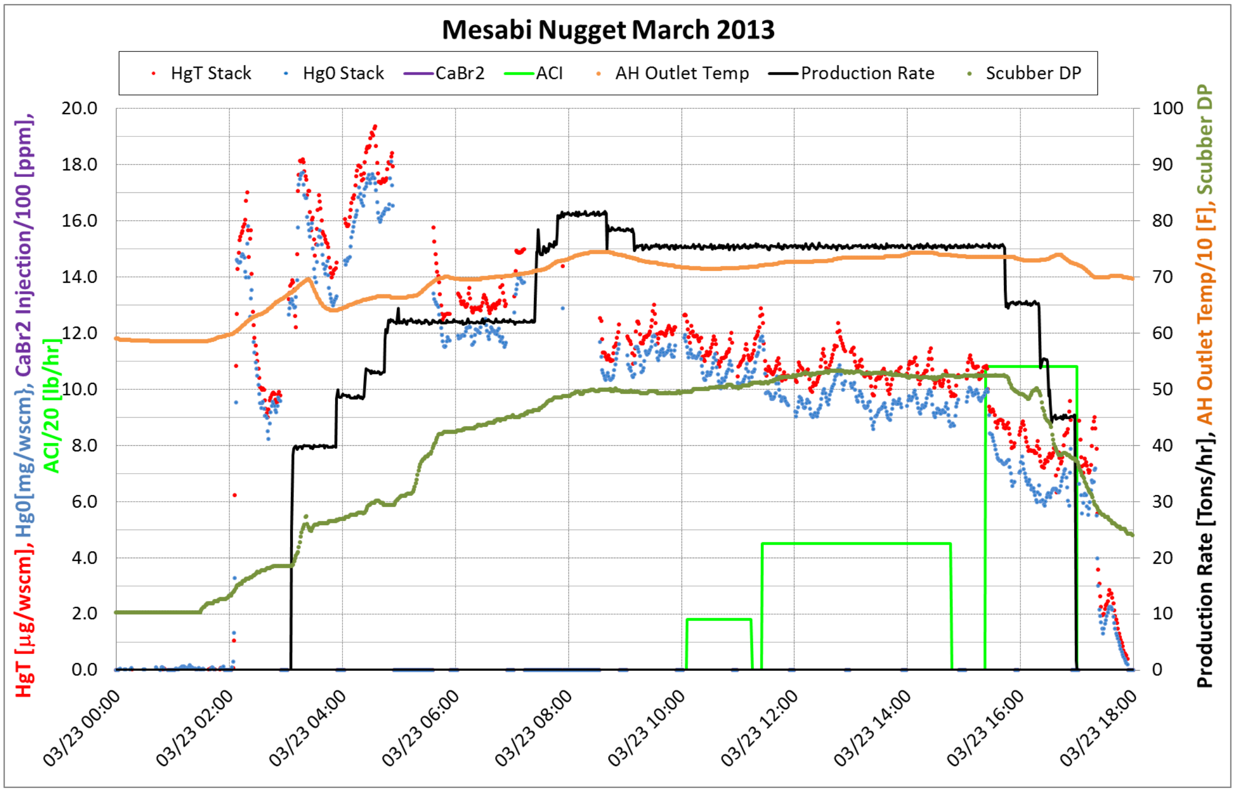

Figure 7: HPAC Parametric Testing Data

Table 5. Hourly Average Plant CEMS Data

3/23/2013 Time	NOx lb/hr	SO2 lb/hr	Flow kdscfh
8:00-9:00	146.5	4.9	20792
9:00-10:00	146.9	6.3	20537
10:00-11:00	146.4	6.1	20136
11:00-12:00	138.5	6.0	19076
12:00-13:00	138.0	6.1	18884
13:00-14:00	142.0	7.3	19497
14:00-15:00	129.0	8.0	17450
15:00-16:00	123.1	7.7	16289
16:00-17:00	84.3	2.5	13581

Table 6. HPAC Parametric Testing Results

3/23/13 Time	Injection Rate (lb/hr)	HgT (µg/wscm)	HgT (lb/hr)	Oxidation	Removal
9:00-10:05	0	12.00	0.0072	6%	-
10:20-11:10	36	11.26	0.0066	6%	6.2%
13:15-14:40	90	10.49	0.0057	11%	12.6%
15:23-16:15	212	8.64	0.0040	14%	28.0%

4.4.2 Analysis

Parametric testing was performed on March 23. The unit had been down for maintenance March 22 and as a result the Hg-CEMS had to be calibrated the morning of March 23. The unit was at a production rate of 75 tons/hr throughout most of the day. At approximately 15:43, the unit started to ramp down to eventually shut down at 17:00. The ramp down was 20 minutes after ADA increased injection to the final injection rate of 212 lb/hr. ADA was not made aware of the change in conditions until Barr Engineering noticed declining stack temperatures that a call to the control room at 16:40 revealed that the unit had been on its way down for the past hour. It should be noted when reviewing Table 5 that the change in unit conditions makes the final injection rate data incomplete and possibly inaccurate.

Judging from the plant stack data, the unit ran relatively consistent through around 14:00. It is difficult to tell from hourly average data when the changes started occurring but it appears the Hg data was unaffected until the unit started coming down. Due to the changes in stack flow and only receiving hourly average flow data, the injection was left as a rate, lb/hr, and not as a concentration, lb/MMacf, for accuracy.

HPAC appears to be working as the oxidized Hg increases and the Hg decreases. It is difficult to tell how much Hg removal the 212 lb/hr rate would have achieved since the unit began shutting down not long into the injection period.

Based on the 90 lb/hr injection rate data, and partially based on the incomplete data at 212 lb/hr, the data does not suggest the 75% reduction regulation is achievable with HPAC alone.

5.0 DISCUSSIONS AND CONCLUSION

The Mesabi Nugget unit currently only has one place on each of its waste gas streams to inject PAC and manage to recapture the injected carbon. This location is between the air preheater and the wet scrubber. At this location, however, the temperatures are too high for standard PAC. For this testing a specially designed activated carbon, Albemarle's HPAC, was used to try to capture the vapor phase mercury. Unfortunately, it does not appear HPAC will work with the current conditions to achieve 75% mercury removal.

It appears $CaBr_2$ is affective at increasing oxidized mercury at Mesabi Nugget. But either the wet scrubber is not effective enough at capturing the oxidized mercury or there is not sufficient native particulate matter to capture this oxidized mercury. With current conditions, it does not look as though $CaBr_2$ alone would achieve 75% mercury removal.

In conclusion, both $CaBr_2$ and HPAC injection showed some mercury reduction at the Hg-CEMS sampling location but neither was able to attain the desired 75% removal individually. Based on the results of ADA's testing, it appears Mesabi Nugget will need to perform additional mercury control testing to achieve the 75% removal regulation.

6.0 APPENDIX A: MEASURMENT EQUIPMENT DESCRIPTIONS

Thermo Scientific Mercury Freedom System™

A mercury continuous emission monitor system (CEMS), specifically, the Mercury Freedom™ System manufactured by Thermo Scientific provides a method to monitor mercury concentrations real-time in the range expected from process gas streams. Thermo Fisher's Mercury Freedom™ System is comprised of a mercury analyzer, a mercury calibrator, a mercury probe controller, and a mercury probe along with additional peripheral components, such as a zero air supply, umbilical, and instrument rack. A sketch of the assembled Thermo Fisher Mercury Freedom System as installed into a CEMS rack is shown in Figure 8. The plumbing and interconnection diagram for the Mercury CEMS is shown in Figure 9.

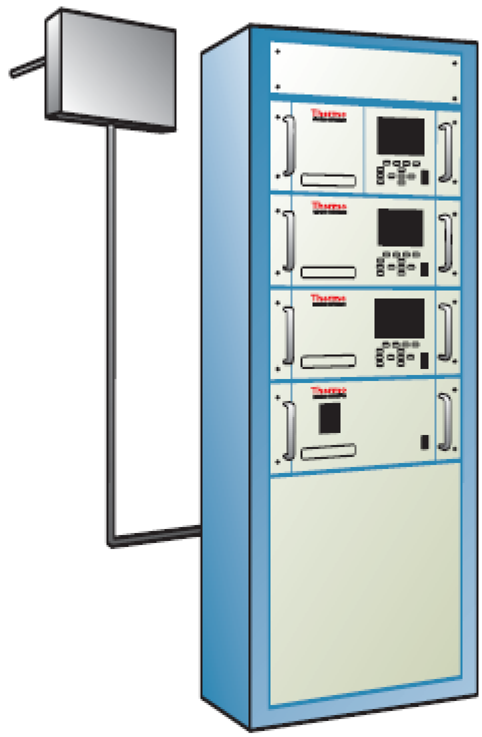

Figure 8. Thermo Scientific Mercury Freedom System

The system uses a probe/converter with an inertial separation filter with dilution and sample pretreatment (conversion/scrubbing) at the stack. The analyzer is based on the principle that mercury atoms absorb ultraviolet (UV) light at 253.7 nm, become excited, then decay back to the ground energy state, emitting (fluorescing) UV light at the same wavelength. The analyzer uses this UV fluorescence method to detect mercury via continuous, direct measurement cold vapor atomic fluorescence spectroscopy (CVAFS). This allows real-time, continuous mercury monitoring.

The integrated analyzer calibration system uses elemental mercury via vapor pressure/mass flow control. As elemental mercury can be transported without significant problems, this system uses this form via a mercury source in the calibrator. The non-elemental fraction is either converted to elemental mercury (for total mercury measurement) or removed (for measurement of the elemental fraction) near the sample extraction point. This minimizes any losses due to the sampling system.

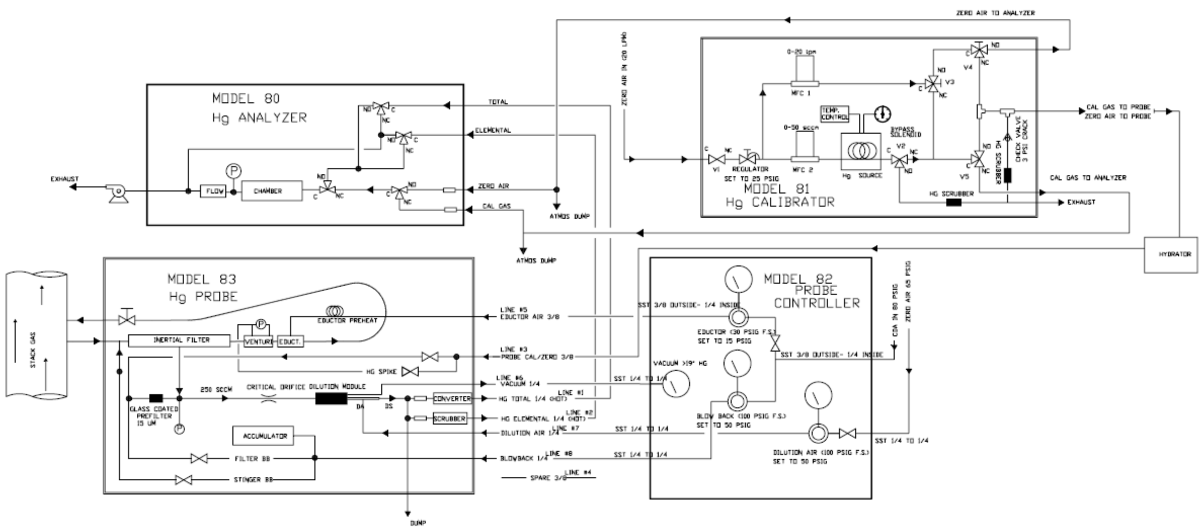

Figure 9. Thermo Fisher Mercury CEMS Plumbing Diagram

Model 80*i* Mercury Analyzer

Mercury is continuously measured directly in the analyzer using CVAFS, with no additional gases required. There is no cross interference from SO_2 with CVAFS. Because the sample is diluted, it has low moisture, is relatively non-reactive and therefore has minimal interference from other gases.

The analyzer is configured with two sampling channels that can be used for two sampling locations or measuring total and elemental mercury measurements at a single location. The sample from the probe is introduced to the rear panel of the instrument as either total mercury or elemental mercury from the appropriate probe umbilical connection. When sampling total mercury, the total sample is routed into the fluorescence chamber and the elemental mercury sample bypasses the chamber. When the sampling elemental mercury, the elemental sample is routed into the fluorescence chamber and the total mercury sample bypasses the chamber. As the monitored sample (total or elemental mercury) leaves the optical chamber, it passes through a flow sensor, then to an external pump. The external pump is used to draw the sample through the analyzer and to create the analyzer vacuum, which is measured with the pressure transducer. The schematic of the flows through the analyzer are shown in Figure 10.

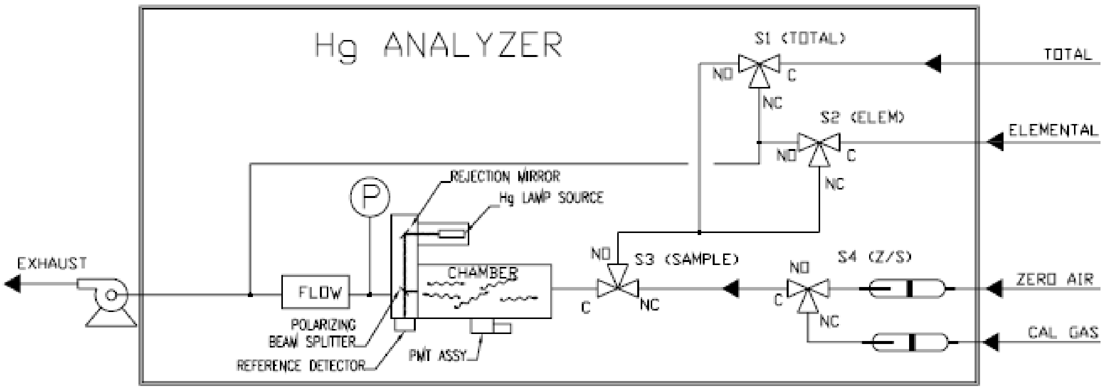

Figure 10. Model 80i Mercury Analyzer Flow Schematic

Either the total or the elemental sample is introduced into the fluorescence chamber, where UV light from a high-energy mercury line source lamp excites the mercury atoms. The UV light is directed to the fluorescence chamber by a rejection mirror/beam splitter combination. A reference detector monitors the lamp intensity by viewing the transmitted light from the beam splitter. As the excited mercury atoms decay back to the ground energy state, they emit UV light that is proportional to the mercury concentration. The mercury fluorescence is monitored by a solar blind photomultiplier tube (PMT) placed at a right angle to the exciting radiation. The PMT detects the UV light emission from the decaying mercury atoms.

Model 81*i* Mercury Calibrator

A Thermo Fisher Mercury Calibrator is used to calibrate directly to the analyzer and probe. The calibrator module incorporates a mercury source in a temperature-controlled chamber that can be heated or cooled to maintain the source at a precise temperature. The Mercury Calibrator generates known concentrations of gas phase elemental mercury by combining the output flow of the temperature-controlled, saturated mercury vapor source with a flow of mercury-free dilution air. The operator can program the calibrator to deliver zero or span gas to the analyzer, to the sample port between the inertial filter and the critical orifice, or upstream of the inertial filter. A picture of the Model 81i Mercury Calibrator and a diagram of the major internal components can be found in Figure 11.

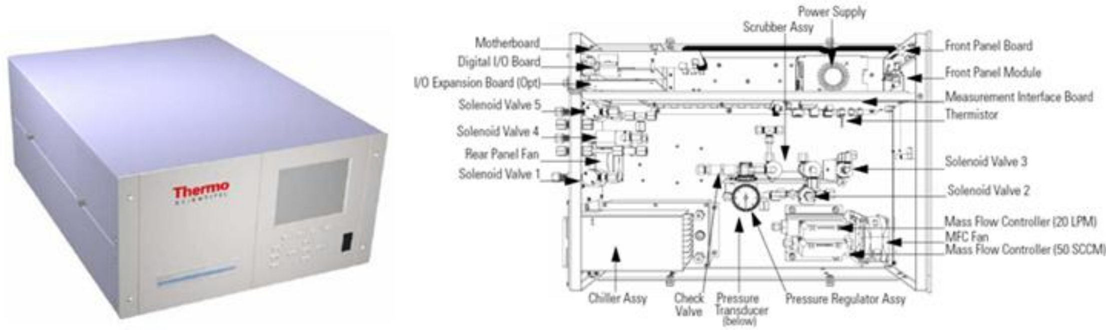

Figure 11. Model 81i Mercury Calibrator and Hardware Components

Calibration gas from the calibrator is plumbed to the zero air and cal gas bulkheads on the rear panel of the analyzer. Currently, elemental mercury is used for calibrations. The zero or span gas is routed through an internal critical orifice, through two solenoids, and into the fluorescence chamber. During this time, both total and elemental mercury samples bypass the chamber and they are sent to the external pump exhaust. The analyzer outputs the total mercury or elemental mercury concentration to the front panel display, the analog outputs, and makes the data available over the serial or Ethernet connection.

The Mercury Calibrator is calibrated to NIST standards at the factory and it should not require calibration prior to startup. However, when a mass flow controller or pressure transducer is replaced it must be calibrated before operating the instrument.

Model 82*i* Mercury Probe Controller and Model 83*i* Mercury Probe

The Thermo analyzer measures vapor-phase mercury. A probe is required to extract a representative sample of flue gas from the duct. As mentioned, the extraction probe contains an inertial separation filter; this is because fly ash collected on a standard sampling filter can cause sampling artifacts such as capture of vapor-phase mercury on the fly ash, or conversion of the form of mercury, typically from the elemental vapor-phase to the oxidized vapor-phase. An inertial separation filter minimizes fly ash buildup on the sampling filter and subsequent sampling artifacts. The sample is immediately diluted with pre-heated dilution air to minimize mercury reactions with other flue gas species. The porous filter element can be cleaned in-situ by simple blow back.

In an inertial separation filter, the filter forms the wall of the pipe through which the bulk gas flows. The bulk of the ash is carried with the bulk flow through the pipe and only a small fraction of the ash is captured on the walls as a sample of the flue gas is drawn through the filter for analysis. For reference, the ratio of bulk gas to sample flow is typically in the range of 100:1 to 400:1. The velocity of the bulk flow is typically set at 70 to 100 feet per second. The combination of the high bulk gas velocity and high ratio of bulk gas to sample gas results in efficient inertial separation of the gas and particulates. In addition, the bulk flue gas flow tends to scour fly ash continuously from the filter surface and to maintain a clean filter surface. This arrangement has demonstrated good performance and is applicable to low and high dust environments. The probe case and internal components are shown in Figure 12.

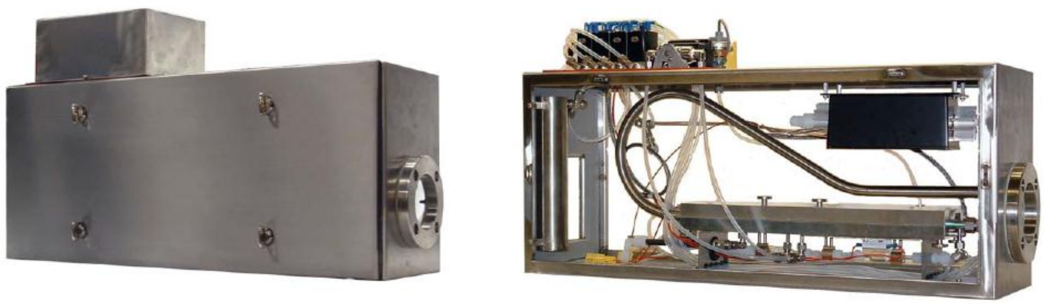

Figure 12. Model 83i Mercury Probe

The wetted surfaces of the probe upstream of mercury measurement are coated with an inert layer of glass. This coating is very durable and it should minimize corrosion of the metal surfaces, which can lead to mercury oxidation. The purpose of the integrated conversion system is twofold. The first step is to convert all the mercury to elemental mercury or to remove oxidized mercury because the elemental fraction is the only form that can be analyzed. Second, to remove gases that interferes with the analyzer.

Sample pretreatment (conversion or scrubbing) is done via the probe/converter. For total vapor-phase mercury measurements, all non-elemental vapor-phase mercury in the flue gas is converted to elemental mercury. To measure speciated mercury, the non-elemental vapor-phase fraction is removed via a scrubber, which removes acid gases as well. The sample must be transported from the extraction location to the analyzer. The transport line is downstream of conversion and coupled with dilution. The line is heated (>220ºF), and made of PFA Teflon™.

Mercury CEMS Operation in Extreme Conditions

Extreme conditions for purposes of operating Mercury CEMS are defined as having one or more of the following:

High dust loading (sampling at locations prior to the particulate control device);

High temperatures > 500˚F;

SO_3 concentrations > 30 ppm;

SO_2 concentrations > 2000 ppm;

High selenium process gas stream; and/or

High moisture (i.e., downstream of wet FGD).

These conditions will be reported if they are in the "extreme" range listed above, and are available to ADA. Some of the data such as SO_3 content is difficult to measure on an ongoing basis, so data may be limited. Mercury CEMS are typically designed to operate at the stack downstream of pollution control devices. With care, accurate measurements can be successfully obtained in difficult upstream locations. Techniques have been developed for measuring in locations that are more difficult to sample and analyze mercury in the flue gas.

Particulate from process gas streams can react with or adsorb mercury as the flue gas passes through a filter. This effect can be minimized if the standard sampling filter is replaced with an inertial separation probe to reduce the contact between the flue gas and fly ash upon extraction from the duct. Although not perfect, this type of probe greatly reduces the interactions between the fly ash and mercury. To improve the results, the inertial filter should be maintained at or above the flue gas temperature and an automatic blowback should be conducted periodically to remove fine particulate that may form on the inertial separation filter surface. If the measured mercury concentration increases following blowback, the blowback frequency should be increased.

When measuring mercury in high temperature flue gas, the extraction probe temperature should be maintained at flue gas temperatures. This may require modifications to some inertial separation probes to replace components that may not be appropriate for elevated temperature operation. The user should be careful to eliminate cold spots on the probe (even the portion outside the duct) as this can cause rapid plugging of the filter, especially at units equipped with an SCR where ammonia and SO_3 may be present.

Because the catalytic nature of many trace metals increases with temperature, it is still recommended to use an inertial separation filter if it can be maintained at the appropriate temperature and when speciation information is desired, in the event an ash is sampled with catalytic characteristics. It may be necessary to preheat the eductor air on the inertial filter assembly to prevent gas quenching in the eductor and subsequent plugging, especially when sampling in high SO_3 environments.

Measuring mercury in high SO_2/SO_3 environments can be very difficult. Frequent system checks need to be made with both zero and mercury span gas to assure quality measurements. Alkali-SO_2/SO_3 reactions occur most efficiently at higher temperatures and it is recommended that the probe be heated to 700˚F. The connections from the probe are typically Teflon™, therefore it becomes a balancing act to prevent condensation of SO_3 and yet cool the flue gas down enough to below the softening point of Teflon™. Longer-term use of CEMS at these conditions may require a more aggressive maintenance schedule, especially for pumps, tubing, and flow meters that can be affected due to prolonged exposure to sulfuric acid.

High moisture environments can cause sample-handling problems, particularly at the extraction probe. If the probe temperature is not maintained at a sufficient temperature, liquid can form on the sampling filter and increase the pressure drop across the filter sufficiently that drawing a sample through the filter is difficult. Eventual plugging may also occur in the eductor as wet scrubber carryover collects and dries. It is recommended that an inertial filter be used, the temperature of the probe be maintained well above water dew point temperature, the inlet probe extending into the duct be heated to help elevate the bulk gas temperature before it reaches the inertial filter, and that a tip be installed on the end of the probe to reject large droplets. Thermo has developed a "slurry cup" for this purpose. Periodic blowback of the filter and probe on a regular basis is also recommended, and may even be required every few hours.

7.0 APPENDIX B: MERCURY MEASUREMENT QUALITY ASSURANCE

Mercury CEMS Quality Assurance Program

ADA Environmental Solutions has developed an extensive internal Mercury Continuous Emissions Monitoring System Quality Assurance and Quality Control Program that is implemented as a guide during ADA's Thermo Scientific Mercury Freedom System™ operation and deployment.

Given the locations for installation of mercury analyzers during test programs, strict adherence to promulgated quality assurance standards is not always possible. As such, latitude is taken internally when applying the quality assurance standards to the data collected with experience and judgment employed when interpreting data.

In order to have confidence in the individual measurements and the conclusion based on those measurements, a set of quality assurance checks have been developed. Many of the quality control requirements were used as referenced in Appendix A and Appendix B of Part 75. While these QA/QC checks are generally observed, they are only guidelines. ADA has significant experience and expertise in designing and conducting test programs and in conducting the subsequent analyses.

Regulatory Drivers

Clean Air Mercury Rule (CAMR)

The EPA published the Clean Air Mercury Rule (CAMR) on March 15, 2005 to permanently cap and reduce mercury emissions from coal-fired power plants. CAMR provided for operation and maintenance requirements, specifications and test procedures, and quality assurance and quality control procedures for continuous mercury emission monitoring systems (Mercury CEMS) to be included in 40 CFR Part 75.

On February 8, 2008, the D.C. Circuit Court of Appeals vacated the EPA's rule. This removed power plants from the Clean Air Act list of sources of hazardous air pollutants and likewise vacated the entire Clean Air Mercury Rule. Because the entire CAMR was vacated, it is in the opinion of the EPA's Office of General Counsel that the provisions that regulated quality control and quality assurance were also vacated.

Mercury and Air Toxics Standards (MATS)

The EPA signed the Mercury and Air Toxics Standards (MATS) rule to reduce the emissions of toxic air pollutants from power plants on December 16, 2011. Included in the rule were specific emissions standards for mercury and other heavy metals like arsenic, chromium, and nickel. Other hazardous air pollutants, such as hydrochloric acid and hydrofluoric acid emissions were also regulated.

In addition to the emissions limits for hazardous pollutants, the EPA published Appendix A to Subpart UUUUU in 40 CFR Part 63 to provide general provisions for monitoring mercury emissions. Monitoring system installation requirements, description of monitoring methods, certification and recertification procedures, and ongoing quality assurance guidelines are included in Appendix A.

ADA Performance Specifications

ADA has adopted the procedures established by Appendix A of Subpart UUUUU in 40 CFR Part 63 to ensure proper quality control and quality assurance of data collected by the Mercury CEMS.

The intent of the quality assurance program is to configure the Mercury CEMS to follow the applicable QA/QC procedures for compliance as defined in MATS. The procedures are outlined in Appendix A of Subpart UUUUU in 40 CFR Part 63. Appendix A details the certification requirements for installation of mercury monitors and outlines the ongoing quality assurance/quality control (QA/QC) procedures that need to be followed for accurate collection of data. Many of the certification tests are performed on an ongoing basis as part of the QA/QC requirements. While the tests performed are the same, the success criteria for certification can be tighter than what is required for the on-going QA/QC activities. Table 7 and Table 8 provide a summary and comparison of the procedures for certification and on-going QA/QC.

For the short duration tests anticipated in many programs (typically less than 1 month per sampling location), most of the Ongoing QA/QC tests are not applicable. At a minimum, calibrations are performed daily as listed in the table below.

Table 7. Hg CEMS Certification Requirements (Part 63, Subpart UUUUU, Appendix A)

Performance Test	Test Specifications	Criteria	MATS Reference
Seven-Day Calibration Error Test	Zero and upscale check for seven consecutive days.	≤ 5.0% of span value *or* ≤ 1.0 μg/m³ absolute	40 CFR Part 63 Subpart UUUUU Appendix A Section 4.1.1.1
Linearity Check	Challenge monitor with low, mid, and high reference gases.	≤ 10% of ref. value *or* ≤ 0.8 μg/m³ absolute	40 CFR Part 63 Subpart UUUUU Appendix A Section 4.1.1.2
3-Level System Integrity Check	Three-point converter efficiency test.	≤ 10% of ref. value *or* ≤ 0.8 μg/m³ absolute	40 CFR Part 63 Subpart UUUUU Appendix A Section 4.1.1.3
Cycle Time Test	Zero and upscale.	< 15 minutes to 95%	40 CFR Part 63 Subpart UUUUU Appendix A Section 4.1.1.4

Relative Accuracy Test Audit (RATA)	One set of 12 test runs.	< 20% rel. accuracy *or* ≤ 1.0 µg/m³ absolute if RM < 5.0 µg/m³	40 CFR Part 63 Subpart UUUUU Appendix A Section 4.1.1.5

Table 8. Hg CEMS Ongoing Quality Assurance (Part 63, Subpart UUUUU, Appendix A)

Performance Test	Test Specifications	Criteria	MATS Reference
Daily Calibration Error Test	Two-point calibration check (zero and upscale).	≤ 5.0% of span value *or* ≤ 1.0 µg/m³ absolute	40 CFR Part 63 Subpart UUUUU Appendix A Section 5.1.2.1
Quarterly Linearity Check	Challenge monitor with low, mid, and high reference gas.	≤ 10% of ref. value *or* ≤ 0.8 µg/m³ absolute	40 CFR Part 63 Subpart UUUUU Appendix A Section 5.1.2.2
Weekly System Integrity Check	Single-point converter efficiency test.	≤ 10% of ref. value *or* ≤ 0.8 µg/m³ absolute	40 CFR Part 63 Subpart UUUUU Appendix A Section 5.1.2.3
Relative Accuracy Test Audit (RATA) and Bias Test	One set of 12 test runs.	< 20% rel. accuracy *or* ≤ 1.0 µg/m³ absolute if RM < 5.0 µg/m³	40 CFR Part 63 Subpart UUUUU Appendix A Section 5.1.2.4

Equipment Installation and Acceptability

Each component of the Mercury CEMS is evaluated to ensure that the equipment is functioning according to the performance specifications determined by the manufacturer. The mercury system is completely assembled and run through a checklist of activities to simulate and confirm typical operating conditions. All preventative maintenance activities are completed and any modifications required due to sampling location are considered.

Installation Procedure

The installation procedure of a Mercury CEMS is designed to take place over four days although the duration of the equipment installation is highly dependent on equipment configuration, system performance, installation location, and other external influences. A list of the scheduled activities for each day of installation can be found in Table 9.

Table 9. Typical ADA-ES Mercury CEMS Daily Installation Procedure

Install Day	Installation Activities
Day 1	Receive equipment; inspect sampling locations; stage equipment at sampling locations; and provide power to analyzer and calibrator.
Day 2	Inspect analyzer and calibrator system configuration, set points, and communication; supply power to probe and install into duct; set probe temperatures and pressures; check system flow rates; and allow system to condition at temperature overnight.
Day 3	Set PMT voltage adjustment and instrument calibration; set lamp compensation; check instrument calibration response; set probe dilution ratio and system calibration; and check system calibration response.
Day 4	Analyze daily calibration check, linearity check, system integrity check (if applicable), and cycle time response to MATS criteria; determine pass/fail of acceptance tests; and begin sampling of mercury in the flue gas.

The mercury system is installed in accordance with ADA's established practices and procedures. Each step of the procedure is documented to ensure that the system is installed and configured correctly and that components were not damaged during transportation.

The acceptance tests are based on the certification procedures found in Appendix A of Subpart UUUUU of 40 CFR Part 63, as applicable. The certification tests include a two-point calibration error test, three-point linearity error test, a cycle time test, a three-point system integrity test, and a RATA test. The acceptance tests as defined by ADA are described in this document.

Equipment Specifications

It is common for ADA to install a Mercury CEMS at a location upstream of any equipment that may cause control of mercury emissions, including powdered activated carbon injection, dry sorbent injection, particulate collectors, and wet scrubbers. It is also common for the Mercury CEMS to be installed at outlet locations during control technology demonstrations where mercury concentrations will be unstable and not constantly held to specific emissions standards. Therefore, it is impractical for ADA to estimate the concentration of mercury in the flue gas measured at the sampling location according to the generic guidelines found in Appendix A of Subpart UUUUU in 40 CFR Part 63.

Instead, ADA will use the actual Ultimate Analysis of coal to calculate the expected concentration of mercury using combustion calculations and the mercury content in the coal sample. In the absence of recent analysis of the coal, ADA may use typical Ultimate Analysis and mercury content laboratory results for the type of coal that is used at the plant. After the span value and reference gases have been defined, ADA reserves the ability to adjust the reference gas concentrations throughout the test due to test conditions or operational concerns of the Mercury CEMS.

Seven-Day Calibration Drift Check

Excerpts From 40 CFR Part 63, Subpart UUUUU, Appendix A, Section 4.1.1.1

Perform the 7-day calibration error test on 7 consecutive source operating days, using a zero-level gas and either a high-level or a mid-level calibration gas standard. Either elemental or oxidized NIST-traceable Hg standards may be used for the test. If moisture and/or chlorine is added to the calibration gas, the dilution effect of the moisture and/or chlorine addition on the calibration gas concentration must be accounted for in an appropriate manner.

Operate the Hg CEMS in its normal sampling mode during the test. The calibrations should be approximately 24 hours apart, unless the 7-day test is performed over nonconsecutive calendar days. On each day of the test, inject the zero level and upscale gases in sequence and record the analyzer responses. Pass the calibration gas through all filters, scrubbers, conditioners, and other monitor components used during normal sampling, and through as much of the sampling probe as is practical.

Do not make any manual adjustments to the monitor (i.e., resetting the calibration) until after taking measurements at both the zero and upscale concentration levels. If automatic adjustments are made following both injections, conduct the calibration error test such that the magnitude of the adjustments can be determined, and use only the unadjusted analyzer responses in the calculations.

Calculate the calibration error (CE) on each day of the test. The CE on each day of the test must either meet the main performance specification or the alternative specification.

Definition for ADA Environmental Solutions Quality Assurance Program

The seven-day calibration drift check is based on Section 4.1.1.1 in Appendix A of Subpart UUUUU in 40 CFR Part 63. After the Mercury CEMS has been installed and it has passed a hands-off calibration check, the calibration responses will be monitored and analyzed for drift. The amount of acceptable drift of the zero gas or upscale calibration gas response should not exceed 5.0% or 1.0 μg/m^3 absolute difference.

The Mercury CEMS installed by ADA is considered a temporary system and the collection of valid data is often needed prior to the completion of seven straight days of operation. The calibration response of the Mercury CEMS is collected over seven days but is not a determining factor if the Mercury CEMS is collecting valid data. Any drift experienced by the Mercury CEMS is corrected as soon as possible to avoid the collection of inaccurate data.

Linearity Check

Excerpts From 40 CFR Part 63, Subpart UUUUU, Appendix A, Section 4.1.1.2

Perform the linearity check using low, mid, and high level concentrations of NIST-traceable elemental Hg standards. Three gas injections at each concentration level are required, with no two successive injections at the same concentration level.

Introduce the calibration gas at the gas injection port. Operate the CEMS at its normal operating temperature and conditions. Pass the calibration gas through all filters, *scrubbers, conditioners, and other components used during normal sampling, and through as much of the sampling probe as is practical. If moisture and/or chlorine is added to the calibration gas, the dilution effect of the moisture and/or chlorine addition on the calibration gas concentration must be accounted for in an appropriate manner.*

Record the monitor response from the data acquisition and handling system for each gas injection. At each concentration level, use the average analyzer response to calculate the linearity error (LE). The LE must either meet the main performance specification or the alternative specification.

Definition for ADA Environmental Solutions Quality Assurance Program

ADA completes linearity checks according to the specifications outlined in Section 4.1.1.2 in Appendix A of Subpart UUUUU in 40 CFR Part 63. Linearity checks are performed to access the response of the system with the low-, mid-, and high-level reference gases injected at the filter in non-repetitive triplicate. The linearity check must be performed manually by changing the span concentration output of the calibrator during the test. ADA ensures that the daily calibration check has passed requirements before starting a linearity check. The monitor is required to meet a performance specification of 10.0% of the reference gas concentration or an alternate specification of 0.8 μg/m^3 absolute difference from the reference gas, whichever is less restrictive.

Cycle Time Test

Excerpts From 40 CFR Part 63, Subpart UUUUU, Appendix A, Section 4.1.1.4

Perform the cycle time test, using a zero-level gas and a high-level calibration gas. Either an elemental or oxidized NIST-traceable Hg standard may be used as the high-level gas. Perform the test in two stages—upscale and downscale. The slower of the upscale and downscale response times is the cycle time for the CEMS.

Begin each stage of the test by injecting calibration gas after achieving a stable reading of the stack emissions. The cycle time is the amount of time it takes for the analyzer to register a reading that is 95 percent of the way between the stable stack emissions reading and the final, stable reading of the calibration gas concentration.

Use the following criterion to determine when a stable reading of stack emissions or calibration gas has been attained—the reading is stable if it changes by no more than 2.0 percent of the span value or 0.5 mg/scm (whichever is less restrictive) for two minutes, or a reading with a change of less than 6.0 percent from the measured average concentration over 6 minutes.

Definition for ADA Environmental Solutions Quality Assurance Program

The calibration response time is based on the cycle time test based on Section 4.1.1.4 in Appendix A of Subpart UUUUU in 40 CFR Part 63. The calibration response time test is similar to the cycle time test except for the result can be analyzed from any calibration routine with a zero gas and upscale calibration gas response. From a stable mercury concentration measurement, the downscale calibration response time is the time it takes for 95% of the step change to be achieved between the stable mercury concentration value and the stable ending zero gas reading.

To determine the upscale calibration response time, determine the time it takes for 95% of the step change to be achieved between the stable zero gas reading and the stable ending calibration gas reading. To determine the calibration recovery response time, determine the time it takes for 95% of the step change to be achieved between the stable calibration gas reading and the stable mercury concentration value. A stable value is equivalent to a reading with a change of less than 2.0% of the span value for two minutes, or a reading with a change of less than 6.0% from the measured average concentration over 6 minutes. Alternatively, the reading is considered stable if it changes by no more than 0.5 μg/m^3 for two minutes.

System Integrity Check

Excerpts From 40 CFR Part 63, Subpart UUUUU, Appendix A, Section 4.1.1.3

Perform the 3-level system integrity check using low, mid, and high-level calibration gas concentrations generated by a NIST-traceable source of oxidized Hg. Follow the same basic procedure as for the linearity check. If moisture and/or chlorine is added to the calibration gas, the dilution effect of the moisture and/or chlorine addition on the calibration gas concentration must be accounted for in an appropriate manner.

Calculate the system integrity error (SIE). The SIE must either meet the main performance specification or the alternative specification. Note: This test is not required if the CEMS does not have a converter.

Definition for ADA Environmental Solutions Quality Assurance Program

The Mercury CEMS owned by ADA do not use sampling probes equipped with the Thermo Scientific Mercuric Chloride Generator. ADA has determined that the additional effort, cost, and safety requirements to store and use a compressed gas cylinder of 900 ppm Chlorine in Nitrogen is not practical for short-term demonstration projects. Therefore, the system integrity check cannot be completed as described in Section 4.1.1.3 in Appendix A of Subpart UUUUU in 40 CFR Part 63.

Relative Accuracy Test Audit (RATA) Check

Excerpts From 40 CFR Part 63, Subpart UUUUU, Appendix A, Section 4.1.1.5

Perform the RATA of the Hg CEMS at normal load. Acceptable Hg reference methods for the RATA include Ontario Hydro Method, Methods 29, 30A, and 30B in appendix A– 8 to part 60.

The RD must not exceed 10 percent, when the average Hg concentration is greater than 1.0 ug/dscm. If the average concentration is ≤ 1.0 ug/dscm, the RD must not exceed 20 percent. The RD results are also acceptable if the absolute difference between the two Hg concentrations does not exceed 0.2 ug/dscm. If the RD specification is met, the results of the two samples shall be averaged arithmetically.

A minimum of nine valid test runs must be performed, directly comparing the CEMS measurements to the reference method. More than nine test runs may be performed. If this option is chosen, the results from a maximum of three test runs may be rejected so long as *the total number of test results used to determine the relative accuracy is greater than or equal to nine; however, all data must be reported including the rejected data. The minimum time per run is 21 minutes if Method 30A is used. If Method 29, Method 30B, or Ontario Hydro Method is used, the time per run must be long enough to collect a sufficient mass of Hg to analyze.*

Calculate the relative accuracy (RA) of the monitoring system, on a ug/scm basis, as described in section 12 of Performance Specification (PS) 2 in Appendix B to part 60. For purposes of calculating the relative accuracy, ensure that the reference method and monitoring system data are on a consistent moisture basis, either wet or dry. The CEMS must either meet the main performance specification or the alternative specification.

Definition for ADA Environmental Solutions Quality Assurance Program

A relative accuracy check must be performed to validate the mercury concentrations collected by the Mercury CEMS. Although Section 4.1.1.5 in Appendix A of Subpart UUUUU in 40 CFR Part 63 specifies that at least nine RATA check runs must be conducted, ADA has determined that an abbreviated relative accuracy audit (RAA) check can be performed to verify the concentration data. This RAA check is completed using a modified EPA Method 30B to compare the concentrations between the sorbent trap and the CEMS.

ADA collects three paired-trap samples from a sample port equivalent to the location of the Mercury CEMS probe. This mercury measurement method extracts a known volume of flue gas from a duct through a dry sorbent trap that contains a specially treated form of activated carbon. The dry sorbent trap, which is in the flue gas stream during testing, represents the entire mercury sample. The flue gas is drawn through the dry sorbent trap and the mercury is deposited on the activated carbon. The mercury collected is recovered as a total mass collected and compared to the volume of sampled flue gas to report a concentration.

Sorbent trap measurements are used as a quality assurance check against the Mercury CEMS in order to provide assurance and quality control of the concentrations collected by the CEMS. As the Reference Method, the paired sorbent trap measurements must meet a self-consistency criterion. The average Mercury CEMS measurement must then satisfy a relative accuracy criterion against the average Reference Method result. The relative accuracy between the paired sorbent traps must satisfy the requirements of Section 4.1.1.5 in Appendix A where the relative difference between traps must be less than 10% and the relative difference between the sorbent trap and CEMS must be less than 20% although specifications are available for low mercury emissions.

Bias Determination

Excerpts From 40 CFR Part 63, Subpart UUUUU, Appendix A, Section 4.1.1.5.3

Measurement or adjustment of Hg CEMS data for bias is not required.

Definition for ADA Environmental Solutions Quality Assurance Program

ADA may adjust the data in order to ensure that the results of the testing program are determined with the most accurate data possible. ADA may use the calibration response records and Method 30B sorbent traps comparisons as benchmarks in which the Mercury CEMS data is corrected.

Quality Assurance Procedures

After a Mercury CEMS has been installed and passed all of the acceptance tests, the system is required to pass on-going quality assurance and quality control checks during normal operation for the duration of the test program. These quality assurance procedures are based on the specific requirements for continuous emission monitoring systems found in Section 5.1 in Appendix A of Subpart UUUUU in 40 CFR Part 63. These tests include a daily calibration error test, quarterly linearity check, weekly system integrity check, and optional relative accuracy checks with sorbent traps throughout the long-term operation of the Mercury CEMS.

For short duration tests (typically less than 1 month per sampling location), most of the Ongoing QA/QC tests are not applicable. At a minimum, calibrations are performed daily.

Preventative and Routine Maintenance

Several components of the Thermo Scientific Mercury Freedom System™ need to be replaced after a period of continuous use. Since the ADA-owned Mercury CEMS are not installed as permanent systems and therefore not operated continuously, it is not necessary to replace components of the system based solely on their age. Instead, ADA tracks the amount of use for each of the components of the system that require routine maintenance and replaces them when they are considered exhausted. The determination of when a component is due for replacement is based on daily system checks (e.g. lamp intensity) and routine check-out/check-in before and after each project at ADA. Some of the components that are subject to routine maintenance include the probe converter core, inertial filter, and air scrubbers. Likewise, the analyzer and the calibrator are returned to Thermo Scientific on a specific schedule to ensure the instruments are certified to be functioning properly.

Other maintenance is performed as components become worn out. The condition of these components is easily detectable in the daily performance evaluation of the Mercury CEMS and they can typically be replaced quickly and with very little down time. Two of the components that typically wear out over time are the gas sample pump and mercury lamp.

Daily Calibration Error Test

The daily calibration checks were modeled after the regulations defined by Section 5.1.2.1 in Appendix A of Subpart UUUUU in 40 CFR Part 63. The calibration checks are automatically initiated by the analyzer software or external datalogger or timer each day and the responses compared to the criteria to see if the result of the calibration check passed or failed. A worksheet created by ADA to collect and analyze the response to the daily system calibration check can be found at the end of this document.

The monitor is required to meet a performance specification of 5.0% of span or an alternate specification of 1.0 $\mu g/m^3$ absolute difference between the reference gas and the analyzer response for span values less than 10.0 $\mu g/m^3$.

Whenever a daily calibration error test is failed or whenever a monitoring system is returned to service following repair or corrective maintenance, data from the monitor are considered invalid until the required additional calibration error test has been successfully completed.

Routine calibration adjustments of a monitor are permitted after any successful calibration error test. These adjustments shall be made to bring the monitor readings as close to a perfect calibration response. These adjustments can be made by means of a mathematical algorithm programmed into the data acquisition and handling system or by manual calculations of the calibration factors. However, an additional calibration error test is required if a manual recalibration is performed on the system through the functions of the analyzer program or if physical adjustment is made to the system.

In order to maximize the availability of the instrument and to keep recalibration procedures to a minimum, ADA has developed an extensive quality control and quality assurance program to analyze the daily calibration check responses to a greater level than provided by federal and state regulations. This analysis has held the performance of the mercury system to greater standards to allow measurement of more precise concentrations.

ADA has defined different levels of calibration response error to determine what corrective action should be taken. If the zero and span response to the calibration check is less than 0.1 $\mu g/m^3$ absolute error and less than 0.5% error, then the system does not require any corrective action. If the error is greater than 0.1 $\mu g/m^3$ or 0.5%, then there are several degrees of corrective action depending on if it is the first occurrence at this response error and on what channel (zero or span) the error occurred. An error above 0.5 $\mu g/m^3$ or 2.5% will identify that the system requires a calibration factor update.

Quarterly Linearity Check

Linearity checks are performed to access the response of the system with the low-, mid-, and high-level reference gases injected at the filter in non-repetitive triplicate. ADA performs a linearity check according to the specifications outlined in Section 5.1.2.2 in Appendix A of Subpart UUUUU in 40 CFR Part 63. The linearity check must be performed manually by changing the span concentration output of the calibrator during the test. Ensure that the daily calibration check has passed requirements before starting a linearity check. Linearity checks should be performed once each QA quarter and at least 30 days apart. The complete linearity error test must complete within 24 unit-operating hours.

The monitor is required to meet a performance specification of 10.0% of reference gas concentration or an alternate specification of 0.8 $\mu g/m^3$ absolute difference from the reference gas concentration, whichever is less restrictive. Stopping a linearity test because of monitor problems is automatically a failed linearity check for the monitor. If a linearity test is stopped for reasons other than monitor problems (e.g., unit offline, etc), resume the linearity as soon as reasonably possible when the normal operating conditions are re-established.

If adjustments are necessary, this will constitute an aborted linearity check and thereby forcing the monitor to be considered out-of-control back to the time the linearity test began. For a linearity check to be successful, no adjustments should be made to a monitor between or while gas is flowing. The linearity check must be repeated if a coincident calibration error test fails. Three cycles of the linearity check procedure will flow gas nine times in the proper sequence.

Weekly System Integrity Check

System integrity checks are performed to access the response of the system with the low-, mid-, and high-level oxidized reference gases injected at the filter. The Mercury CEMS may be installed with a Mercuric Chloride Generator (MGC) that converts the elemental mercury into an oxidized form of mercury by exposing the span gas to chlorine under high temperature. If the system is not equipped with a MGC, the requirements of this test are not considered.

Several criteria are used to determine the validity of the system integrity check. According to Section 5.1.2.3 in Appendix A of Subpart UUUUU in 40 CFR Part 63, the monitor must not differ from the reference by more than 5.0% of span value at any of the three gas levels. Another criteria defined by Thermo Scientific is a recovery efficiency of the oxidized mercury greater than 90%. A third criterion is for the response of the test must not differ from the span by more than 10% of the span value.

Relative Accuracy (RA) Checks

Section 5.1.2.4 in Appendix A of Subpart UUUUU in 40 CFR Part 63 specifies that a relative accuracy test audit must be performed annually in order to validate the mercury measurements collected by the Mercury CEMS. Instead of relying on the annual evaluation of the Mercury CEMS, ADA typically allows for routine collection and analysis of sorbent traps to verify the mercury emissions concentration. The relative accuracy (RA) check is performed using a modified version of EPA Method 30B.

As the Reference Method, the paired sorbent trap measurements must meet a self-consistency criterion. The mercury concentration value collected from the Mercury CEMS is averaged during the sampling by the sorbent trap method. The relative accuracy between the paired sorbent traps must satisfy the requirements of CAMR where the relative difference between traps must be less than 10% and the relative difference between the sorbent traps and CEMS must be less than 20% although specifications are available for low mercury emissions.

Data Analysis and Performance Reports

The data collected from each mercury system is regularly collected and analyzed to ensure quality system performance and operation. Performance reports are typically created on a weekly basis to check the system operating conditions and trends (temperatures, pressures, calibration responses and other quality assurance activities) in order to collect the most reliable and accurate mercury concentrations. Along with a report of the data collected by the system, feedback and corrections are provided to the operators of the Mercury CEMS in order to keep the system working at peak performance.

Demobilization and Recovery

The mercury systems are demobilized at the end of the test period. All data is downloaded and collected from the mercury system prior to shut down. The components are checked in and evaluated upon arrival back at the ADA office.

Mercury Concentration Reporting

The Thermo Scientific Mercury Freedom System™ is designed to report mercury concentrations with the same units in which the system is calibrated. The Model 81i Mercury Calibrator generates known concentrations of gas phase elemental mercury in *"micrograms per wet-standard cubic meter"* (µg/wsm^3). The standard temperature and pressure as determined by the calibrator is 20°C and 760 mmHg. In this report, the quality control and quality assurance tests are typically reported in concentrations with these units since they are direct comparisons with the reference gas output of the calibrator.

The Mercury CEMS report mercury concentration data at the actual oxygen content of the flue gas sampled. Using approximate oxygen and moisture contents at each measurement location, ADA corrects all of the raw analyzer data to a reference oxygen content of 3.0% by volume oxygen. When comparing the concentration of two Mercury CEMS at two or more different locations, the data presented in the report are expressed in *"micrograms per wet-standard cubic meter at 3.0 % by volume oxygen"* (µg/wsm^3 @ 3% O_2). This correction is made in all cases when the concentration of mercury is reported as a sampled concentration and not as a response to calibrator reference gases or quality assurance checks.

The mercury concentrations determined by Method 30B sorbent traps is collected through a vacuum pump and a dry gas meter. Therefore, the concentrations are reported in *"micrograms per dry-standard cubic meter"* (µg/dsm^3). These concentrations must first be converted to the same units of measure used by the Mercury CEMS for the relative accuracy checks. The following formula is used to convert the dry-standard concentration to a wet-standard concentration by using the moisture content of the flue gas. All concentrations reported that are determined by the sorbent trap method have used this conversion.

A final common reference form is to translate mercury mass or volume concentrations to a power output basis, in terms of *"pounds of mercury per trillion BTU"* (lb/TBTU). In this report, mercury concentrations are expressed in this manner primarily for the purpose of comparison to coal and fly ash mercury contents.

8.0 APPENDIX C: ACTIVATED CARBON INJECTION BASIS AND SYSTEM DESCRIPTION

ACI System Overview

The sorbent injection system consists of the ADA Bolk Bag Unloader (BBU), conveying lines, and injection lances provided by ADA. The BBU is installed and anchored at grade. Temporary sorbent transport lines are installed by ADA between the temporary BBU and the injection manifold locations.

The BBU is approximately 16 feet high (two 8-ft sections), with a 5 ft x 6 ft footprint as shown in Figure 13 with an empty weight of approximately one (1) ton.

ADA purchases the sorbents and arranges for shipment as well as delivery coordination with the plant in time for each test. Sorbent is provided in 750-1000 pound supersacks, depending on the supplier. The supersacks are off-loaded and then shuttled to the immediate vicinity of the portable injection system by forklift and/or pallet-jack. ADA personnel load the supersacks onto the portable injection skids via a hoist from which the supersacks are suspended above the feeder system. The sorbent is held in a day hopper from which the sorbent feed rate is metered by a variable speed screw feeder.

Figure 13. ADA Bulk Bag Unloader

Motive air from an external positive displacement blower, shown in Figure 14, is compressed by an eductor to an adequate pressure that conveys the sorbent to the injection point. The technical specifications for the blower are summarized in Table 10. Flexible hose carries the sorbent from the feeder to a distribution manifold located near the injection grid. Figure 15 illustrates the injection and conveyance system. To minimize pressure losses, conveyance lines have equivalent areas up to the splitters and minimal sources of friction such as bends and unnecessary height changes.

Table 10. Technical Specifications for Blower

Utility	Specification
Electrical	480VAC / 3PH / 60A, 120VAC
Dimensions	6-ft x 4-ft x 6-ft (L x W x H)
Weight	Approximately 2,750 lbm
Installation	Place on level surface
Location	≤ 20 feet from Skid, with direct path for hose from Blower outlet to Skid

Figure 14. Blower

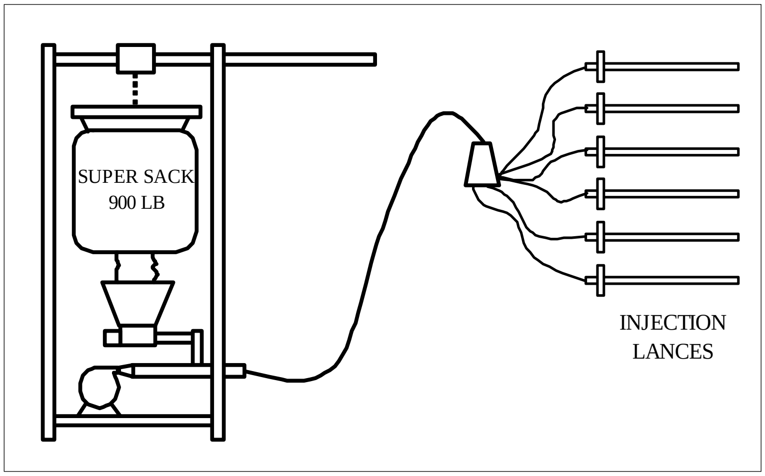

Figure 15. Activated Carbon Injection System

Sorbent Injection Grid Description

The sorbent is split into multiple hoses with a splitter, as illustrated in Figure 16, to be injected into the duct with open-ended pipe lances installed in the test ports as indicated in Table 11. For optimal dispersion of sorbent into the duct, the injection lances are spaced equally and the lance lengths are chosen accordingly to provide equivalent distribution.

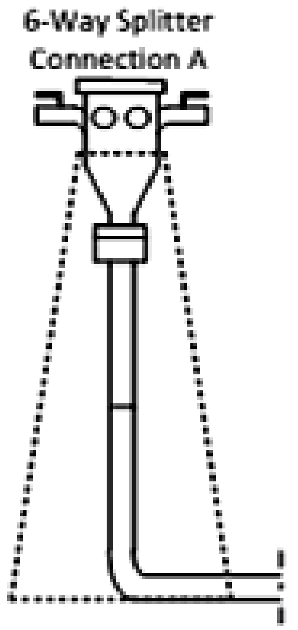

Figure 16. 6-Way Splitter

Table 11. Technical Specifications for Sorbent Injection Location

Utility	Specification
Electrical	120VAC receptacle or cord, sufficient lighting
Installation	Install 4" ports with 150# flanges and blanks
Installation	Remove port caps or blank flanges and install flanges and adapters
Location	APH Inlet

Testing

Parametric testing is conducted by injecting the sorbents at targeted concentrations. ADA's approach to parametric testing is to begin low and increase injection with subsequent test runs. For ease of comparison to baseline data, tests are conducted at as near to full unit load as possible for each test day. Pre-agreed upon injection rates are set through use of the volumetric screw conveyor. Rates are corrected and/or confirmed with calibrations before the start of each test, at the conclusion of each test, and at defined periodic intervals during testing and all data are recorded.

9.0 APPENDIX D: COAL ADDITIVE INJECTION BASIS AND SYSTEM DESCRIPTION

Coal Additive Calculation Basis

Will be updated in final report.

Coal Additive Metering System

The presence of halogens in flue gas is critical to shift elemental to oxidized mercury during the combustion process and therefore increase mercury capture by unburned carbon (UBC) and injected un-treated activated carbon. Halogen-containing coal additives can be utilized in plants that burn coal with low halogen content such as subbituminous or lignite coals. To accommodate this, a coal additive bcket and pump skid are located at grade near the injection location.

The bucket of coal additive are staged next to the skid shown in Figure 17 and are contained inside a secondary containment unit. A hose is used to transport the fluid from the bucket to the pump skid which consists of a positive displacement metering pump. Including ancillary equipment, the pump skid has a footprint of 4-ft x 4-ft and stands 4-ft high as stated in Table 12. It utilizes a 120VAC connection and can be easily moved into place with a pallet jack. The coal additive is injected into the coal feeders.

Figure 17. Coal Additive Pump Skid

Table 12. Technical Specifications for Coal Additive Injection Skid

Utility	Specification
Electrical	120VAC receptacle or cord
Dimensions	4-ft x 4-ft x 4-ft (L x W x H)
Weight	Tote: 3850-lb
Installation	Secondary containment required for coal additive tote
Installation	Install nipple on coal feeder
Location	532-ft Elevation, coal feeder deck

Testing

All parametric injection concentrations and reagent test configurations are agreed upon prior to commencement of each day's testing. ADA's approach to parametric testing is to begin low and increase injection with subsequent test runs. For ease of comparison to baseline data, tests are conducted at as near to full unit load as possible for each test day. The flow of coal additive is metered by the pump set to transport the fluid at a rate sufficient to treat the entire unit. Rates are corrected and/or confirmed with calibrations before the start of each test, at the conclusion of each test, and at defined periodic intervals during testing and all data is recorded.

10.0 APPENDIX E: MERCURY CONCENTRATION CONVERSIONS

Flue Gas Mercury Concentration Conversion

The Thermo CEMS data is provided as micrograms of mercury per wet standard meters cubed of flue gas (µg/wSm[3]). To obtain mercury in lb/hr the calculation is as follows:

$$\frac{lb}{hr} = \frac{\mu g}{wscm} * \frac{g}{1{,}000{,}000\mu g} * \frac{lb}{453.59g} * \frac{wscm}{hr}$$

With moisture data provided from Mesabi Nugget as 6.4% at the ID fan outlet, the conversion of stack flow from kdscfh to wscm/hr is as follows:

$$\frac{\mathbf{wscm}}{\mathbf{hr}} = \frac{kdscf}{hr} * \frac{1{,}000dscf}{kdscf} * \frac{dscm}{35.287dscf} * \frac{wscm}{1.064dscm}$$

Sorbent Injection Concentration Calculation

The convention for describing the concentration of sorbent injected into a duct is pounds per million actual cubic foot of flue gas or lb/MMacf. This value is referred to as the "injection ratio" or the "injection concentration." The actual mass flow rate of sorbent is therefore dependent on the total volumetric flow of flue gas at the point of injection. The mass flow rate is determined by the following calculation:

$$\dot{m}_{sorbent} = \frac{\dot{Q}_{fluegas}}{10^6} \times Ratio * 60$$

Where:

$\dot{m}_{sorbent}$ = mass feed rate of sorbent (lb/hr)

$\dot{Q}fluegas$ = volumetric flow rate of flue gas (acfm)

Ratio = sorbent injection ratio (lb/MMacf)

60 = conversion factor (min/hr)

If the flue gas flow is provided in standard cubic feet per minute (scfm), the flowrate at actual temperature can be calculated as follows:

*acfm = scfm *(459 + Ti)/(459+ 68)*

Where:

Ti = temperature in degrees Fahrenheit at the injection location.

The actual injection ratio can be calculated as follows:

$$Ratio = \frac{\dot{m}_{sorbent}/60}{\dot{Q}_{fluegas}/10^6}$$

11.0 APPENDIX F: PLANT DATA

Will be added to final report.

ADA CMM Data March 21, 2013

Time	Inst. Status	Hg0	HgT	30B			
3/21/13 13:03	sample	8.17948	8.59769	Run 1			
3/21/13 13:04	sample	8.11042	8.52234	Run 1			
3/21/13 13:05	sample	8.02686	8.42132	Run 1			
3/21/13 13:06	sample	7.96097	8.2489	Run 1			
3/21/13 13:07	sample	7.91685	8.10657	Run 1			
3/21/13 13:08	sample	7.87163	8.09734	Run 1			
3/21/13 13:09	sample	7.82583	8.07728	Run 1			
3/21/13 13:10	sample	7.78713	8.03904	Run 1			
3/21/13 13:11	sample	7.74271	8.00132	Run 1			
3/21/13 13:12	sample	7.697	8.01358	Run 1			
3/21/13 13:13	sample	7.62678	8.02469	Run 1			
3/21/13 13:14	sample	7.56708	8.01566	Run 1			
3/21/13 13:15	sample	7.54933	7.98793	Run 1			
3/21/13 13:16	sample	7.51972	7.87093	Run 1			
3/21/13 13:17	sample	7.47465	7.78479	Run 1			
3/21/13 13:18	sample	7.43346	7.79989	Run 1			
3/21/13 13:19	sample	7.4507	7.8327	Run 1			
3/21/13 13:20	sample	7.47429	7.91255	Run 1			
3/21/13 13:21	sample	7.54792	7.99272	Run 1			
3/21/13 13:22	sample	7.61287	8.0749	Run 1			
3/21/13 13:23	sample	7.62943	8.15029	Run 1			
3/21/13 13:24	sample	7.66415	8.18043	Run 1			
3/21/13 13:25	sample	7.77696	8.20489	Run 1			
3/21/13 13:26	sample	7.86254	8.21625	Run 1			
3/21/13 13:27	sample	7.82675	8.21446	Run 1			
3/21/13 13:28	sample	7.81187	8.15861	Run 1			
3/21/13 13:29	sample	7.9103	8.11745	Run 1			
3/21/13 13:30	sample	7.9807	8.14019	Run 1			
3/21/13 13:31	sample	7.84501	8.16391	Run 1			
3/21/13 13:32	sample	7.74471	8.20752	Run 1			
Average		ug/wscm	8.11		30B	6.3	ug/wscm
3/21/13 15:10	sample	7.66479	8.14385	Run 2			
3/21/13 15:11	sample	7.95531	8.42517	Run 2			
3/21/13 15:12	sample	8.13014	8.38896	Run 2			
3/21/13 15:13	sample	7.70747	8.14525	Run 2			
3/21/13 15:14	sample	7.37755	7.85293	Run 2			
3/21/13 15:15	sample	7.4402	7.63889	Run 2			
3/21/13 15:16	sample	7.47745	7.75235	Run 2			
3/21/13 15:17	sample	7.4154	7.83993	Run 2			
3/21/13 15:18	sample	7.32602	7.72691	Run 2			
3/21/13 15:19	sample	7.17454	7.61816	Run 2			
3/21/13 15:20	sample	7.05398	7.56306	Run 2			
3/21/13 15:21	sample	7.04955	7.52659	Run 2			
3/21/13 15:22	sample	7.03156	7.55013	Run 2			
3/21/13 15:23	sample	6.94263	7.5686	Run 2			
3/21/13 15:24	sample	6.88268	7.53742	Run 2			
3/21/13 15:25	sample	6.96466	7.49774	Run 2			
3/21/13 15:26	sample	7.02092	7.40313	Run 2			
3/21/13 15:27	sample	6.94667	7.33875	Run 2			
3/21/13 15:28	sample	6.89394	7.42135	Run 2			
3/21/13 15:29	sample	6.92065	7.48231	Run 2			
3/21/13 15:30	sample	6.92947	7.44068	Run 2			
3/21/13 15:31	sample	6.86573	7.40686	Run 2			

3/21/13 15:32	sample	6.82435	7.39957	Run 2			
3/21/13 15:33	sample	6.8726	7.38171	Run 2			
3/21/13 15:34	sample	6.94724	7.4842	Run 2			
3/21/13 15:35	sample	7.01699	7.56743	Run 2			
3/21/13 15:36	sample	7.05676	7.50488	Run 2			
3/21/13 15:37	sample	7.02293	7.44009	Run 2			
3/21/13 15:38	sample	7.01327	7.38144	Run 2			
3/21/13 15:39	sample	7.0129	7.3442	Run 2			
average		ug/wscm	7.62575133		30B	5.3	ug/wscm
3/21/13 15:58	rec	1.23614	1.30391	Run 3			
3/21/13 15:59	rec	6.85245	7.21797	Run 3			
3/21/13 16:00	rec	6.83256	7.15611	Run 3			
3/21/13 16:01	rec	6.74878	7.11364	Run 3			
3/21/13 16:02	rec	6.70136	7.14902	Run 3			
3/21/13 16:03	sample	6.79543	7.17963	Run 3			
3/21/13 16:04	sample	6.83821	7.16809	Run 3			
3/21/13 16:05	sample	6.69596	7.16087	Run 3			
3/21/13 16:06	sample	6.58977	7.15346	Run 3			
3/21/13 16:07	sample	6.65271	7.15891	Run 3			
3/21/13 16:08	sample	6.68449	7.16606	Run 3			
3/21/13 16:09	sample	6.65508	7.1723	Run 3			
3/21/13 16:10	sample	6.65585	7.17313	Run 3			
3/21/13 16:11	sample	6.75512	7.15857	Run 3			
3/21/13 16:12	sample	6.84164	7.0887	Run 3			
3/21/13 16:13	sample	6.83529	7.03604	Run 3			
3/21/13 16:14	sample	6.81552	7.07751	Run 3			
3/21/13 16:15	sample	6.75762	7.1114	Run 3			
3/21/13 16:16	sample	6.70562	7.09811	Run 3			
3/21/13 16:17	sample	6.70168	7.09806	Run 3			
3/21/13 16:18	sample	6.71641	7.14356	Run 3			
3/21/13 16:19	sample	6.81068	7.1897	Run 3			
3/21/13 16:20	sample	6.87997	7.23389	Run 3			
3/21/13 16:21	sample	6.85177	7.24423	Run 3			
3/21/13 16:22	sample	6.85041	7.12218	Run 3			
3/21/13 16:23	sample	6.94221	7.06579	Run 3			
3/21/13 16:24	sample	6.99842	7.28771	Run 3			
3/21/13 16:25	sample	6.94667	7.5032	Run 3			
3/21/13 16:26	sample	6.90746	7.59102	Run 3			
3/21/13 16:27	sample	7.04256	7.674	Run 3			
average		ug/wscm	6.99989233		30B	4.5	ug/wscm
3/21/13 18:15	sample	6.71459	7.41862	Run 4			
3/21/13 18:16	sample	6.71371	7.45896	Run 4			
3/21/13 18:17	sample	6.78888	7.47663	Run 4			
3/21/13 18:18	sample	6.85373	7.43789	Run 4			
3/21/13 18:19	sample	6.86868	7.4132	Run 4			
3/21/13 18:20	sample	6.86704	7.43234	Run 4			
3/21/13 18:21	sample	6.81381	7.44895	Run 4			
3/21/13 18:22	sample	6.77069	7.47028	Run 4			
3/21/13 18:23	sample	6.74066	7.48253	Run 4			
3/21/13 18:24	sample	6.71319	7.46801	Run 4			
3/21/13 18:25	sample	6.69284	7.4451	Run 4			
3/21/13 18:26	sample	6.68049	7.38707	Run 4			
3/21/13 18:27	sample	6.70369	7.344	Run 4			
3/21/13 18:28	sample	6.72257	7.36985	Run 4			
3/21/13 18:29	sample	6.72475	7.37451	Run 4			

3/21/13 18:30	sample	6.71274	7.2856	Run 4			
3/21/13 18:31	sample	6.62976	7.22467	Run 4			
3/21/13 18:32	sample	6.57506	7.31185	Run 4			
3/21/13 18:33	sample	6.63047	7.37635	Run 4			
3/21/13 18:34	sample	6.66342	7.31029	Run 4			
3/21/13 18:35	sample	6.62548	7.27515	Run 4			
3/21/13 18:36	sample	6.57473	7.35604	Run 4			
3/21/13 18:37	sample	6.47822	7.40852	Run 4			
3/21/13 18:38	sample	6.40973	7.31698	Run 4			
3/21/13 18:39	sample	6.47998	7.24339	Run 4			
3/21/13 18:40	sample	6.54373	7.25928	Run 4			
3/21/13 18:41	sample	6.61351	7.29761	Run 4			
3/21/13 18:42	sample	6.66145	7.35841	Run 4			
3/21/13 18:43	sample	6.66771	7.41008	Run 4			
3/21/13 18:44	sample	6.65554	7.41419	Run 4			
average		ug/wscm	7.37587833		30B	5.8	ug/wscm

ADA CMM Data March 23, 2013

3/23/13 12:31	sample	9.94104	11.4075	Run 1			
3/23/13 12:32	sample	9.99645	11.1604	Run 1			
3/23/13 12:33	sample	9.85108	10.9286	Run 1			
3/23/13 12:34	sample	9.69899	10.7382	Run 1			
3/23/13 12:35	sample	9.54109	10.5858	Run 1			
3/23/13 12:36	sample	9.44463	10.6366	Run 1			
3/23/13 12:37	sample	9.61528	10.6952	Run 1			
3/23/13 12:38	sample	9.78305	10.8357	Run 1			
3/23/13 12:39	sample	9.90832	10.9757	Run 1			
3/23/13 12:40	sample	10.0239	11.0918	Run 1			
3/23/13 12:41	sample	10.0935	11.2218	Run 1			
3/23/13 12:42	sample	10.17	11.3942	Run 1			
3/23/13 12:43	sample	10.3202	11.5414	Run 1			
3/23/13 12:44	sample	10.4495	11.4881	Run 1			
3/23/13 12:45	sample	10.4853	11.5188	Run 1			
3/23/13 12:46	sample	10.5449	12.0041	Run 1			
3/23/13 12:47	sample	10.7172	12.3425	Run 1			
3/23/13 12:48	sample	10.83	12.0738	Run 1			
3/23/13 12:49	sample	10.6812	11.8489	Run 1			
3/23/13 12:50	sample	10.5048	11.7301	Run 1			
3/23/13 12:51	sample	10.195	11.6132	Run 1			
3/23/13 12:52	sample	9.97236	11.5145	Run 1			
3/23/13 12:53	sample	10.1396	11.4168	Run 1			
3/23/13 12:54	sample	10.2676	11.3408	Run 1			
3/23/13 12:55	bbstart	10.0566	11.1148	Run 1			
3/23/13 12:56	rec	0	0	Run 1			
3/23/13 12:57	rec	0	0	Run 1			
3/23/13 12:58	rec	1.841	2.04488	Run 1			
3/23/13 12:59	rec	10.2167	11.342	Run 1			
3/23/13 13:00	sample	10.1992	11.3121	Run 1			
average		ug/wscm	11.3286444		30B	8.6	ug/wscm
3/23/13 13:11	sample	9.81484	11.0522	Run 2			
3/23/13 13:12	sample	9.71083	10.7872	Run 2			
3/23/13 13:13	sample	9.53949	10.5541	Run 2			
3/23/13 13:14	sample	9.37824	10.4749	Run 2			
3/23/13 13:15	sample	9.34621	10.4479	Run 2			
3/23/13 13:16	sample	9.32077	10.539	Run 2			
3/23/13 13:17	sample	9.33627	10.5973	Run 2			

3/23/13 13:18	sample	9.38502	10.5463	Run 2			
3/23/13 13:19	sample	9.51223	10.4942	Run 2			
3/23/13 13:20	sample	9.53981	10.4631	Run 2			
3/23/13 13:21	sample	9.21955	10.3858	Run 2			
3/23/13 13:22	sample	8.92798	10.0876	Run 2			
3/23/13 13:23	sample	8.69838	9.82589	Run 2			
3/23/13 13:24	sample	8.55883	9.76273	Run 2			
3/23/13 13:25	sample	8.80851	9.76376	Run 2			
3/23/13 13:26	sample	9.01184	10.0644	Run 2			
3/23/13 13:27	sample	9.02212	10.3267	Run 2			
3/23/13 13:28	sample	9.05466	10.3736	Run 2			
3/23/13 13:29	sample	9.15656	10.4037	Run 2			
3/23/13 13:30	sample	9.23491	10.374	Run 2			
3/23/13 13:31	sample	9.26329	10.359	Run 2			
3/23/13 13:32	sample	9.29383	10.4353	Run 2			
3/23/13 13:33	sample	9.31526	10.5264	Run 2			
3/23/13 13:34	sample	9.36262	10.6452	Run 2			
3/23/13 13:35	sample	9.45448	10.7174	Run 2			
3/23/13 13:36	sample	9.50017	10.6254	Run 2			
3/23/13 13:37	sample	9.34405	10.5154	Run 2			
3/23/13 13:38	sample	9.18691	10.3406	Run 2			
3/23/13 13:39	sample	9.06951	10.1548	Run 2			
3/23/13 13:40	sample	8.97022	9.94728	Run 2			
average		ug/wscm	10.386372		30B	6.6	ug/wscm
3/23/13 14:16	sample	9.4139	10.447	Run 3			
3/23/13 14:17	sample	9.3677	10.4527	Run 3			
3/23/13 14:18	sample	9.33183	10.545	Run 3			
3/23/13 14:19	sample	9.39765	10.6354	Run 3			
3/23/13 14:20	sample	9.48512	10.6255	Run 3			
3/23/13 14:21	sample	9.65312	10.6473	Run 3			
3/23/13 14:22	sample	9.80951	10.8468	Run 3			
3/23/13 14:23	sample	9.9043	11.0538	Run 3			
3/23/13 14:24	sample	9.96219	11.3041	Run 3			
3/23/13 14:25	sample	9.88405	11.4509	Run 3			
3/23/13 14:26	sample	9.76247	11.0754	Run 3			
3/23/13 14:27	sample	9.43339	10.6926	Run 3			
3/23/13 14:28	sample	9.14048	10.3142	Run 3			
3/23/13 14:29	sample	9.03318	10.0355	Run 3			
3/23/13 14:30	sample	8.97805	10.1777	Run 3			
3/23/13 14:31	sample	9.15154	10.2893	Run 3			
3/23/13 14:32	sample	9.3021	10.3423	Run 3			
3/23/13 14:33	sample	9.27967	10.3718	Run 3			
3/23/13 14:34	sample	9.24618	10.2909	Run 3			
3/23/13 14:35	sample	9.1485	10.1936	Run 3			
3/23/13 14:36	sample	9.10284	10.12	Run 3			
3/23/13 14:37	sample	9.18826	10.0784	Run 3			
3/23/13 14:38	sample	9.24135	10.1842	Run 3			
3/23/13 14:39	sample	9.17206	10.3084	Run 3			
3/23/13 14:40	sample	9.15481	10.4984	Run 3			
3/23/13 14:41	sample	9.36449	10.6362	Run 3			
3/23/13 14:42	sample	9.49643	10.5735	Run 3			
3/23/13 14:43	sample	9.29194	10.4879	Run 3			
3/23/13 14:44	sample	9.07601	10.2656	Run 3			
3/23/13 14:45	sample	8.84354	10.0563	Run 3			
average		ug/wscm	10.5000233		30B	7.1	ug/wscm

3/23/13 16:31	sample	6.18348	7.69466	Run 4			
3/23/13 16:32	sample	6.13358	7.60733	Run 4			
3/23/13 16:33	sample	6.27716	7.54555	Run 4			
3/23/13 16:34	sample	6.39973	7.61884	Run 4			
3/23/13 16:35	sample	6.43661	7.72595	Run 4			
3/23/13 16:36	sample	6.45121	7.88056	Run 4			
3/23/13 16:37	sample	6.44911	7.83304	Run 4			
3/23/13 16:38	sample	6.44941	6.91927	Run 4			
3/23/13 16:39	sample	6.39488	6.32423	Run 4			
3/23/13 16:40	sample	6.32814	7.1272	Run 4			
3/23/13 16:41	sample	6.30368	7.7337	Run 4			
3/23/13 16:42	sample	6.35247	7.52929	Run 4			
3/23/13 16:43	sample	6.53586	7.34846	Run 4			
3/23/13 16:44	sample	6.71915	7.41898	Run 4			
3/23/13 16:45	sample	6.8419	7.55718	Run 4			
3/23/13 16:46	sample	6.96946	7.98686	Run 4			
3/23/13 16:47	sample	7.10065	8.32827	Run 4			
3/23/13 16:48	sample	7.14779	8.36819	Run 4			
3/23/13 16:49	sample	6.84175	8.4271	Run 4			
3/23/13 16:50	sample	6.48425	8.42926	Run 4			
3/23/13 16:51	sample	6.00703	8.55546	Run 4			
3/23/13 16:52	sample	5.83739	9.18952	Run 4			
3/23/13 16:53	sample	7.0178	9.57022	Run 4			
3/23/13 16:54	sample	7.87124	8.89838	Run 4			
3/23/13 16:55	bbstart	7.13104	8.19162	Run 4			
3/23/13 16:56	rec	0	0	Run 4			
3/23/13 16:57	rec	0	0	Run 4			
3/23/13 16:58	rec	1.16675	1.41854	Run 4			
3/23/13 16:59	rec	6.46757	7.86456	Run 4			
3/23/13 17:00	rec	6.41043	7.88505	Run 4			
average		ug/wscm	7.90958259	Run 4	30B	5.1	ug/wscm

ATTACHMENT 4
AIR PERMIT 13700318-003
(JAN. 2010)

AIR EMISSION PERMIT NO. 13700318- 003
Major Amendment

IS ISSUED TO

Mesabi Nugget Delaware LLC
Steel Dynamics Inc

MESABI NUGGET DELAWARE LLC
6500 Hwy 135
Aurora, St. Louis County, MN 55750

The emission units, control equipment and emission stacks at the stationary source authorized in this permit amendment are as described in the Permit Applications Table.

This permit amendment supersedes Air Emission Permit No. 13700318-002 and authorizes the Permittee to operate and modify the stationary source at the address listed above unless otherwise noted in Table A. The Permittee must comply with all the conditions of the permit. Any changes or modifications to the stationary source must be performed in compliance with Minn. R. 7007.1150 to 7007.1500. Terms used in the permit are as defined in the state air pollution control rules unless the term is explicitly defined in the permit.

Unless otherwise indicated, all the Minnesota rules cited as the origin of the permit terms are incorporated into the State Implementation Plan under 40 CFR § 52.1220 and as such are enforceable by U.S. Environmental Protection Agency Administrator or citizens under the Clean Air Act.

Permit Type: Federal; Part 70/Major for NSR
Operating Permit Issue Date: 7/29/05
Authorization to Construct and Operate (40 CFR § 52.21 and 112g) Issuance Date: December 23, 2009
Major Amendment Issue Date: January 8, 2010
Expiration Date: 07/29/2010 – Title I Conditions do not expire.

Christopher J. Nelson, P.E., Manager
Metallic Mining Sector
Industrial Division

for Paul Eger
Commissioner
Minnesota Pollution Control Agency

TDD (for hearing and speech impaired only): (651) 282-5332
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Permit Applications Table

Permit Type	Application Date	Permit Action
Total Facility Operating Permit	11/11/04	001
Administrative Amendment	11/1/07	002
Major Amendment, Minor Amendment	8/05/09, 10/8/09	003

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- **Appendix A: [Not used in Permit Number 13700318-001]**
- **Appendix B: Insignificant Activities**
- **Appendix C: Modeling Parameters**
- **Appendix D: Determination of Allowances Needed to Address Visibility Impacts**

NOTICE TO THE PERMITTEE:

Your stationary source may be subject to the requirements of the Minnesota Pollution Control Agency's (MPCA) solid waste, hazardous waste, and water quality programs. If you wish to obtain information on these programs, including information on obtaining any required permits, please contact the MPCA general information number at:

Metro Area	651-296-6300
Outside Metro Area	1-800-657-3864
TTY	651-282-5332

The rules governing these programs are contained in Minn. R. chs. 7000-7105. Written questions may be sent to: Minnesota Pollution Control Agency, 520 Lafayette Road North, St. Paul, Minnesota 55155-4194.

Questions about this air emission permit or about air quality requirements can also be directed to the telephone numbers and address listed above.

PERMIT SHIELD:

Subject to the limitations in Minn. R. 7007.1800, compliance with the conditions of this permit shall be deemed compliance with the specific provision of the applicable requirement identified in the permit as the basis of each condition. Subject to the limitations of Minn. R. 7007.1800 and 7017.0100, subp. 2, notwithstanding the conditions of this permit specifying compliance practices for applicable requirements, any person (including the Permittee) may also use other credible evidence to establish compliance or noncompliance with applicable requirements.

FACILITY DESCRIPTION (PER001):

The Mesabi Nugget facility is a commercial-scale demonstration plant. It will be the first iron nugget production-scale plant to be built.

The raw materials for the process will consist of various coals, fluxes, and binders, as well as iron ore concentrate from the Northshore Mining Company facility in Silver Bay, Minnesota. Raw materials will be delivered by rail, truck, or in bulk supersacks. Iron ore concentrate will be stored in indoor storage piles, tanks or bins, while other raw materials will be stored in outdoor storage piles or storage bins. The coals and fluxes will be pulverized on-site.

Coals, fluxes, binders and iron ore concentrate will be mixed and formed into “green balls.” The balls will be dried and fed to a rotary hearth furnace, where they will be converted to metallic iron and slag material. The iron and slag are cooled and separated. The iron nuggets and slag materials will either be directly loaded into rail cars or stored in on-site piles for later shipment.

An emergency generator may be installed to provide power during disruptions in electrical power supply. A process water cooling tower may provide cooling for scrubber water and other contact cooling water. Blowdown from the process cooling water may be treated at the water treatment plant. A clean water cooling tower may provide cooling for equipment and other non-contact cooling requirements. Blowdown from the clean water cooling tower may be sent to the process cooling tower.

AMENDMENT DESCRIPTION (PER002):

This administrative amendment (Permit Action Number 002) reflects a change in ownership to Mesabi Nugget Delaware, LLC and Steel Dynamics, Inc (co-permittees). This amendment provides administrative edits to Permit Action Number 001 and does not allow for an increase or decrease in emission limits nor affect regulatory requirements.

AMENDMENT DESCRIPTION (PER003):

The minor amendments are DQ number 2872 and are being rolled into a major amendment, which is DQ number 2782.

The first minor amendment permits construction and operation of a second emergency generator to ensure that the facility can maintain power to parts of the facility that could otherwise be unsafe if forced into a cold shutdown.

The second minor amendment permits construction and operation of a recycled fines crusher. The crusher is being added to crush recovered concentrate fragments to prevent scrapping concentrate fines that are otherwise too large to be processed.

The third minor amendment permits construction and operation of a concentrate feeder breaker. It also permits the outdoor storage of taconite concentrate. The feeder breaker will be used to break up concentrate if it is frozen together since the concentrate will be stored outdoors.

The major (Prevention of Significant Deterioration Program (PSD)) amendment permits a change in operation of concentrate receiving from being delivered to the facility primarily by rail to being delivered to the facility primarily by road or rail. The main pollutants of concern are particulate matter smaller than ten microns (PM_{10}) and particulate matter smaller than 2.5 microns, which are emitted from trucks driving on paved roads.

The second major (PSD) amendment permits a change in the greenball dryer nitrogen oxides (NO_X) emission rate limit (on a lb/MMBtu basis). The initial permit action included a lb/hr limit that was calculated incorrectly and a lb/MMBtu limit that has no clear basis. The NO_X emission rate limit (on a lb/hr basis) was removed because it was redundant. Also, the final design of the greenball dryer has changed, and the fuel use limits have changed accordingly.

This permit action is rolling in three independent minor amendments with two major (PSD) amendments. The facility was initially classified as a 250 tons per year, major PSD source and was not major for any other reason. The activities allowed by the moderate permit amendment primarily consist of fugitive source PM_{10} emissions. Fugitive source emissions are included in the potential to emit calculations (September 30, 2009, stay of the December 2008 rule that exempted some facilities), which determine whether the PSD significance thresholds have been exceeded. The activities allowed by this permit action exceed the PSD significance thresholds. The second major amendment is major for PSD because best available control technology determined NO_X limits on the greenball dryer are being changed.

TABLE A: LIMITS AND OTHER REQUIREMENTS

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Table A contains limits and other requirements with which your facility must comply. The limits are located in the first column of the table (What To do). The limits can be emission limits or operational limits. This column also contains the actions that you must take and the records you must keep to show that you are complying with the limits. The second column of Table A (Why to do it) lists the regulatory basis for these limits. Appendices included as conditions of your permit are listed in Table A under total facility requirements.

Subject Item: **Total Facility**

What to do	Why to do it
SOURCE-SPECIFIC REQUIREMENTS	hdr
For changes that do not require a permit amendment: - The Permittee shall submit a Part 1 MACT application within 30 days of startup of any 112(j) affected source. The application shall meet the requirements of 40 CFR Section 63.53(a). - The Permittee shall submit a Part 2 MACT application within 90 days of startup of any 112(j) affected source. The application shall meet the requirements of 40 CFR Section 63.53(b). 112(j) affected source is defined in 40 CFR Section 63.51. As of permit issuance, 112(j) affected sources include industrial, commercial, and institutional boilers and process heaters; brick and structural clay products manufacturing; clay ceramics manufacturing.	40 CFR Section 63.52(b)(1) and 63.52(e)(1)
The construction authorization expires 18 months after permit issuance. The Permittee must keep a record of the dates of installation and start-up on site.	Title I Condition: 40 CFR Section 52.21(r)(2): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g)(4): MACT and Minn. R. 7007.3010
Comply with Fugitive Emission Control Plan: The Permittee shall follow the actions and record keeping specified in the control plan. The plan may be amended by the Permittee with the Commissioner's approval. If the Commissioner determines the Permittee is out of compliance with Minn. R. 7011.0150 or the fugitive control plan, then the Permittee may be required to amend the control plan and/or to install and operate particulate matter ambient monitors as requested by the Commissioner.	Minn. Stat. Section 116.07, subd. 4a; Minn. R. 7007.0100; Minn. R. 7007.0800, subp. 2; Minn. R. 7011.0150; Minn. R. 7009.0020
Parameters Used in Modeling: Stack heights, emission rates, and other parameters used in the modeling for this permit (13700318-003) are listed in Appendices C.1 and C.2 of PER003. The Permittee must submit to the Commissioner for approval any revisions of these parameters and must wait for a written approval before making such changes. The information submitted must include, at a minimum, the locations, heights and diameters of the stacks, locations and dimensions of nearby buildings, the velocity and temperatures of the gases emitted, and the emission rates. The plume dispersion characteristics due to the revisions of the information must be equivalent to or better than the dispersion characteristics modeled. (CONTINUED)	Title I Condition: 40 CFR Section 52.21(k) and Minn. R. 7007.3000
(Continued from above) The Permittee shall demonstrate this equivalency in the proposal. If the information does not demonstrate equivalent or better dispersion characteristics, or if a conclusion cannot readily be made about the dispersion, the Permittee must remodel.	Title I Condition: 40 CFR Section 52.21(k) and Minn. R. 7007.3000
For changes that do not involve an increase in an emission rate and that do not require a permit amendment, this proposal must be submitted as soon as practicable, but no less than 60 days before beginning actual construction of the stack or associated emission unit. For changes involving increases in emission rates and that require a minor permit amendment, the proposal must be submitted as soon as practicable, but no less than 60 days before beginning actual construction of the stack or associated emission unit. For changes involving increases in emission rates and that require a permit amendment other than a minor amendment, the proposal must be submitted with the permit application.	Title I Condition: 40 CFR Section 52.21(k) and Minn. R. 7007.3000
OPERATIONAL REQUIREMENTS	hdr
The Permittee shall comply with National Primary and Secondary Ambient Air Quality Standards, 40 CFR pt. 50, and the Minnesota Ambient Air Quality Standards, Minn. R. 7009.0010 to 7009.0080. Compliance shall be demonstrated upon written request by the MPCA.	40 CFR pt. 50; Minn. Stat. Sec. 116.07, subds. 4a and 9; Minn. R. 7007.0100, subps. 7A, 7L and 7M; Minn. R. 7007.0800, subps. 1, 2, and 4; Minn. R. 7009.0010-7009.0080.
Circumvention: Do not install or use a device or means that conceals or dilutes emissions, which would otherwise violate a federal or state air pollution control rule, without reducing the total amount of pollutant emitted.	Minn. R. 7011.0020

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Air Pollution Control Equipment: Operate all pollution control equipment whenever the corresponding process equipment and emission units are operated, unless otherwise noted in Table A.	Minn. R. 7007.0800, subp. 2; Minn. R. 7007.0800, subp. 16(J)
Operation and Maintenance Plan: Retain at the stationary source an operation and maintenance plan for all air pollution control equipment. At a minimum, the O & M plan shall identify all air pollution control equipment and control practices and shall include a preventative maintenance program for the equipment and practices, a description of (the minimum but not necessarily the only) corrective actions to be taken to restore the equipment and practices to proper operation to meet applicable permit conditions, a description of the employee training program for proper operation and maintenance of the control equipment and practices, and the records kept to demonstrate plan implementation.	Minn. R. 7007.0800, subp. 14 and Minn. R. 7007.0800, subp. 16(J)
Operation Changes: In any shutdown, breakdown, or deviation the Permittee shall immediately take all practical steps to modify operations to reduce the emission of any regulated air pollutant. The Commissioner may require feasible and practical modifications in the operation to reduce emissions of air pollutants. No emissions units that have an unreasonable shutdown or breakdown frequency of process or control equipment shall be permitted to operate.	Minn. R. 7019.1000, subp. 4
Fugitive Emissions: Do not cause or permit the handling, use, transporting, or storage of any material in a manner which may allow avoidable amounts of particulate matter to become airborne. Comply with all other requirements listed in Minn. R. 7011.0150.	Minn. R. 7011.0150
Noise: The Permittee shall comply with the noise standards set forth in Minn. R. 7030.0010 to 7030.0080 at all times during the operation of any emission units. This is a state only requirement and is not enforceable by the EPA Administrator or citizens under the Clean Air Act.	Minn. R. 7030.0010 - 7030.0080
Inspections: The Permittee shall comply with the inspection procedures and requirements as found in Minn. R. 7007.0800, subp. 9(A).	Minn. R. 7007.0800, subp. 9(A)
The Permittee shall comply with the General Conditions listed in Minn. R. 7007.0800, subp. 16.	Minn. R. 7007.0800, subp. 16
PERFORMANCE TESTING	hdr
Initial Performance Test Trigger Date: The Initial Performance Test Trigger date refers to the day on which the Mesabi Nugget Plant has produced 200,000 metric tons of iron nuggets since initial startup.	Minn. R. 7017.2020; Minn. R. 7007.0800, subp. 2 & 4
Notification of the Initial Performance Test Trigger Date: Not more than 15 days after the Initial Performance Test Trigger Date, the Permittee shall notify the Agency of the Initial Performance Test Trigger Date.	Minn. R. 7017.2020; Minn. R. 7007.0800, subp. 2 & 4
Performance Testing: Conduct all performance tests in accordance with Minn. R. ch. 7017 unless otherwise noted in Tables A, B, and/or C.	Minn. R. ch. 7017
Performance Test Notifications and Submittals: Performance Tests are due as outlined in Tables A and B of the permit. See Table B for additional testing requirements. Performance Test Notification (written): due 30 days before each Performance Test Performance Test Plan: due 30 days before each Performance Test Performance Test Pre-test Meeting: due 7 days before each Performance Test Performance Test Report: due 45 days after each Performance Test Performance Test Report - Microfiche Copy: due 105 days after each Performance Test The Notification, Test Plan, and Test Report may be submitted in alternative format as allowed by Minn. R. 7017.2018. NOTE: Performance tests required for compliance with MACT conditions have their own notification and submittal requirements. Those requirements are found in GP005.	Minn. Rs. 7017.2030, subp. 1-4, 7017.2018 and Minn. R. 7017.2035, subp. 1-2
Limits set as a result of a performance test (conducted before or after permit issuance) apply until superseded as specified by Minn. R. 7017.2025 following formal review of a subsequent performance test on the same unit.	Minn. R. 7017.2025
MONITORING REQUIREMENTS	hdr
Monitoring Equipment Calibration: Annually calibrate all required monitoring equipment (any requirements applying to continuous emission monitors are listed separately in this permit).	Minn. R. 7007.0800, subp. 4(D)

Operation of Monitoring Equipment: Unless otherwise noted in Tables A, B, and/or C, monitoring a process or control equipment connected to that process is not necessary during periods when the process is shutdown, or during checks of the monitoring systems, such as calibration checks and zero and span adjustments. If monitoring records are required, they should reflect any such periods of process shutdown or checks of the monitoring system.	Minn. R. 7007.0800, subp. 4(D)
QA Plan required: Prior to the startup of each CEM, develop and implement a written quality assurance plan that covers each CEMS. The plan shall be on site and available for inspection within 30 days after monitor certification. The plan shall contain the written procedures listed in Minn. R. 7017.1170. subp. 2.	Minn. R. 7017.1210, subp. 1; Minn. R. 7017.1170, subp. 2
PERMIT REOPENING	hdr
If a required stack test demonstrates that these emission limits are less stringent than what is achieved in practice, the Agency may, at its discretion, use the authority under Minn. R. 7007.1600, subp. 2.C to reopen and revise the emission limit(s) to more closely reflect the actual stack test results.	Minn. R. 7007.1600, subp. 2.C.
Because best available control technology (BACT) levels have not previously been established for an iron nugget production plant, if a required stack test demonstrates that the emission limit initially established in this permit is not achievable in practice, the Permittee may submit to the Agency an application for a revision to the permit to reflect the emission level achieved in the stack test. The Permittee has the burden of demonstrating that it took all steps necessary to ensure that the emissions levels achieved in the stack test were the lowest achievable. Any revision of the emission limits made as the result of this provision shall be subject to the best available control technology (BACT) review and air quality analysis, specified in 40 CFR pt 52.21 and Minn. R. 7007.3000.	40 CFR pt. 52.21 and Minn. R. 7007.3000
The Agency will provide an opportunity for public notice and comment under Minn. R. 7007.0850, subp. 2.A prior to finalizing any permit amendment. If the action involves a Title I condition, the procedures provided under Minn. R. 7007.0850, subp. 4 also apply to the permit amendment. Minn. R. 7007.0850, subp. 3 (Petitions for meetings and hearings) shall apply to the permit amendment.	Minn. R. 7007.0850, subps. 2, 3, and 4
RECORDKEEPING	hdr
Record keeping: Retain all records at the stationary source for a period of five (5) years from the date of monitoring, sample, measurement, or report. Records which must be retained at this location include all calibration and maintenance records, all original recordings for continuous monitoring instrumentation, and copies of all reports required by the permit. Records must conform to the requirements listed in Minn. R. 7007.0800, subp. 5(A).	Minn. R. 7007.0800, subp. 5(C)
Recordkeeping: Maintain records describing any insignificant modifications (as required by Minn. R. 7007. 1250, subp. 3) or changes contravening permit terms (as required by Minn. R. 7007.1350 subp. 2), including records of the emissions resulting from those changes.	Minn. R. 7007. 0800, subp. 5(B)
If the Permittee determines that no permit amendment or notification is required prior to making a change, the Permittee must retain records of all calculations required under Minn. R. 7007.1200. For expiring permits, these records shall be kept for a period of five years from the date the change was made or until permit reissuance, whichever is longer. The records shall be kept at the stationary source for the current calendar year of operation and may be kept at the stationary source or office of the stationary source for all other years. The records may be maintained in either electronic or paper format.	Minn. R. 7007.1200, subp. 4
REPORTING/SUBMITTALS	hdr
Shutdown Notifications: Notify the Commissioner at least 24 hours in advance of a planned shutdown of any control equipment or process equipment if the shutdown would cause any increase in the emissions of any regulated air pollutant. If the owner or operator does not have advance knowledge of the shutdown, notification shall be made to the Commissioner as soon as possible after the shutdown. However, notification is not required in the circumstances outlined in Items A, B and C of Minn. R. 7019.1000, subp. 3. At the time of notification, the owner or operator shall inform the Commissioner of the cause of the shutdown and the estimated duration. The owner or operator shall notify the Commissioner when the shutdown is over.	Minn. R. 7019.1000, subp. 3

Breakdown Notifications: Notify the Commissioner within 24 hours of a breakdown of more than one hour duration of any control equipment or process equipment if the breakdown causes any increase in the emissions of any regulated air pollutant. The 24-hour time period starts when the breakdown was discovered or reasonably should have been discovered by the owner or operator. However, notification is not required in the circumstances outlined in Items A, B and C of Minn. R. 7019.1000, subp. 2. At the time of notification or as soon as possible thereafter, the owner or operator shall inform the Commissioner of the cause of the breakdown and the estimated duration. The owner or operator shall notify the Commissioner when the breakdown is over.	Minn. R. 7019.1000, subp. 2
Notification of Deviations Endangering Human Health or the Environment: As soon as possible after discovery, notify the Commissioner or the state duty officer, either orally or by facsimile, of any deviation from permit conditions which could endanger human health or the environment.	Minn. R. 7019.1000, subp. 1
Notification of Deviations Endangering Human Health or the Environment Report: Within 2 working days of discovery, notify the Commissioner in writing of any deviation from permit conditions which could endanger human health or the environment. Include the following information in this written description: 1. the cause of the deviation; 2. the exact dates of the period of the deviation, if the deviation has been corrected; 3. whether or not the deviation has been corrected; 4. the anticipated time by which the deviation is expected to be corrected, if not yet corrected; and 5. steps taken or planned to reduce, eliminate, and prevent reoccurrence of the deviation.	Minn. R. 7019.1000, subp. 1
Application for Permit Amendment: If a permit amendment is needed, submit an application in accordance with the requirements of Minn. R. 7007.1150 through Minn. R. 7007.1500. Submittal dates vary, depending on the type of amendment needed.	Minn. R. 7007.1150 through Minn. R. 7007.1500
Extension Requests: The Permittee may apply for an Administrative Amendment to extend a deadline in a permit by no more than 120 days, provided the proposed deadline extension meets the requirements of Minn. R. 7007.1400, subp. 1(H).	Minn. R. 7007.1400, subp. 1(H)
Emission Inventory Report: due 91 days after end of each calendar year following permit issuance (April 1). To be submitted on a form approved by the Commissioner.	Minn. R. 7019.3000 through Minn. R. 7019.3100
Emission Fees: due 60 days after receipt of an MPCA bill.	Minn. R. 7002.0005 through Minn. R. 7002.0095
DETERMINING IF A PROJECT/MODIFICATION IS SUBJECT TO NEW SOURCE REVIEW	hdr
These requirements apply if a reasonable possibility (RP) as defined in 40 CFR Section 52.21(r)(6)(vi) exists that a proposed project, analyzed using the actual-to-projected-actual (ATPA) test (either by itself or as part of the hybrid test at Section 52.21(a)(2)(iv)(f)) and found to not be part of a major modification, may result in a significant emissions increase (SEI). If the ATPA test is not used for the project, or if there is no RP that the proposed project could result in a SEI, these requirements do not apply to that project. The Permittee is only subject to the Preconstruction Documentation requirement for a project where a RP occurs only within the meaning of Section 52.2(r)(6)(vi)(a). Even though a particular modification is not subject to New Source Review (NSR), or where there isn't a RP that a proposed project could result in a SEI, a permit amendment, recordkeeping, or notification may still be required by Minn. R. 7007.1150 - 7007.1500.	Title I Condition: 40 CFR Section 52.21(r)(6); Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 2
Preconstruction Documentation -- Before beginning actual construction on a project, the Permittee shall document the following: 1. Project description 2. Identification of any emission unit (EU) whose emissions of an NSR pollutant could be affected 3. Pre-change potential emissions of any affected existing EU, and the projected post-change potential emissions of any affected existing or new EU. 4. A description of the applicability test used to determine that the project is not a major modification for any regulated NSR pollutant, including the baseline actual emissions, the projected actual emissions, the amount of emissions excluded due to increases not associated with the modification and that the EU could have accommodated during the baseline period, an explanation of why the amounts were excluded, and any creditable contemporaneous increases and decreases that were considered in the determination. The Permittee shall maintain records of this documentation.	Title I Condition: 40 CFR Section 52.21(r)(6); Minn. R. 7007.3000; Minn. R. 7007.1200, subp. 4; Minn. R. 7007.0800, subps. 4 & 5

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The Permittee shall monitor the actual emissions of any regulated NSR pollutant that could increase as a result of the project and that were analyzed using the ATPA test, and the potential emissions of any regulated NSR pollutant that could increase as a result of the project and that were analyzed using potential emissions in the hybrid test. The Permittee shall calculate and maintain a record of the sum of the actual and potential (if the hybrid test was used in the analysis) emissions of the regulated pollutant, in tons per year on a calendar year basis, for a period of 5 years following resumption of regular operations after the change, or for a period of 10 years following resumption of regular operations after the change if the project increases the design capacity of or potential to emit of any unit associated with the project.	Title I Condition: 40 CFR Section 52.21(r)(6); Minn. R. 7007.3000; Minn. R. 7007.0800, subps. 4 & 5
The Permittee must submit a report to the Agency if the annual summed (actual, plus potential if used in hybrid test) emissions differ from the preconstruction projection and exceed the baseline actual emissions by a significant amount as listed at 40 CFR Section 52.21(b)(23). Such report shall be submitted to the Agency within 60 days after the end of the year in which the exceedances occur. The report shall contain: a. The name and ID number of the facility, and the name and telephone number of the facility contact person b. The annual emissions (actual, plus potential if any part of the project was analyzed using the hybrid test) for each pollutant for which the preconstruction projection and significant emissions increase are exceeded. c. Any other information, such as an explanation as to why the summed emissions differ from the preconstruction projection.	Title I Condition: 40 CFR Section 52.21(r)(6); Minn. R. 7007.3000; Minn. R. 7007.0800, subps. 4 & 5
MERCURY REDUCTION EFFORTS	hdr
Design and construct air pollution control equipment such that sufficient space exists after the rotary hearth furnace for the installation of chemical addition or other pollution control equipment necessary to achieve further mercury reductions. This is a state-only requirement and is not enforceable by the EPA Administrator and citizens under the Clean Air Act.	Minn. Laws Chap. 220 (2004) Sec. 1(d); Minn. R. 7007.0800, subp. 2
Submittal: due 540 days after the Initial Performance Test Trigger Date - a plan describing the campaign for identifying and testing options to control mercury from the rotary hearth furnace. The mercury reduction report must contain the information described in the facility-level requirements under Mercury Reduction Efforts.	Minn. Laws Chap. 220 (2004) Sec. 1(d); Minn. R. 7007.0800, subp. 2
The mercury reduction report must: 1) Review technical developments in mercury control since the submittal of the facility's revised permit application in May 2005. 2) Identify options targeting a reduction, from the baseline determined after initial startup, of at least fifty percent of the annual mercury emissions from the rotary hearth furnace (RHF). 3) Evaluate the effectiveness of, at a minimum, the following options: a) Changing to raw materials with a lower mercury concentration. b) Installing additional control devices to the flue gas cleanup process, including the use of sorbent injection or the modification of existing control devices. c) Enhancing the existing flue gas cleanup process to remove mercury through process modifications or chemical addition to the furnace or flue gas. d) A combination of any or all of the above techniques. (CONTINUED)	Minn. Laws Chap. 220 (2004) Sec. 1(d); Minn. R. 7007.0800, subp. 2

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(continued from above) 4) Present three options to the Commissioner that can be implemented at the RHF to lower the amount of mercury emitted. To select these options, the first criterion shall be the potential for greatest removal of mercury, while the second criterion is technical feasibility. 5) Include, for each option presented, a schedule for constructing or installing new needed equipment, operating the equipment (including shakedown), and testing the mercury reduction method selected by the Commissioner for further implementation. (Mercury performance testing of the selected option shall be conducted according to Minn. R. 7017.2001 to 7017.2060 for data submittal engineering tests, including the preparation of test plan and test reports, providing the MPCA adequate notice of the test, and submittal of test reports.) This is a state-only requirement and is not enforceable by the EPA Administrator and citizens under the Clean Air Act.	Minn. Laws Chap. 220 (2004) Sec. 1(d); Minn. R. 7007.0800, subp. 2
Upon the Commissioner's approval of the mercury reduction options report and the Commissioner's selection of a mercury control option, the Permittee shall follow the schedule in the mercury reduction report to initiate construction and operation of the selected option, and conduct data submittal and engineering tests of that option. (These performance tests will be conducted in addition to those required to demonstrate compliance with the case-by-case MACT limit for mercury.) This is a state-only requirement and is not enforceable by the EPA Administrator and citizens under the Clean Air Act.	Minn. Laws Chap. 220 (2004) Sec. 1(d); Minn. R. 7007.0800, subp. 2
Conduct a performance test for mercury at least 60 days after but not more than 180 after implementing the selected option to implement the goal of achieving at least a fifty percent reduction in baseline mercury emissions. This is a state-only requirement and is not enforceable by the EPA Administrator and citizens under the Clean Air Act.	Minn. Laws Chap. 220 (2004) Sec. 1(d); Minn. R. 7007.0800, subp. 2
PROTECTION OF VISIBILITY IN CLASS I AREAS	hdr
The Permittee must meet the Class I visibility requirements by (1) reducing visibility impairing emissions from the facility and demonstrating with USEPA approved modeling at the facility's maximum 24-hour average, allowed emission rate that the visibility impacts from the facility are less than a perceptible change over natural background; OR (2) the Permittee shall acquire and permanently retire sulfur dioxide allowances from the EPA Acid Rain Program sufficient to mitigate its visibility impacts, as described below; OR (3) The Permittee may propose an alternative means to reduce the visibility impacts, including emission reductions at other facilities.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000
(1) Emission Reductions and Modeling. The Permittee may propose to reduce the emission rate of visibility impairing pollutants from its facility and then make a demonstration of the impact of the new emission rate to visibility by submitting a permit amendment to the Agency. The proposal will be shared with the Federal Land Managers of Superior National Forest (for the Boundary Waters Canoe Area Wilderness) and of Voyageurs National Park. After considering the comments of the Federal Land Managers, the Commissioner may approve the submittal following the MPCA's procedure for modifying a Title I Condition.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000
(2) Retirement of Acid Rain Allowances. (a) Each calendar year, the Permittee shall determine the number of sulfur dioxide allowances or nitrogen oxides allowances (if available) needed to be permanently retired according to Appendix D.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000
(2)(b) - Acceptable sulfur dioxide allowances or nitrogen oxide allowances (if available) shall be acquired from facilities that were allocated allowances under 40 CFR Part 73 or under a future emissions trading program administered by USEPA to reduce acid rain and/or meet the NAAQS.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000
(2)(c) The vintage year of the allowances shall correspond to the calendar year that is being mitigated.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000
(2)(d) The Permittee shall transfer these allowances into an account in the Allowance Tracking System administered by the U.S. EPA for the Acid Rain Program (or a similar trading program), to be identified by the Commissioner. These retired allowances can never be used by the Permittee to meet any compliance requirement under the Clean Air Act or any State Implementation Plan.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000

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(2)(e) The Permittee shall submit a report to the Commissioner no later than 60 days after the end of the calendar year. The report shall contain the amount of sulfur dioxide, nitrogen oxide, particulate matter, and sulfuric acid mist emitted by the Mesabi Nugget facility; the amount, facility name, location of facility (including the distances, in kilometers, from the Boundary Waters Canoe Area Wilderness and Voyageurs National Park), vintage year of allowances retired, proof that allowances have been transferred into the account identified by the Commissioner and any applicable serial or other identification associated with the retired allowances.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000
(3) Alternative Proposal. The Permittee may propose an alternative means to reduce the visibility impacts, including emission reductions at other facilities. Such an alternative proposal shall be made by submitting a permit amendment to the Agency that includes a modeling demonstration and proposed federally enforceable permit conditions. The proposal will be shared with the Federal Land Managers of Superior National Forest (for the Boundary Waters Canoe Area Wilderness) and of Voyageurs National Park. After considering the comments of the Federal Land Managers, the Commissioner may approve the submittal following the MPCA's procedure for modifying a Title I Condition.	Title I Condition: 40 CFR 52.21(p) and Minn. R. 7007.3000
AMBIENT BOUNDARY	hdr
1. This permit authorizes the Permittee to perform the activities identified on the cover page of this permit under the conditions and terms of this permit. 2. This permit does not authorize the Permittee to enter, invade or trespass on any property (e.g., surface estates, mineral estates, etc.), including but not limited to the property depicted within the ambient air boundary in Figure 2, Appendix G of the Permittee's PSD Permit Application for Mesabi Nugget LLC, Hoyt Lakes, Minnesota, May, 2005. This permit shall not be construed as authorizing the Permittee to enter, invade or trespass upon any property (e.g., surface estates, mineral estates, etc.), including but not limited to the property depicted within the ambient air boundary in Figure 2, Appendix G of the Permittee's PSD Permit Application for Mesabi Nugget LLC, Hoyt Lakes, Minnesota, May, 2005.	Title I Condition: 40 CFR 52.21(k); Minn. R. 7007.3000, Minn. R,. 7007.0800, subp. 2
3. This permit does not authorize the Permittee to use, impair, injure, hinder, encumber or interfere with any property (e.g., surface estates, mineral estates, etc.), including but not limited to the property depicted within the ambient air boundary in Figure 2, Appendix G of the Permittee's PSD Permit Application for Mesabi Nugget LLC, Hoyt Lakes, Minnesota, May, 2005. This permit shall not be construed as authorizing the Permittee to use, impair, injure, hinder, encumber or interfere with any property (e.g., surface estates, mineral estates, etc.), including but not limited to the property depicted within the ambient air boundary in Figure 2, Appendix G of the Permittee's PSD Permit Application for Mesabi Nugget LLC, Hoyt Lakes, Minnesota, May, 2005.	Title I Condition: 40 CFR 52.21(k); Minn. R. 7007.3000, Minn. R,. 7007.0800, subp. 2
4. The Permittee is solely responsible for obtaining from all property owners (e.g., surface estates, mineral estates, etc.) access to, possession and control of any and all property (e.g., surface estates, mineral estates, etc.) necessary to implement and comply with the terms and conditions of this permit. 5. The Permittee shall exercise the authorizations under this permit in compliance with the terms and conditions of all other conveyances of property interests (e.g., leases, etc.) to the Permittee. 6. The Permittee shall obtain and maintain exclusive possession of and control over all property (e.g., surface estates only) within the ambient air boundary of Figure 2, Appendix G of the Permittee's PSD Permit Application for Mesabi Nugget LLC, Hoyt Lakes, Minnesota, May, 2005.	Title I Condition: 40 CFR 52.21(k); Minn. R. 7007.3000, Minn. R,. 7007.0800, subp. 2

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Subject Item: **GP 001 Particulate MACT Monitoring Equipment**

Associated Items: MR 001 Coal 1 Pulverizer - Differential Pressure

MR 002 Coal 2 Pulverizer - Differential Pressure

MR 006 RHF - Differential Pressure

MR 007 RHF - Scrubber Water Flow

MR 009 RHF - Offgas Flow

MR 010 RHF - O2 content

MR 012 Flux 1 Pulverizer - Differential Pressure

MR 013 Coal Flux/Unload - Differential Pressure

MR 014 Rail Loadout - Differential Pressure

What to do	Why to do it
MONITORING REQUIREMENTS	xhdr
Prior to startup, install, calibrate, maintain, and operate a continuous parameter monitoring system for measuring and recording pressure drop across the control equipment by the startup date.	Title I Condition: 40 CFR 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.8(c)(1),(2),(3),(4)
The Permittee shall develop and implement a CMS quality control program. As part of the quality control program, the Permittee shall develop and submit to the Commissioner for approval upon request a site-specific performance evaluation test plan for the performance evaluation required in 40 CFR 63.8 (e)(3)(i), according to the procedures specified in paragraph (e). Each quality control program shall include, at a minimum, a written protocol that describes procedures for each of the operations listed in items (1) through (6) below. (1) Initial and any subsequent calibration of the CMS; (2) Determination and adjustment of the calibration drift of the CMS; (3) Preventive maintenance of the CMS, including spare parts inventory; (4) Data recording, calculations, and reporting; (5) Accuracy audit procedures, including sampling and analysis methods; and (6) Program of corrective action for a malfunctioning CMS. (CONTINUED)	40 CFR Section 63.8(d): MACT and Minn. R. 7007.3010
(Continued from above) The Permittee shall keep these written procedures on record for the life of the affected source or until the affected source is no longer subject to the provisions of this part, to be made available for inspection, upon request, by the Commissioner. If the performance evaluation plan is revised, the Permittee shall keep previous (i.e., superseded) versions of the performance evaluation plan on record to be made available for inspection, upon request, by the Commissioner, for a period of 5 years after each revision to the plan. Where relevant, e.g., program of corrective action for a malfunctioning CMS, these written procedures may be incorporated as part of the affected source's startup, shutdown, and malfunction plan to avoid duplication of planning and recordkeeping efforts.	40 CFR Section 63.8(d): MACT and Minn. R. 7007.3010
MONITORING AND COLLECTING DATA	hdr
Except for monitoring malfunctions, associated repairs, and required quality assurance or control activities (including as applicable, calibration checks and required zero and span adjustments), monitor continuously (or collect data at all required intervals) at all times an affected source is operating.	Title I Condition: 40 CFR 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010
Do not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels, or to fulfill a minimum data availability requirement. All the data collected during all other periods must be used in assessing compliance.	Title I Condition: 40 CFR 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010
A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not considered malfunctions.	Title I Condition: 40 CFR 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010

TABLE A: LIMITS AND OTHER REQUIREMENTS

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 002 Cooling Towers**

Associated Items: EU 014 Process Water Cooling Tower

EU 015 Clean Water Cooling Tower

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Cooling tower drift rate: Less than or equal to 0.001 percent. [This is a design criterion, and a basis of the BACT determination.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. Rules 7007.3000
Cooling water flow rate: Less than or equal to 30,000 gpm. [Basis of BACT limit.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. Rules 7007.3000
Cooling water total dissolved solids content: Less than or equal to 15,100 parts per million. [Basis of BACT limit.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. Rules 7007.3000
MONITORING REQUIREMENTS	hdr
By the startup date of the cooling tower: Install, calibrate, maintain, and operate a continuous monitoring system for measuring and recording cooling water circulation.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. Rules 7007.3000
Measure and record the cooling tower flow rate of each cooling tower at least once per month.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. Rules 7007.3000
Measure and record the concentration of total dissolved solids in each cooling tower at least once per month.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. Rules 7007.3000

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 003 Green Ball Dryer/Material Transfer Operations Baghouses**

Associated Items: CE 007 Fabric Filter - High Temperature, i.e., T>250 Degrees F

CE 009 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 010 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

What to do	Why to do it
EMISSIONS LIMITATIONS AND OPERATING REQUIREMENTS	hdr
Operate and maintain the Green Ball Dryer/Material Transfer Operations (EU 002), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
Prepare, and at all times operate according to, a written operation and maintenance plan for each control device applied to meet the particulate matter emission limit developed for the Green Ball Dryer in the case-by-case MACT determination. Each site-specific operation and maintenance plan must be submitted to the Administrator on or before the initial startup date. The submitted plan must explain why the chosen practices (i.e., quantified objectives) are effective in performing corrective actions. The Administrator will review the adequacy of the site-specific practices and objectives to be followed and the records that will be kept to demonstrate compliance with the Plan. If the Administrator determines that any portion of the operation and maintenance plan is not adequate, those portions of the plan can be rejected and additional information addressing the relevant issues will need to be provided. In the interim of this process, continue to follow the current (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) site-specific practices and objectives, as submitted until the revisions are accepted as adequate by the Administrator. Maintain a current copy of the operation and maintenance plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart. Each operation and maintenance plan must address the elements in paragraphs (1) and (2), below. (1) Preventative maintenance for each control device, including a preventative maintenance schedule that is consistent with the manufacturer's instructions for routine and long-term maintenance. (2) Corrective action procedures for bag leak detection systems. In the event a bag leak detection system alarm is triggered, you must initiate corrective action to determine the cause of the alarm within 1 hour of the alarm, initiate corrective action to correct the cause of the (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) problem within 24 hours of the alarm, and complete the corrective action as soon as practicable. Corrective actions may include, but are not limited to, the actions in paragraphs (i) through (vi), below. (i) Inspecting the baghouse for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in emissions. (ii) Sealing off defective bags or filter media. (iii) Replacing defective bags or filter media or otherwise repairing the control device. (iv) Sealing off a defective baghouse compartment. (v) Cleaning the bag leak detection system probe, or otherwise repairing the bag leak detection system. (vi) Adjusting the process operation producing the particulate emissions.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
GENERAL COMPLIANCE REQUIREMENTS	hdr

Comply with the work practice standards, operation and maintenance requirements, notification requirements, reporting requirements, and recordkeeping requirements for the Green Ball Dryer and its associated control equipment at all times, except during periods of startup, shutdown, and malfunction. The terms startup, shutdown, and malfunction are defined in 40 CFR Section 63.2. Between the date of initial startup and the date upon which continuous monitoring systems have been installed and certified and any applicable operating limits have been set, maintain a log detailing the operation and maintenance of the process and emissions control equipment. This includes the daily monitoring and recordkeeping of air pollution control device operating parameters as specified in this permit.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
MONITORING REQUIREMENTS	hdr
Install, calibrate, maintain, and operate a continuous monitoring system for measuring and recording particulate matter passing through the control equipment by the startup date.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200; 40 CFR Section 63.8(c)(1),(2),(3),(4)
Install, operate, and maintain a bag leak detection system to monitor the relative change in particulate matter loadings according to the requirements in this permit, and conduct inspections at their specified frequencies according to the requirements in paragraphs (1) through (8), below. (1) Monitor the pressure drop across each baghouse cell each day to ensure pressure drop is within the normal operating range. (2) Confirm that dust is being removed from hoppers through weekly visual inspections or other means of ensuring the proper functioning of removal mechanisms. (3) Check the compressed air supply of pulse-jet baghouses each day. (4) Monitor cleaning cycles to ensure proper operation using an appropriate methodology. (5) Check bag cleaning mechanisms for proper functioning through monthly visual inspections or equivalent means. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) (5) Check bag cleaning mechanisms for proper functioning through monthly visual inspections or equivalent means. (6) Make monthly visual checks of bag tension on reverse air and shaker-type baghouses to ensure that bags are not kinked (kneed or bent) or lying on their sides. If it is a shaker-type baghouses that has self-tensioning (spring-loaded) devices, this check is not needed. (7) Confirm the physical integrity of the baghouse through quarterly visual inspections of the baghouse interior for air leaks. (8) Inspect fans for wear, material buildup, and corrosion through quarterly visual inspections, vibration detectors, or equivalent means.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
OPERATION AND MAINTENANCE REQUIREMENTS - BAG LEAK DETECTION SYSTEM	hdr

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

For each negative pressure baghouse or positive pressure baghouse equipped with a stack, applied to meet any MACT-based particulate emission limit, install, operate, and maintain a bag leak detection system according to the requirements in paragraphs (1) through (8), below. (1) The system must be certified by the manufacturer to be capable of detecting emissions of particulate matter at concentrations of 10 milligrams per actual cubic meter (0.0044 grains per actual cubic foot) or less. (2) The system must provide output of relative changes in particulate matter loadings. (3) The system must be equipped with an alarm that will sound when an increase in relative particulate loadings is detected over the alarm level set point established according to paragraph (4) of this section. The alarm must be located such that it can be heard by the appropriate plant personnel. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) (4) For each bag leak detection system, develop and submit to the Administrator for approval, a site-specific monitoring plan that addresses the items identified in paragraphs (i) through (v), below. For each bag leak detection system that operates based on the triboelectric effect, the monitoring plan shall be consistent with the recommendations contained in the U.S. Environmental Protection Agency (U.S. EPA) guidance document, "Fabric Filter Bag Leak Detection Guidance" (EPA-454/R-98-015). This document is available on the EPA's Technology Transfer Network at http://www.epa.gov/ttn/emc/cem/tribo.pdf (Adobe Acrobat version) or http://www.epa.gov/ttn/emc/cem/tribo.wpd (WordPerfect version). Operate and maintain the bag leak detection system according to the site-specific monitoring plan at all times. The plan shall describe all of the items in paragraphs (i) through (v), below. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) (i) Installation of the bag leak detection system. (ii) Initial and periodic adjustment of the bag leak detection system including how the alarm set-point will be established. (iii) Operation of the bag leak detection system including quality assurance procedures. (iv) How the bag leak detection system will be maintained including a routine maintenance schedule and spare parts inventory list. (v) How the bag leak detection system output shall be recorded and stored. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) (5) To make the initial adjustment of the system, establish the baseline output by adjusting the sensitivity (range) and the averaging period of the device. Then, establish the alarm set points and the alarm delay time (if applicable). (6) Following initial adjustment, do not adjust averaging period, alarm set point, or alarm delay time, without approval from the Administrator except as provided for in the following paragraph. Once per quarter, you may adjust the sensitivity of the bag leak detection system to account for seasonal effects, including temperature and humidity, according to the procedures identified in the site-specific monitoring plan required under paragraph (4) of this section. (7) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors. (8) The bag leak detector sensor must be installed downstream of the baghouse and upstream of any wet scrubber.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
CONTINUOUS COMPLIANCE DEMONSTRATION - EMISSION LIMITS	hdr

Maintain the mean concentration of particulate matter below the MACT emission limit listed under EU002.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
Conduct subsequent performance tests following the test frequency schedule.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
Demonstrate continuous compliance by completing the requirements in paragraphs (1) and (2), below. (1) Maintaining records of the time corrective actions were taken in the event of a bag leak detection system alarm, the corrective action(s) taken, and the date on which corrective action was completed. (2) Inspecting and maintaining each baghouse according to the requirements in this permit's operating and maintenance conditions and recording all information needed to document conformance with these requirements. If the sensitivity of the bag leak detection system is increased or decreased beyond the limits specified in your site-specific monitoring plan, include a copy of the required written certification by a responsible official in the next semiannual compliance report.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
If the daily average operating parameter value for the Green Ball Dryer does not meet the corresponding established operating limit, follow the procedures in paragraphs (1) through (4), below. (1) Initiate and complete initial corrective action within 10 calendar days and demonstrate that the initial corrective action was successful. During any period of corrective action, continue to monitor and record all required operating parameters for equipment that remains in operation. After 10 calendar days, measure and record the daily average operating parameter value for the emission unit or group of similar emission units on which corrective action was taken. After the initial corrective action, if the daily average operating parameter value for the emission unit meets the operating limit established for the corresponding unit or group, then the corrective action was successful and the emission unit is in compliance with the established operating limits. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) (2) If the initial corrective action required in paragraph (1) of this section was not successful, then complete an additional corrective action within 10 calendar days and demonstrate that the subsequent corrective action was successful. During any period of corrective action, continue to monitor and record all required operating parameters for equipment that remains in operation. After the second set of 10 calendar days allowed to implement corrective action, again measure and record the daily average operating parameter value for the emission unit. If the daily average operating parameter value for the emission unit meets the operating limit established for the corresponding unit or group, then the corrective action was successful and the emission unit is in compliance with the established operating limits. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) (3) If the second attempt at corrective action required in paragraph (2) was not successful, then you must repeat the procedures of paragraph (2) of this section until the corrective action is successful. If the third attempt at corrective action is unsuccessful, you must conduct another performance test in accordance with the procedures in this permit and report to the Administrator as a deviation the third unsuccessful attempt at corrective action. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
(continued from above) (4) After the third unsuccessful attempt at corrective action, you must submit to the Administrator the written report required in paragraph (3) of this section within 5 calendar days after the third unsuccessful attempt at corrective action. This report must notify the Administrator that a deviation has occurred and document the types of corrective measures taken to address the problem that resulted in the deviation of established operating parameters and the resulting operating limits.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
CONTINUOUS COMPLIANCE DEMONSTRATION - OPERATION AND MAINTENANCE REQUIREMENTS	hdr

Demonstrate continuous compliance with the operation and maintenance requirements in this permit by completing the requirements of paragraphs (1) and (2), below. (1) Performing preventative maintenance for each control device in accordance with this permit and recording all information needed to document conformance with these requirements; (2) Initiating and completing corrective action for a bag leak detection system alarm in accordance with this permit and recording all information needed to document conformance with these requirements.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
Maintain a current copy of the operation and maintenance plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
CONTINUOUS COMPLIANCE DEMONSTRATION - OTHER REQUIREMENTS	hdr
(a) Deviations. Report each instance in which an emission limitation was not met. This includes periods of startup, shutdown, and malfunction in accordance with the paragraph (b), below. Report each instance in which the work practice standards in this permit were not met and each instance in which the operation and maintenance requirement in this permit were not met. These instances are deviations from the emission limitations, work practice standards, and operation and maintenance requirements in this subpart. Report these deviations in accordance with the requirements in this permit. (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
(continued from above) (b) Startups, shutdowns, and malfunctions. During periods of startup, shutdown, and malfunction, operate in accordance with your startup, shutdown, and malfunction plan and the requirements in paragraphs (1) and (2), below. (1) Consistent with 40 CFR Section 63.6(e) and 63.7(e)(1), deviations that occur during a period of startup, shutdown, or malfunction are not violations if it is demonstrated to the Administrator's satisfaction that the emission unit and control equipment were operating in accordance with the startup, shutdown, and malfunction plan. (2) The Administrator will determine whether deviations that occur during a period of startup, shutdown, or malfunction are violations, according to the provisions in 40 CFR Section 63.6(e). [These startup, shutdown, and malfunction provisions apply only to the MACT (40 CFR 63.43(g)) limits. There is no startup, shutdown, and malfunction exception for the limits set under BACT (40 CFR 52.21).]	Title I Condition: 40 CFR Section 63.43(g): MACT; Minn. R. 7007.3010; 40 CFR Section 63.6(e) and 63.7(e)(1); 40 CFR Section 64.5

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 004 Baghouses not subject to CAM**

Associated Items: CE 003 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 004 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 005 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 006 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 008 Fabric Filter - High Temperature, i.e., T>250 Degrees F

CE 011 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 012 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 013 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 014 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 015 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 016 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

What to do	Why to do it
EMISSIONS LIMITATIONS AND OPERATING REQUIREMENTS	hdr
The baghouses in this group (GP004) are not subject to the Compliance Assurance Monitoring requirements for large pollutant-specific emissions unit. However, they are subject to the monitoring requirements of GP001 (MACT).	Title I Condition: 40 CFR Section 63.43(g): case-by-case MACT; Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
Operate and maintain the baghouses and associated monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
For baghouses without bag leak detection systems, the continuous parameter monitoring system (CPMS) is the system that measures the differential pressure drop across the baghouse. For each required CPMS, develop and make available for inspection upon request by the permitting authority a site-specific monitoring plan that addresses the requirements in paragraphs (1) through (7), below. (1) Installation of the CPMS sampling probe or other interface at a measurement location relative to each affected emission unit such that the measurement is representative of control of the exhaust emissions (e.g., on or downstream of the last control device). (2) Performance and equipment specifications for the sample interface, the parametric signal analyzer, and the data collection and reduction system. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.8(c)(1), (3), (4)(ii), (7), and (8)
(continued from above) (3) Performance evaluation procedures and acceptance criteria (e.g., calibrations). (4) Ongoing operation and maintenance procedures in accordance with the general requirements of 40 CFR Section 63.8(c)(1), (3), (4)(ii), (7), and (8). (5) Ongoing data quality assurance procedures in accordance with the general requirements of 40 CFR Section 63.8(d). (6) Ongoing recordkeeping and reporting procedures in accordance with the general requirements of 40 CFR Section 63.10(c), (e)(1), and (e)(2)(i). (7) Corrective action procedures that you will follow in the event an air pollution control device exceeds an established operating limit.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.8(d); 40 CFR Section 63.10(c), (e)(1), and (e)(2)(i)
Unless otherwise specified, each CPMS must meet the requirements in paragraphs (1) and (2), below. (1) Each CPMS must complete a minimum of one cycle of operation for each successive 15-minute period while the associated emission unit(s) is in operation and must have valid data for at least 95 percent of every daily averaging period. (2) Each CPMS must determine and record the daily average of all recorded readings while the associated emission unit(s) was in operation.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Conduct a performance evaluation of each CPMS in accordance with the site-specific monitoring plan.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate and maintain the CPMS in continuous operation according to the site-specific monitoring plan.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING AND COLLECTING DATA	hdr
Except for monitoring malfunctions, associated repairs, and required quality assurance or control activities (including as applicable, calibration checks and required zero and span adjustments), monitor continuously (or collect data at all required intervals) at all times an affected source is operating.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Do not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels, or to fulfill a minimum data availability requirement. All the data collected during all other periods must be used in assessing compliance.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not considered malfunctions.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Prepare and at all times operate according to a written operation and maintenance plan for each control device applied to meet the particulate matter emission limit for the baghouses in GP004. Submit the site-specific operation and maintenance plan to the Administrator on or before the start of operation. The plan you submit must explain why the chosen practices (i.e., quantified objectives) are effective in performing corrective actions. Maintain a current copy of the operation and maintenance plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart. Each operation and maintenance plan must address the elements in paragraphs (1) and (2), below. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
(Continued from above) (1) Preventative maintenance for each control device, including a preventative maintenance schedule that is consistent with the manufacturer's instructions for routine and long-term maintenance. (2) In the event an established operating limit for a baghouse is exceeded, initiate corrective action to determine the cause of the operating limit exceedance and complete the corrective action within 10 calendar days. The corrective action procedures taken must be consistent with the installation, operation, and maintenance procedures listed in the facility's site-specific CPMS monitoring plan.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING REQUIREMENTS	hdr
Install, calibrate, maintain, and operate a continuous parameter monitoring system (CPMS) for measuring and recording pressure drop across the control equipment by the startup date.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.8(c)(1),(2),(3),(4)
The Permittee shall develop and implement a CMS quality control program. As part of the quality control program, the Permittee shall develop and submit to the Commissioner for approval upon request a site-specific performance evaluation test plan for the performance evaluation required in 40 CFR 63.8 (e)(3)(i), according to the procedures specified in paragraph (e). Each quality control program shall include, at a minimum, a written protocol that describes procedures for each of the operations listed in items (1) through (6) below. (1) Initial and any subsequent calibration of the CMS; (2) Determination and adjustment of the calibration drift of the CMS; (3) Preventive maintenance of the CMS, including spare parts inventory; (4) Data recording, calculations, and reporting; (5) Accuracy audit procedures, including sampling and analysis methods; and (6) Program of corrective action for a malfunctioning CMS. (CONTINUED)	40 CFR Section 63.8(d): MACT and Minn. R. 7007.3010

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

(Continued from above) The Permittee shall keep these written procedures on record for the life of the affected source or until the affected source is no longer subject to the provisions of this part, to be made available for inspection, upon request, by the Commissioner. If the performance evaluation plan is revised, the Permittee shall keep previous (i.e., superseded) versions of the performance evaluation plan on record to be made available for inspection, upon request, by the Commissioner, for a period of 5 years after each revision to the plan. Where relevant, e.g., program of corrective action for a malfunctioning CMS, these written procedures may be incorporated as part of the affected source's startup, shutdown, and malfunction plan to avoid duplication of planning and recordkeeping efforts.	40 CFR Section 63.8(d): MACT and Minn. R. 7007.3010
Install, operate, and maintain a pressure drop monitoring system to monitor the relative change in pressure drop according to the requirements in this permit. Conduct inspections at their specified frequencies according to the requirements in paragraphs (1) through (8), below. (1) Monitor the pressure drop across each baghouse cell each day to ensure pressure drop is within the normal operating range. (2) Confirm that dust is being removed from hoppers through weekly visual inspections or other means of ensuring the proper functioning of removal mechanisms. (3) Check the compressed air supply of pulse-jet baghouses each day. (4) Monitor cleaning cycles to ensure proper operation using an appropriate methodology. (5) Check bag cleaning mechanisms for proper functioning through monthly visual inspections or equivalent means. (CONTINUED)	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
(continued from above) (5) Check bag cleaning mechanisms for proper functioning through monthly visual inspections or equivalent means. (6) Make monthly visual checks of bag tension on reverse air and shaker-type baghouses to ensure that bags are not kinked (kneed or bent) or lying on their sides. If it is a shaker-type baghouses that has self-tensioning (spring-loaded) devices, this check is not needed. (7) Confirm the physical integrity of the baghouse through quarterly visual inspections of the baghouse interior for air leaks. (8) Inspect fans for wear, material buildup, and corrosion through quarterly visual inspections, vibration detectors, or equivalent means.	Title I Condition: 40 CFR Section 52.21: BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
RECORDKEEPING	hdr
QA Plan: Develop and implement a written quality assurance plan that covers the pressure drop CPMS. The plan shall be on site and available for inspection within 30 days after monitor certification. The plan shall contain all of the information required by 40 CFR Section 63.8(d).	40 CFR Section 63.8(d)(2); Minn. R. 7017.1170, subp. 2
Recordkeeping: The owner or operator must retain records of all pressure drop CPMS monitoring data and support information for a period of five years from the date of the monitoring, sample, measurement, or report. Records shall be kept at the source.	40 CFR Section 63.10(b); Minn. R. 7017.1130

TABLE A: LIMITS AND OTHER REQUIREMENTS

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 005 Emission Units subject to MACT**

Associated Items:
EU 001 Rotary Hearth Furnace (RHF)
EU 002 Green Ball Dryer/Material Transfer Operations
EU 003 Product Separator
EU 004 Coal 1 Pulverizer
EU 005 Coal 2 Pulverizer
EU 006 Flux 1 Pulverizer
EU 007 Coal Flux/Unload Baghouse
EU 008 Rail Loadout Baghouse/Material Transfer Operations
EU 010 Material Transfer Operations
EU 011 Back-up Generator 3
EU 012 Flux 2 Pulverizer
EU 013 Product Cooler

What to do	Why to do it
NOTIFICATION & REPORTING REQUIREMENTS	hdr
STARTUP, SHUTDOWN, AND MALFUNCTION REQUIREMENTS	hdr
At all times the Permittee shall operate and maintain the emission unit subject to the MACT standard and its associated air pollution control equipment in a manner consistent with good air pollution control practices for minimizing emissions at least to the levels required by all relevant standards, as described at 40 CFR Section 63.6(e)(1)(i).	40 CFR Section 63.6(e)(1)(i)
During periods of startup, shutdown, and malfunction, the owner or operator of an affected source must operate and maintain such source (including associated air pollution control and monitoring equipment) in accordance with the procedures specified in the startup, shutdown, and malfunction plan developed under 40 CFR Section 63.6(e)(3)(i). Malfunctions shall be corrected as soon as practicable after their occurrence in accordance with the startup, shutdown, and malfunction plan.	40 CFR Section 63.6(e)(1)(ii); 40 CFR Section 63.6(e)(3)(ii); 40 CFR Section 63.6(e)(3)(iii)
The Permittee shall prepare and implement a Startup, Shutdown, and Malfunction Plan (SSMP) for each of the emission units subject to Maximum Control Technology Standards by the start of operation. The SSMP is a federally enforceable part of the permit and shall be prepared in accordance with 40 CFR Section 63.6(e)(3) and include requirements specified therein. The SSMP must be located at the plant site and must be kept updated. When the SSMP is updated, the Permittee must keep all previous versions of the SSMP for a period of 5 years. The Permittee must submit the SSMP when required.	40 CFR Section 63.6(e)(3)(i); 40 CFR Section 63.6(e)(3)(v)
If the Permittee deviates from the startup, shutdown, and malfunction plan (SSMP) during a startup, shutdown or malfunction, the Permittee shall record the actions taken for that event and report such actions within 2 working days after commencing actions inconsistent with the plan, followed by a letter within 7 working days after the end of the event. The report must contain name, title, and signature of a responsible official who is certifying its accuracy, explaining the circumstances of the event, the reasons for not following the SSMP, and whether any excess emissions and/or parameter monitoring exceedances are believed to have occurred.	40 CFR Section 63.6(e)(3)(iv); 40 CFR Section 63.10(d)(5)(ii)
A written SSMP must contain the minimum of the following information: 1. A procedure that documents how any startup, shutdown, or malfunction event that has occurred will be addressed and documented; 2. Information regarding the operation of the source and its associated pollution control devices during a startup, shutdown, or malfunction event in a manner consistent with good air pollution control practices for minimizing emissions at least to the levels required by all relevant standards; and 3. Adequate procedures for correcting malfunctioning process and/or air pollution control equipment as quickly as practicable.	40 CFR Section 63.6(e)(3)(vii)
The Permittee shall maintain files of all information required by this part in a form suitable and readily available for expeditious inspection and review. The files should be retained for at least 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. Only the most recent two years of information must be kept on site.	40 CFR Section 63.10(b)(1)

The Permittee shall maintain, at a minimum, the following information in the files: 1) the occurrence and duration of each startup, shutdown, or malfunction of operation; 2) the occurrence and duration of each malfunction of the air pollution control equipment; 3) all maintenance performed on the pollution control equipment; 4) actions taken during periods of startup, shutdown, and malfunction when such actions are different from the procedures specified in the affected source's startup, shutdown, and malfunction plan (SSMP). In this case, the Permittee shall report this action within 2 days of occurrence and follow by a written notification within 7 days of occurrence. 5) all information necessary to demonstrate conformance with the affected source's SSMP and actions taken in accordance with SSMP; (CONTINUED)	40 CFR Section 63.10(b)(2)
(continued from above) 6) each period during which a continuous monitoring system (CMS) is malfunctioning or inoperative; 7) all required measurements needed to demonstrate compliance with a relevant standard; 8) all results of performance test, CMS performance evaluations, and opacity and visible emission observations; 9) all measurements as may be necessary to determine the conditions of performance tests and performance evaluations; 10) all CMS calibration checks; 11) all adjustments and maintenance performed on CMS; 12) any information demonstrating whether a source is meeting the requirements for a waiver of record keeping or reporting requirements under this part; 13) all documents supporting initial notifications and notifications of compliance status.	40 CFR Section 63.10(b)(2)
Startup, shutdown, and malfunction reports shall be submitted only if there is an occurrence of startup, shutdown, or malfunction during the reporting period and shall be delivered or postmarked by the 30th day following the end of each calendar half year.	40 CFR Section 63.10(d)(5)(i)
TEST METHODS AND OTHER PROCEDURES - MACT EMISSION LIMITS	hdr
Determine compliance with each MACT emission limit for particulate matter according to the requirements in 40 CFR Section 63.7(e)(1) and by following the test methods and procedures in paragraphs (1) and (2), below. (1) Determine the concentration of particulate matter for each stack according to the test methods in 40 CFR part 60, appendix A. The applicable test methods are listed in paragraphs (i) through (v), below. (i) Method 1 or 1A to select sampling port locations and the number of traverse points. Sampling ports must be located at the outlet of the control device and prior to any releases to the atmosphere. (ii) Method 2, 2A, 2C, 2D, 2F, or 2G, as applicable, to determine the volumetric flow rate of the stack gas. (iii) Method 3, 3A, or 3B to determine the dry molecular weight of the stack gas. (iv) Method 4 to determine the moisture content of the stack gas. (v) Method 5, 5D, or 17 to determine the concentration of particulate matter. (CONTINUED)	40 CFR part 60, appendix A; 40 CFR Section 63.7(e)(1); 40 CFR Section 63.43(g)

Facility Name: Mesabi Nugget Delaware LLC

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(Continued from above) (2) Each Method 5, 5D, or 17 performance test must consist of three separate runs. Each run must be conducted for a minimum of 2 hours. (The duration of the runs may be changed with the approval of the Commissioner.) The average particulate matter concentration from the three runs will be used to determine compliance.	40 CFR part 60, appendix A; 40 CFR Section 63.7(e)(1); 40 CFR Section 63.43(g)
PERFORMANCE TESTING NOTIFICATIONS	hdr

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 007 Material Handling Operations - Fugitives**

Associated Items: FS 001 Material Handling Operation, Coal

FS 003 Material Handling Operation, Flux (Limestone, Dolomite)

FS 005 Material Handling Operation, Slag

FS 007 Material Handling Operation, Nuggets

What to do	Why to do it
EMISSION LIMITATIONS	hdr
Opacity: less than or equal to 5 percent opacity using 6-minute Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
WORK PRACTICE STANDARDS	hdr
Prior to startup, prepare, and at all times operate according to, a fugitive dust emissions control plan that describes in detail the measures that will be put in place to control fugitive dust emissions from the locations listed in paragraphs (1) through (5), below. (1) Stockpiles (includes, but is not limited to, stockpiles of uncrushed coal, crushed coal, or slag); (2) Material transfer points; (3) Plant roadways; (4) Nugget loading areas; and (5) Yard areas.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Maintain a current copy of the fugitive dust emissions control plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R 7007.3010
Follow fugitive dust emissions control plan for applicable recordkeeping requirements. Perform weekly visibility checks for the stockpiles and maintain watering records for stockpile operations.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.6(e); 40 CFR Section 63.8(b)); Minn. R. 7007.0800, subp. 6(A)(2)
For each work practice standard and operation and maintenance requirement that applies where initial compliance is not demonstrated using a performance test, demonstrate initial compliance within 30 calendar days after initial startup. Demonstrate continuous compliance with the work practice standard requirements by operating in accordance with the fugitive dust emissions control plan at all times.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Clean up all coal spilled on roads or access areas as soon as practicable using methods that minimize the amount of dust suspended. Control fugitive particulate emissions by dust suppression methods on such operations so that fugitive particulate emissions are minimized. However, during freezing temperatures, owners or operators shall not be required to apply water or dust suppressants. No nonessential coal handling operations shall be conducted that are not shielded from the wind or enclosed in a building when steady wind speeds exceed 30 miles per hour as determined at the nearest official station of the United States Weather Bureau or by wind speed instruments on or adjacent to the site. This does not authorize the use of surface hardening agents, wetting or chemical agents, foam agents, and oils that may cause ground water or surface water contamination in violation of any applicable water pollution law.	Minn. R. 7011.1105.A.; Minn. R. 7011.1120; Minn. R. 7011.1125; Minn. R. 7011.1140
Hold initial notifications, all other reports, testing and compliance data for at least five years.	40 CFR Section 63.10(b)); Minn. R. 7007.0800, subp. 6(A)(2)
CONTROL EQUIPMENT REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the material handling operations once each calendar week while in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing material transfer operations.	Minn. R. 7007.0800, subp. 2

Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken. Maintain watering records for material handling operations.	Minn. R. 7007.0800, subp. 5

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 008 Storage Piles - Fugitives**

Associated Items: FS 002 Wind Erosion, Coal

FS 004 Wind Erosion, Flux (Limestone, Dolomite)

FS 006 Wind Erosion, Slag

FS 008 Wind Erosion, Nuggets

What to do	Why to do it
EMISSION LIMITATIONS	hdr
Opacity: less than or equal to 5 percent opacity using 6-minute Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
WORK PRACTICE STANDARDS	hdr
Prepare, and at all times operate according to, a fugitive dust emissions control plan that describes in detail the measures that will be put in place to control fugitive dust emissions from the locations listed in paragraphs (1) through (5), below. (1) Stockpiles (includes, but is not limited to, stockpiles of uncrushed coal, crushed coal, or slag); (2) Material transfer points; (3) Plant roadways; (4) Nugget loading areas; and (5) Yard areas.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Maintain a current copy of the fugitive dust emissions control plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R 7007.3010
For each work practice standard and operation and maintenance requirement that applies where initial compliance is not demonstrated using a performance test, demonstrate initial compliance within 30 calendar days after initial startup. Demonstrate continuous compliance with the work practice standard requirements by operating in accordance with the fugitive dust emissions control plan at all times.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Clean up all coal spilled on roads or access areas as soon as practicable using methods that minimize the amount of dust suspended. Control fugitive particulate emissions by dust suppression methods on such operations so that fugitive particulate emissions are minimized. However, during freezing temperatures, owners or operators shall not be required to apply water or dust suppressants. No nonessential coal handling operations shall be conducted that are not shielded from the wind or enclosed in a building when steady wind speeds exceed 30 miles per hour as determined at the nearest official station of the United States Weather Bureau or by wind speed instruments on or adjacent to the site. This does not authorize the use of surface hardening agents, wetting or chemical agents, foam agents, and oils that may cause ground water or surface water contamination in violation of any applicable water pollution law.	Minn. R. 7011.1105.A.; Minn. R. 7011.1120; Minn. R. 7011.1125; Minn. R. 7011.1140
Hold initial notifications, all other reports, testing and compliance data for at least five years.	40 CFR Section 63.10(b)); Minn. R. 7007.0800, subp. 6(A)(2)
VISIBLE EMISSION REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the storage piles once each calendar week.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken. Maintain watering records for storage piles.	Minn. R. 7007.0800, subp. 5

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 009 Continuous Monitors subject to BACT and MACT**

Associated Items: MR 003 RHF - SO2 Monitor

MR 005 RHF - CO Monitor

MR 009 RHF - Offgas Flow

MR 010 RHF - O2 content

What to do	Why to do it
MONITORING AND COLLECTING DATA	hdr
Do not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels, or to fulfill a minimum data availability requirement. All the data collected during all other periods must be used in assessing compliance.	Minn. R. 7007.0800, subp. 2
Installation Notification: due 60 days before installing the continuous emissions monitoring system. The notification shall include plans and drawings of the system.	Minn. R. 7017.1040, subp. 1
CEMS Installation: install CEMS such that representative measurements of emissions or process parameters from the source are obtained. In addition the CEMS shall be located according to procedures contained in the applicable performance specifications of 40 CFR pt. 60, Appendix B.	Minn. R. 7017.1040, subp. 2 ; 40 CFR Section 63.8(c)(2)(i)
When two or more emission units required to be monitored with a CEMS are not subject to the same emission limit, a separate CEMS shall be installed on each emission unit.	Minn. R. 7017.1040, subp. 3
CEMS Certification Test: due within 60 days after the due date of the first excess emissions report required for the CEMS. Follow the Performance Specifications listed in 40 CFR pt. 60, Appendix B.	Minn. R. 7017.1050, subp. 1; 40 CFR Section 63.8(e)(5)
CEMS Certification Test Plan: due 60 days before CEMS Certification Test	Minn. R. 7017.1060, subp.1 & 2; 40 CFR Section 63.8(e)(3)
CEMS Certification Test Pretest Meeting: due 7 days before CEMS Certification Test.	Minn. R. 7017.1060, subp. 3
All CEMS must be certified according to the appropriate performance specifications listed in 40 CFR pt. 60, Appendix B.	Minn. R. 7017.1070, subp. 1
CEMS Certification Test Report: due 45 days after CEMS Certification Test	Minn. R. 7017.1080, subp. 1, 2, & 4
CEMS Certification Test Report - Microfiche Copy: due 105 days after CEMS Certification Test	Minn. R. 7017.1080, subp. 3
Continuous Operation: CEMS must be operated and data recorded during all periods of emission unit operation including periods of emission unit start-up, shutdown, or malfunction except for periods of acceptable monitor downtime. This requirement applies whether or not a numerical emission limit applies during these periods. A CEMS must not be bypassed except in emergencies where failure to bypass would endanger human health, safety, or plant equipment. Acceptable monitor downtime includes reasonable periods as listed in Items A, B, C and D of Minn. R. 7017.1090, subp. 2.	Minn. R. 7017.1090, subp. 1; 40 CFR Section 63.8(c)(4)
Excess Emissions/Downtime Reports (EERs): due 30 days after end of each calendar quarter following CEMS Certification Test (Submit Deviations Reporting Form DRF-1 as amended). The EER shall indicate all periods of monitor bypass and all periods of exceedances of the limit including exceedances allowed by an applicable standard, i.e. during startup, shutdown, and malfunctions.	Minn. R. 7017.1110, subp. 1 & 2; 40 CFR Section 63.8(c)(8); 40 CFR Section 63.10(e)(3)
Recordkeeping: The owner or operator must retain records of all CEMS monitoring data and support information for a period of five years from the date of the monitoring sample, measurement or report. Records shall be kept at the source.	Minn. R. 7007.1130

All data points collected by a CEMS shall be used to calculate individual hourly emission averages unless another applicable requirement or compliance document requires more frequent averaging. Each hourly average starts at the beginning of the hour and ends at the beginning of the following hour. In order for an hour of data to be considered valid, it must contain the following minimum number of data points during the hour: - four data points, equally spaced, if the emission unit operated during the entire hour; - two data points, at least 15 minutes apart, during periods of monitor calibration, and periods of time to conduct quality control audits or routine maintenance; and - one data point if the emission unit operated for 15 minutes or less during the hour. Monitoring data shall be recorded in the same units of measurement and averaging period as the facility's emission standard.	Minn. R. 7017.1160; 40 CFR 63.8(c)(4)
QA Plan: Develop and implement a written quality assurance plan that covers each CEMS. The plan shall be on site and available for inspection within 30 days after monitor certification. The plan shall contain all of the information required by 40 CFR pt. 60, App. F, section 3.	Minn. R. 7017.1170, subp. 2; 40 CFR Section 63.8(d)
CEMS Daily Calibration Drift (CD) Test: The CD shall be quantified and recorded at zero (low-level) and upscale (high-level) gas concentrations at least once daily. The CEMS shall be adjusted whenever the CD exceeds twice the specification of 40 CFR pt. 60, Appendix B. 40 CFR pt. 60, Appendix F, shall be used to determine out-of-control periods for CEMS. Follow the procedures in 40 CFR pt. 60, Appendix F.	Minn. R. 7017.1170, subp. 3; 40 CFR Section 63.8(c)(6)
Cylinder Gas Audit (CGA): due before end of each calendar half-year following CEMS Certification Test. Conduct CGA at least 3 months apart and not greater than 8 months apart. Follow the procedures in 40 CFR pt. 60, Appendix F.	Minn. R. 7017.1170, subp. 4
Cylinder Gas Audit (CGA) Results Summary: due 30 days after end of each calendar half-year following Cylinder Gas Audit (CGA).	Minn. R. 7017.1180, subp. 1
CEMS Relative Accuracy Test Audit (RATA): due before end of each calendar year following CEMS Certification Test. Follow the procedures in 40 CFR pt. 60, Appendix F, as amended.	Minn. R. 7017.1170, subp. 5
Relative Accuracy Test Audit (RATA) Notification: due 30 days before CEMS Relative Accuracy Test Audit (RATA)).	Minn. R. 7017.1180, subp 2
Relative Accuracy Test Audit (RATA) Results Summary: due 30 days after end of each calendar quarter in which the CEMS RATA was conducted.	Minn. R. 7017.1180, subp. 3
CEM Certification Test: Written notification of the planned test date shall be postmarked or received at least 60 days before the planned test date.	Minn. R. 7017.2030, subp. 1; 40 CFR Section 63.8(e)(2)

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **GP 010 Concentrate Receiving Fugitives**

Associated Items: FS 010 Material Handling Operation, Concentrate Receiving

FS 011 Wind Erosion, Concentrate Receiving Storage

What to do	Why to do it
EMISSION LIMITATIONS	hdr
Opacity: less than or equal to 10 percent opacity using 6-minute Average	40 CFR 60.382(b) Minn. R. 7011.2700
WORK PRACTICE STANDARDS	hdr
Prior to startup, prepare, and at all times operate according to, a fugitive dust emissions control plan that describes in detail the measures that will be put in place to control fugitive dust emissions from the locations listed in paragraphs (1) through (4), below. (1) Stockpiles of concentrate; (2) Material transfer points; (3) Plant roadways; (4) Yard areas.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Maintain a current copy of the fugitive dust emissions control plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart.	40 CFR Section 63.43(g): MACT and Minn. R 7007.3010
Follow fugitive dust emissions control plan for applicable recordkeeping requirements. Perform weekly visibility checks for the stockpiles and maintain watering records for stockpile operations.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.6(e); 40 CFR Section 63.8(b)); Minn. R. 7007.0800, subp. 6(A)(2)
For each work practice standard and operation and maintenance requirement that applies where initial compliance is not demonstrated using a performance test, demonstrate initial compliance within 30 calendar days after initial startup. Demonstrate continuous compliance with the work practice standard requirements by operating in accordance with the fugitive dust emissions control plan at all times.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Maintain records of initial notifications, all other reports, testing and compliance data for at least five years.	40 CFR Section 63.10(b)); Minn. R. 7007.0800, subp. 6(A)(2)
CONTROL REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the concentrate handling and storage operations once each calendar week while in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing concentrate handling and storage operations.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken. Maintain watering records for material handling operations.	Minn. R. 7007.0800, subp. 5

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 001 Rotary Hearth Furnace (RHF)**

Associated Items:
CE 001 Wet Scrubber - High Efficiency
CE 002 Air Infiltration
GP 005 Emission Units subject to MACT
MR 003 RHF - SO2 Monitor
MR 004 RHF - NOx Monitor
MR 005 RHF - CO Monitor
MR 006 RHF - Differential Pressure
MR 007 RHF - Scrubber Water Flow
MR 008 RHF - pH
MR 009 RHF - Offgas Flow
MR 010 RHF - O2 content
SV 001 Rotary Hearth Furnace Stack Vent
SV 008 Rotary Hearth Furnace Bypass Stack Vent

What to do	Why to do it
EMISSION & OPERATING LIMITS	hdr
Sulfur Dioxide: less than or equal to 75.0 lbs/hour using 3-hour Block Average [With the use of natural gas in the RHF, compliance with this limit demonstrates compliance with Minn. R. 7011.0610, Subp. 2.B.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, Subp. 2.B.
Sulfur Content of Coal: Less than or equal to 0.85 percent by weight	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Sulfur Dioxide: greater than or equal to 90 percent control efficiency using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Opacity: less than or equal to 10 percent opacity using 6-minute Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1(A)(2).	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 1(A)(2)
Front-half Particulate Matter: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Rolling Average at 7% oxygen using Method 5. [Front-catch particulate Matter is a surrogate for the control of metal HAPs.] Because PM emissions (as measured by Method 5) from commercial-scale iron nugget rotary hearth furnaces have not been quantified, the actual emissions may exceed the above emission rate. If the Permittee cannot meet the above limit during normal operation, the MPCA may adjust the PM emission rate to a level not to exceed 0.020 gr/dscf at 7% oxygen using Method 5, following the MPCA's review of the stack test results. The Permittee has the burden of demonstrating that it took all steps necessary to ensure that the emissions levels achieved in the stack test were the lowest achievable. This change in the permit will be accomplished administratively. [This fulfills the requirements of Minn. R. 7011.0610, subp. 1(A)(1).]	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g) and Minn. R. 3010; Minn. R. 7011.0610, subp. 1(A)(1).
Front-half Particulate Matter: less than or equal to 44.3 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 3010
Front-half Particulate Matter: greater than or equal to 92 percent control efficiency using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 3010

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Particulate Matter < 10 micron: less than or equal to 0.020 grains/dry standard cubic foot using 3-hour Block Average at 7% oxygen. Because PM10 emissions from commercial-scale iron nugget rotary hearth furnaces have not been quantified, the actual emissions may exceed the above emission rate. If the the Permittee cannot meet the above limit during normal operation, the MPCA may adjust the PM10 emission rate to a level not to exceed 0.025 gr/dscf at 7% oxygen, following the MPCA's review of the stack test results. The Permittee has the burden of demonstrating that it took all steps necessary to ensure that the emissions levels achieved in the stack test were the lowest achievable. This change in the permit will be accomplished administratively. [PM10 is also a surrogate for the control of inorganic HAPs.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Particulate Matter < 10 micron: less than or equal to 44.3 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Particulate Matter < 10 micron: greater than or equal to 92 percent control efficiency using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 60 parts per million using 3-hour Block Average dry at 7% oxygen. [Carbon monoxide concentration is a surrogate for the control of volatile HAPs.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Carbon Monoxide: less than or equal to 58.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 4.86 lbs/hour using 3-hour Rolling Average at maximum capacity	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 1.0 parts per million using 3-hour Block Average wet, at 7% oxygen (as propane, using Method 25A)	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 125 parts per million using 3-hour Rolling Average dry by volume at 7% oxygen	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 205.8 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Lead: less than or equal to 0.96 lbs/hour at maximum capacity	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Lead: greater than or equal to 90 percent control efficiency using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Fluorides: less than or equal to 24.6 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Fluorides: greater than or equal to 97 percent control efficiency using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Sulfuric Acid Mist: less than or equal to 20.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Sulfuric Acid Mist: greater than or equal to 90 percent control efficiency using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Mercury: less than or equal to 0.0086 lbs/hour at maximum capacity calculated as a two-hour average	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Always operate and maintain the rotary hearth furnace (EU001), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the levels required.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.6(e)(1)(i); 40 CFR Section 64.5
Operate a wet scrubber at all times the emission unit is operating to control emissions of sulfur dioxide, particulate matter, particulate matter less than ten microns in diameter, lead, fluorides, and sulfuric acid mist.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Operate a wet scrubber at all times the emission unit is operating to control emissions of metal HAPs and acid gas HAPs.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate an air infiltration system at all times the emission unit is operating to control emissions of carbon monoxide and volatile organic compounds.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Operate an air infiltration system at all times the emission unit is operating to control emissions of volatile organic HAPs.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING REQUIREMENTS	hdr
Coal Properties Monitoring: The Permittee shall obtain, from the supplier of each coal shipment, a certificate that specifies the sulfur content (in percent sulfur by weight). For any shipment received without the certificate, the Permittee shall obtain a representative sample from the shipment for analysis of sulfur content and heating value.	Minn. R. 7011.0610, Subp. 2.B.
For compliance assurance monitoring provisions, EU001 is a large emission pollutant-specific unit for SO2, PM, PM10, CO, fluorides, and sulfuric acid mist.	40 CFR Section 64.6 and Minn. R. 7017.0200

Emissions Monitoring: The owner or operator shall install and operate a CO CEMS to measure CO emissions from the rotary hearth furnace and to be used as a surrogate monitoring parameter for VOCs and volatile organic HAPs.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6 and Minn. R. 7017.0200; Minn. R. 7017.1006
Emissions Monitoring: The owner or operator shall install and operate an SO2 CEMS to measure SO2 emissions from the rotary hearth furnace and to be used as a surrogate monitoring parameter for sulfuric acid mist.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6 and Minn. R. 7017.0200; Minn. R. 7017.1006
Emissions Monitoring: The owner or operator shall install and operate a NOx CEMS to measure NOx emissions from the rotary hearth furnace.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7017.1006
Emissions Monitoring: The owner or operator shall install and operate an offgas flow monitor to measure offgas flow from the rotary hearth furnace. (Basis: This is needed to determine lbs of emissions from concentration measurements.)	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6 and Minn. R. 7017.0200; Minn. R. 7017.1006
Emissions Monitoring: The owner or operator shall install and operate an oxygen monitor to measure the oxygen content in the offgas flow from the rotary hearth furnace. (Basis: This is needed to correct concentrations to a specific oxygen content.)	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6 and Minn. R. 7017.0200; Minn. R. 7017.1006
Conduct Visual Emissions checks once weekly.	Minn. R. 7007.0800, subp. 4
NOTIFICATION REQUIREMENTS	hdr
TESTING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM10 limit and with the case-by-case MACT limit for acid gas HAPs (for which PM10 is a surrogate).	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT limits for opacity, volatile organic compounds, lead, fluorides, and sulfur acid mist.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the MACT limit for mercury.	Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
SO2 CEM Certification Test: due 90 days after Initial Performance Test Trigger Date.	Title I Condition: 40 CFR Section 52.21(j): MACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
CO CEM Certification Test: due 90 days after Initial Performance Test Trigger Date.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
NOx CEM Certification Test: due 90 days after Initial Performance Test Trigger Date.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
O2 CEM Certification Test: due 90 days after Initial Performance Test Trigger Date.	Title I Condition: 40 CFR Section 52.21(j): MACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Offgas flow CEM Certification Test: due 90 days after Initial Performance Test Trigger Date.	Title I Condition: 40 CFR Section 52.21(j): MACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Mercury Performance Test: due 270 days before Application for Permit Reissuance	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Mercury Performance Test: due 730 days after the previous performance test for mercury	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 2
WET SCRUBBER OPTIMIZATION STUDY	hdr
Wet scrubber optimization study: Within 180 days after the Initial Performance Test Trigger Date, the Permittee shall complete a study of the wet scrubber according to the plan submitted to the MPCA.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g); MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4

Wet scrubber optimization study report: Within 90 days of completing the wet scrubber optimization study, the Permittee shall submit a report to the MPCA. The report must contain: 1) All parameter data and pollutant emission data gathered during the process; 2) A description of any deviations from the plan submitted to the MPCA; 3) A description of the variability and uncertainty using a significance level of five percent; 4) Proposed limits (maximum pound per hour; minimum removal efficiency or pound per ton of product) for SO2, PM, PM10, lead, fluorides, and sulfuric acid mist with the rationale for those limits; 5) Proposed ranges for operating parameters to monitor the performance of the wet scrubber; and 6) A demonstration that the Permittee took all steps necessary to ensure that the emissions levels achieved in the stack test were the lowest achievable. (CONTINUED)	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g); MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
(continued from above) The MPCA may use the information provided in the report on the wet scrubber optimization study as described under PERMIT REOPENING in the facility conditions. The Permittee may use the information provided by the report on the wet scrubber optimization study to request changes to emission rates as described under PERMIT REOPENING in the facility conditions.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR 63.43(g); MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
MACT GENERAL COMPLIANCE REQUIREMENTS	hdr
Comply with the emission limitations, work practice standards, operation and maintenance requirements, notification requirements, reporting requirements, and recordkeeping requirements for the wet scrubber at all times, except during periods of startup, shutdown, and malfunction. The terms startup, shutdown, and malfunction are defined in 63.2. During the period between initial startup and the date upon which continuous monitoring systems have been installed and certified and any applicable operating limits have been set, maintain a log detailing the operation and maintenance of the process and emissions control equipment. This includes the daily monitoring and recordkeeping of air pollution control device operating parameters. [These startup, shutdown, and malfunction provisions apply only to the MACT (40 CFR 63.43(g)) limits. There is no startup, shutdown, and malfunction exception for the limits set under BACT (40 CFR 52.21).]	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.6 and Minn. R. 7017.0200
Prior to startup, develop and implement a written startup, shutdown, and malfunction plan according to the provisions in 63.6(e)(3).	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.6(e)(3); ; 40 CFR Section 64.6 and Minn. R. 7017.0200
NOx CONTROL STUDY	hdr
The Permittee shall design and complete a study of NOx control for the RHF.	Minn. R. 7007.0800, subp. 2

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The Permittee shall: 1. Within 60 days of the Initial Performance Trigger Date, design, install and operate a selective noncatalytic reduction (SNCR) system for the RHF for the purposes of determining the emission rate and reduction achievable, reliability and feasibility of SNCR; 2. Within 365 days of the Initial Performance Trigger Date, submit a report to the Commissioner of the results of the SNCR NOx emissions control study. The report shall, at a minimum, describe in detail the following: a. the system installed; b. operating conditions of the RHF and the affects of varying these conditions; c. operating parameters of SNCR and the affects of varying these parameters; d. problems and efforts taken to address those problems; e. reliability of the SNCR; f. efforts taken to optimize the system; and g. feasibility of the controls. (CONTINUED)	Minn. R. 7007.0800, subp. 2
(continued from above) 3. If the Commissioner determines that selective noncatalytic reduction is feasible, the Commissioner shall notify the Permittee and the Permittee shall submit an application for a permit amendment to incorporate the emission limits reflective of the control efficiency and/or emission rate achieved with SNCR, and the operating and monitoring conditions, as appropriate, within 180 days of the notification of the feasibility of SNCR.	Minn. R. 7007.0800, subp. 2
If the commissioner determines that SNCR is not feasible, upon notification by the Commissioner, the Permittee may shutdown the SNCR system and the Permittee shall design and complete a study of alternative NOx control for the RHF.	Minn. R. 7007.0800, subp. 2
The study shall consist of the following steps: 1. A literature search of other NOx control technologies including non-thermal plasma control; 2. Selection of a technology for a pilot-scale demonstration; 3. Submittal, within 180 days of the Commissioner's notification of the infeasibility of SNCR, of a plan and schedule for a pilot-scale project for the control of NOx for approval by the commissioner; 4. Implementation of a pilot-scale NOx emission reduction project for the RHF for the purposes of determining the emission rate and reduction achievable, the dollar costs per ton of NOx reduced, reduction and increases of other pollutants associated with the technology, reliability and feasibility of selected technology; 5. Submittal, within 540 days of Commissioner's notification of the infeasibility of SNCR, of a report to the commissioner of the results of the NOx emissions control study. The report shall, at a minimum, describe in detail the following: (CONTINUED)	Minn. R. 7007.0800, subp. 2
(continued from above) a) The system installed; b) Operating conditions of the RHF and the affects of varying these conditions; c) Operating parameters of the system and the affects of varying these parameters; d) Problems and efforts taken to address those problemsroblems and efforts taken to address those problems; e) Reliability of the system; f) Efforts taken to optimize the system; and g) Feasibility of the controls.	Minn. R. 7007.0800, subp. 2

If the commissioner determines that the alternative technology is cost effective and feasible, the Commissioner shall notify the Permittee and the Permittee shall submit an application for a permit amendment to incorporate the emission limits reflective of the control efficiency and/or emission rate achieved with the alternative technology, and the operating and monitoring conditions, as appropriate, within 180 days of the Commissioner's notification of the determination of the feasibility and cost effectiveness of the alternative technology.	Minn. R. 7007.0800, subp. 2

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 002 Green Ball Dryer/Material Transfer Operations**

Associated Items: CE 007 Fabric Filter - High Temperature, i.e., T>250 Degrees F

CE 009 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 010 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

MR 011 Green Ball Dryer - Bag Alarm

SV 001 Rotary Hearth Furnace Stack Vent

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Opacity: less than or equal to 10 percent opacity using 6-minute Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(2)	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 1.A(2)
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(1) [Front-half particulate matter is a surrogate for the capture of metals HAPs]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.0610, subp. 1.A(1)
Front-half Particulate Matter: less than or equal to 35.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Front-half Particulate Matter: greater than or equal to 92 percent control efficiency using 3-hour Block Average .	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Particulate Matter < 10 micron: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Particulate Matter < 10 micron: less than or equal to 35.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Particulate Matter < 10 micron: greater than or equal to 92 percent control efficiency using 3-hour Block Average .	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 19.4 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.094 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.25 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 37.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 60 parts per million using 3-hour Block Average at 7% oxygen	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Fuel Usage: Limited to natural gas or propane (as backup) only. Complying with this restriction also fulfills the requirements of Minn. R. 7011.0610, subp. 2.B. [Basis for BACT for sulfur dioxide.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 2.B
Fuel Usage: less than or equal to 232 million cubic feet/year using 12-month Rolling Sum [This is a basis for the BACT analysis.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Operate with low-NOx burners only. [Basis for BACT for nitrogen oxides.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Operate the baghouses (CE007, CE009, and CE010) at all times the emission unit is operating to control particulate emissions.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate and maintain the Green Ball Dryer (EU 002), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations. See GP005 for additional requirements.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING AND RECORDKEEPING REQUIREMENTS	hdr

Facility Name: Mesabi Nugget Delaware LLC

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For compliance assurance monitoring provisions, EU002 is a large emission pollutant-specific unit for PM10.	40 CFR Section 64.6 and Minn. R. 7017.0200
Conduct Visual Emissions checks once weekly.	Minn. R. 7007.0800, subp. 4
Recordkeeping: Record and maintain records of the amount of natural gas combusted on a monthly basis. These records may consist of purchase records or receipts.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
COMPLIANCE DEMONSTRATIONS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT opacity limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM10 limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to measure emissions of VOCs. This test will verify permit application assumptions about VOC emissions.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT NOx limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT CO limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
12-Month Rolling Sum calculation of Natural Gas Consumption: Calculate the 12-month rolling sum of the volume of natural gas consumed (in million cubic feet) by summing the monthly volume of natural gas consumed for the previous 12 operating months.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 003 Product Separator**

Associated Items: CE 008 Fabric Filter - High Temperature, i.e., T>250 Degrees F

GP 005 Emission Units subject to MACT

SV 001 Rotary Hearth Furnace Stack Vent

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(1) [Front-half particulate matter is a surrogate for the capture of metals HAPs]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.0610, subp. 1.A(1)
Particulate Matter < 10 micron: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Opacity: less than or equal to 10 percent opacity using 6-minute Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(2)	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 1.A(2)
Volatile Organic Compounds: less than or equal to 0.13 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.0054 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 1.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.049 lbs/million Btu heat input using 3-hour Block Average at 7% oxygen	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 2.1 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 0.082 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Fuel Usage: Limited to natural gas or propane (as backup) only. Complying with this restriction also fulfills the requirements of Minn. R. 7011.0610, subp. 2.B. [Basis for BACT for sulfur dioxide.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 2.B
Operate and maintain the Product Separator (EU 003), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the baghouse (CE008) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT opacity limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM10 limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT VOC limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT NOx limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT CO limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Conduct Visual Emissions checks once weekly.	Minn. R. 7007.0800, subp. 4

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 004 Coal 1 Pulverizer**

Associated Items: CE 005 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

MR 001 Coal 1 Pulverizer - Differential Pressure

SV 002 Pulverizer Stack Vent (CE 004, CE 005, CE 012, CE 016

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Opacity: less than or equal to 10 percent using 6-minute Average from any coal processing and conveying equipment, coal storage system, or coal transfer and loading system processing coal [Compliance with this limit indicates compliance with the opacity limits in 40 CFR Section 60.252(c); Minn. R. 7011.0610; Minn. R. 7011.1115, Subp. 2.B; Minn. R. 7011.1150]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(1) [Front-half particulate matter is also a surrogate for (particulate) metals HAPs.]	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.0610, subp. 1.A(1)
Particulate Matter < 10 micron: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.19 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.0054 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 1.8 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.049 lbs/million Btu heat input using 3-hour Block Average at 7% oxygen	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 3.0 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 0.082 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Fuel Usage: Limited to natural gas or propane (as backup) only. Complying with this restriction also fulfills the requirements of Minn. R. 7011.0610, subp. 2.B. [Basis for BACT for sulfur dioxide.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 2.B.
Operate with low-NOx burners only. Complying with this restriction also fulfills the requirements of Minn. R. 7011.0610, subp. 2.B. [Basis for BACT for nitrogen oxides.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Operate and maintain the Coal 1 Pulverizer (EU 004), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. Rules 7007.3010
Operate the baghouse (CE005) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
OPERATIONAL & CONTROL REQUIREMENTS	hdr
Install thermal dryers in a manner that performance tests for particulate matter can be run in accordance with applicable procedures and methods.	Minn. R. 7011.1115, Subp. 3.
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE005) once each calendar week while EU004 is in operation.	40 CFR Section 60.252(c); Minn. R. 7011.0600 - 7011.0610; Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE005.	Minn. R. 7007.0800, subp. 2

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
MONITORING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT opacity limit.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM10 limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT VOC limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT NOx limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT CO limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Prior to startup, install and operate a monitoring device for the measurement of the temperature of the gas stream at the exit of the thermal dryer on a continuous basis. The monitoring device shall be certified by the manufacturer to be accurate within three degrees Fahrenheit.	Minn. R. 7011.1115, Subp. 4.A.
Recalibrate each device required by Minn. R. 7011.1115 annually in accordance with the manufacturer's written requirements for checking the operation and calibration of the device.	Minn. R. 7011.1115, Subp. 4.C.
RECORDKEEPING	hdr
QA Plan: Develop and implement a written quality assurance plan that covers the pressure drop CMS. The plan shall be on site and available for inspection within 30 days after monitor certification. The plan shall contain all of the information required by 40 CFR Section 63.8(d).	Title I Condition: 40 CFR 52.21(j): BACT; 40 CFR Section 63.8(d)(2); Minn. R. 7017.1170, subp. 2
Recordkeeping: The owner or operator must retain records of all pressure drop CMS monitoring data and support information for a period of five years from the date of the monitoring, sample, measurement, or report. Records shall be kept at the source.	Title I Condition: 40 CFR 52.21(j): BACT; 40 CFR Section 63.10(b); Minn. R. 7017.1130

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 005 Coal 2 Pulverizer**

Associated Items: CE 006 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

MR 002 Coal 2 Pulverizer - Differential Pressure

SV 007 Material Transfer Operations Stack Vent

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Opacity: less than or equal to 10 percent using 6-minute Average from any coal processing and conveying equipment, coal storage system, or coal transfer and loading system processing coal [Compliance with this limit indicates compliance with the opacity limits in 40 CFR Section 60.252(c); Minn. R. 7011.0610; Minn. R. 7011.1115, Subp. 2.B; Minn. R. 7011.1150]	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000;
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(1) [Front-half particulate matter is also a surrogate for (particulate) metals HAPs.]	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.0610, subp. 1.A(1)
Particulate Matter < 10 micron: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.05 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.0054 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.45 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.049 lbs/million Btu heat input using 3-hour Block Average at 7% oxygen	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 0.76 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 0.082 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Fuel Usage: Limited to natural gas or propane (as backup) only. Complying with this restriction also fulfills the requirements of Minn. R. 7011.0610, subp. 2.B. [Basis for BACT for sulfur dioxides.]	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 2.B.
Operate with low-NOx burners only. [Basis for BACT for nitrogen oxides.]	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000
Operate and maintain the Coal 2 Pulverizer (EU 005), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the baghouse (CE006) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
OPERATIONAL & CONTROL REQUIREMENTS	hdr
Install thermal dryers in a manner that performance tests for particulate matter can be run in accordance with applicable procedures and methods.	Minn. R. 7011.1115, Subp. 3.
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE006) once each calendar week while EU005 is in operation.	40 CFR Section 60.252(c); Minn. R. 7011.0600 - 7011.0610; Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE006.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

MONITORING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT opacity limit.	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j); BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM10 limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT VOC limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT NOx limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT CO limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Prior to startup, install and operate a monitoring device for the measurement of the temperature of the gas stream at the exit of the thermal dryer on a continuous basis. The monitoring device shall be certified by the manufacturer to be accurate within three degrees Fahrenheit.	Minn. R. 7011.1115, Subp. 4.A.
Recalibrate each device required by Minn. R. 7011.1115 annually in accordance with the manufacturer's written requirements for checking the operation and calibration of the device.	Minn. R. 7011.1115, Subp. 4.C.
RECORDKEEPING	hdr
QA Plan: Develop and implement a written quality assurance plan that covers the pressure drop CMS. The plan shall be on site and available for inspection within 30 days after monitor certification. The plan shall contain all of the information required by 40 CFR Section 63.8(d).	Title I Condition: 40 CFR 52.21(j): BACT; 40 CFR Section 63.8(d)(2); Minn. R. 7017.1170, subp. 2
Recordkeeping: The owner or operator must retain records of all pressure drop CMS monitoring data and support information for a period of five years from the date of the monitoring, sample, measurement, or report. Records shall be kept at the source.	Title I Condition: 40 CFR 52.21(j): BACT; 40 CFR Section 63.10(b); Minn. R. 7017.1130

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 006 Flux 1 Pulverizer**

Associated Items: CE 004 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

MR 012 Flux 1 Pulverizer - Differential Pressure

SV 002 Pulverizer Stack Vent (CE 004, CE 005, CE 012, CE 016

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Opacity: less than or equal to 10 percent opacity using 6-minute Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(2)	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 1.A(2)
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(1) [Front-half particulate matter is a surrogate for the capture of metals HAPs]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.0610, subp. 1.A(1)
Particulate Matter < 10 micron: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.08 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.0054 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.71 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.049 lbs/million Btu heat input using 3-hour Block Average at 7% oxygen	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 1.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 0.082 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Fuel Usage: Limited to natural gas or propane (as backup) only. Complying with this restriction also fulfills the requirements of Minn. R. 7011.0610, subp. 2.B. [Basis for BACT for sulfur dioxide.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 2.B
Operate and maintain the Flux 1 Pulverizer (EU006), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the baghouse (CE004) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE004) once each calendar week while EU006 is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE004.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
MONITORING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT opacity limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM10 limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4

Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT VOC limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT NOx limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT CO limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 007 Coal Flux/Unload Baghouse**

Associated Items: CE 003 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

MR 013 Coal Flux/Unload - Differential Pressure

SV 003 Coal/Flux Unloading Stack Vent

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Front-half Particulate Matter: less than or equal to 0.005 grains/dry standard cubic foot using 3-hour Rolling Average for rail unloading and conveyor systems	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Particulate Matter < 10 micron: less than or equal to 0.005 grains/dry standard cubic foot using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Opacity: less than or equal to 10 percent opacity using 6-minute Average [This condition fulfills the opacity-related requirements of Minn. R. 7011.1105.H.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Coal unloading stations. Control fugitive particulate emissions from the unloading of trucks, haulers, and railcars by dust suppression methods so that emissions from such sources are minimized.	Minn. R. 7011.1105.B
Unload railcars only within a permanent building or structure.	Minn. R. 7011.1105.H
Operate and maintain the Coal Flux/Unload Baghouse operations (EU007), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the fabric filter (CE003) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
VISIBLE EMISSION REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE003) once each calendar week, while EU 007 is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE003.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
MONITORING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT opacity limit.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT PM10 limit.	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 008 Rail Loadout Baghouse/Material Transfer Operations**

Associated Items: CE 014 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 015 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

MR 014 Rail Loadout - Differential Pressure

SV 004 Railcar Loadout Stack Vent

What to do	Why to do it
EMISSION & OPERATING LIMITS	hdr
Front-half Particulate Matter: less than or equal to 0.005 grains/dry standard cubic foot using 3-hour Average [Front-half Particulate Matter is also a surrogate for the control of metal HAPs.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Particulate Matter < 10 micron: less than or equal to 0.005 grains/dry standard cubic foot using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Opacity: less than or equal to 10 percent using 6-minute Average . If opacity exceeds 10 percent, then action must be taken to control exhaust gases so that particulate matter emissions do not exceed 0.020 gr/dscf.. [Compliance with this condition fulfills the requirements of 40 CFR Section 60.252(c) and Minn. R. 7011.1105 (G)]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; 40 CFR Section 60.252(c); Minn. R. 7011.1105 (G)
Do not build, erect, install, or use any article, machine, equipment, or process, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard.	40 CFR Section 60.12
Operate and maintain the Rail Loadout Baghouse/Material Transfer Operations (EU008), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the baghouses (CE014 and CE015) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
NOTIFICATION REQUIREMENTS	hdr
Notification of Anticipated Date for Conducting Opacity Observations: due 30 days prior to observation date.	40 CFR Section 60.7(a)(4); Minn. R. 7019.0100, subp. 1
Notification of any physical change or operational change which increases emissions rate: due 60 days (or as soon as practicable) before the change is commenced. Within 180 days of completion of any physical or operational change subject to the control measures specified in 40 CFR Section 60.14(a), compliance with all applicable standards must be achieved.	40 CFR Section 60.7(a)(4); Minn. R. 7019.0100, subp. 1
VISIBLE EMISSION REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE014 and CE015) once each calendar week, while EU 008 is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE014 or CE015.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
TESTING REQUIREMENTS	hdr
Initial Performance Test: due 60 days after achieving maximum capacity but not more than 180 days after initial startup of the rail loadout to measure opacity.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; 40 CFR Section 60.8
Initial Performance Test: due 60 days after achieving maximum capacity but not more than 180 days after initial startup. This test is to demonstrate initial compliance with the NSPS particulate matter limit, the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 60.8; 40 CFR Section 63.7(a)(2), (e); Minn. R. 7017.2020, subp. 1; Minn. R. 7017.2030, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT PM10 limit.	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000
RECORDKEEPING REQUIREMENTS	hdr

Maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the facility including any malfunction of the air pollution control equipment, or any periods during which a continuous monitoring system or monitoring device is inoperable.	40 CFR Section 60.7(b); Minn. R. 7019.0100, subp. 1

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 009 RHF Roof Monitor/Heat Control**

Associated Items: SV 005 RHF Roof Monitor Stack Vent

What to do	Why to do it
EMISSION LIMITS AND OPERATING REQUIREMENTS	hdr
Opacity: less than or equal to 20 percent opacity	Minn. R. 7007.0800, subp. 2
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the RHF roof monitor once each calendar week while the RHF is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through SV 005.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 010 Material Transfer Operations**

Associated Items: CE 011 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 012 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

CE 013 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

SV 002 Pulverizer Stack Vent (CE 004, CE 005, CE 012, CE 016

SV 007 Material Transfer Operations Stack Vent

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Front-half Particulate Matter: less than or equal to 0.005 grains/dry standard cubic foot using 3-hour Average [Front-half Particulate Matter is also a surrogate for the control of metal HAPs.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Particulate Matter < 10 micron: less than or equal to 0.005 grains/dry standard cubic foot using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Opacity: less than or equal to 10 percent opacity using 6-minute Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Operate and maintain the Material Transfer Operations (EU 010), including air pollution capture, control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the baghouses (CE011, CE012, and CE013) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE011, CE012, and CE013) once each calendar week while EU010 is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE011, CE012, or CE013.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
MONITORING REQUIREMENTS	hdr
Initial Hood Certification and Evaluation: The control device hood shall conform to the requirements listed in Minn. R. 7011.0070, subp. 1, and the Permittee shall certify this as specified in Minn. R. 7011.0070, subps. 1 and 3. The Permittee shall maintain a copy of the evaluation and certification on site.	Minn. R. 7011.0070, subps. 1 & 3
Annual Hood Evaluation: The Permittee shall measure and record at least once every 12 months the fan rotation speed, fan power draw, or face velocity of each hood, or other comparable air flow indication method as required by Minn. R. 7011.0080. The Permittee shall maintain a copy of the annual evaluation on site.	Minn. R. 7011.0080
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT opacity limit.	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT PM10 limit.	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 011 Back-up Generator 3**

Associated Items: GP 005 Emission Units subject to MACT

SV 006 Back-up Generator 3 Stack Vent

What to do	Why to do it
EMISSION & OPERATING LIMITS	hdr
Operating Hours: less than or equal to 100 hours/year using 12-month Rolling Sum to be calculated by the 15th day of each month for the previous 12-month period as described later in this permit.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Visible Emissions: less than or equal to 20 percent once operating temperatures have been obtained	Minn. R. 7011.2300, subp. 1
Fuel type: No. 2 fuel oil only by design. [Basis for BACT analysis.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Sulfur Content of Fuel: less than or equal to 0.05 percent by weight [Basis for BACT analysis for PM, PM10, and SO2.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.2300, Subp. 2
Operating Hours: less than or equal to 100 hours/year based on a 12-month rolling sum to be calculated by the 15th day of each month. [Basis for BACT analysis for PM, PM10, SO2, CO, VOCs, and NOx.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Install, calibrate, and maintain an hour clock.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING AND RECORDKEEPING REQUIREMENTS	hdr
Fuel Supplier Certification: The Permittee shall obtain and maintain a fuel supplier certification for each shipment of No. 2 fuel oil, certifying that the sulfur content does not exceed 0.05 percent by weight.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Hours of Operation: The Permittee shall maintain documentation on site that the unit is an emergency diesel generator by design that qualifies under the U.S. EPA memorandum entitled "Calculating Potential to Emit (PTE) for Emergency Generators" dated September 6, 1995, limiting operation to 500 hours per year. [In this case, operation is limited to 100 hours per year.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Monthly Recordkeeping -- Hours of operation. By the 15th of the month, the Permittee shall calculate and record the following: 1) The hours of operation for back-up generator (EU011) during the previous month as recorded by the hour clock.. 2) The 12 month rolling sum hours of operation for the previous 12 month period by summing the monthly hours of operation data for the previous 12 months.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
RECIPROCATING INTERNAL COMBUSTION ENGINE (RICE) MACT NOTIFICATION REQUIREMENTS	hdr
Submit: due 120 days after Initial Startup of the RICE an Initial Notification required by 40 CFR 63 Subpart ZZZZ.	40 CFR Section 63.6645(c)
The Initial Notification should include the information in 40 CFR Section 63.9(b)(2)(i) through (v), a statement that the stationary RICE has no additional requirements, and an explanation of the basis of the exclusion.	40 CFR Section 63.9(b)(2)(i)-(v); 40 CFR Section 63.6645(d)

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 012 Flux 2 Pulverizer**

Associated Items: CE 016 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

GP 005 Emission Units subject to MACT

SV 002 Pulverizer Stack Vent (CE 004, CE 005, CE 012, CE 016

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Opacity: less than or equal to 10 percent opacity using 6-minute Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(2)	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 1.A(2)
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour Average Compliance with this limit also fulfills the requirements of Minn. R. 7011.0610, subp. 1.A(1) [Front-half particulate matter is a surrogate for the capture of metals HAPs]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.0610, subp. 1.A(1)
Particulate Matter < 10 micron: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.08 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Volatile Organic Compounds: less than or equal to 0.0054 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.71 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Nitrogen Oxides: less than or equal to 0.049 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 1.2 lbs/hour using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Carbon Monoxide: less than or equal to 0.082 lbs/million Btu heat input using 3-hour Block Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Fuel Usage: Limited to natural gas or propane (as backup) only. Complying with this restriction also fulfills the requirements of Minn. R. 7011.0610, subp. 2.B. [Basis for BACT for sulfur dioxide.]	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7011.0610, subp. 2.B
Operate and maintain the Flux 1 Pulverizer (EU006), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the baghouse (CE004) at all times the emission unit is operating to control particulate emissions. Also, operate in compliance with the requirements in GP004.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE016) once each calendar week while EU012 is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE016.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
MONITORING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT opacity limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT PM10 limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT VOC limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4

Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT NOx limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date. This test is to demonstrate initial compliance with the BACT CO limit.	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 013 Product Cooler**

Associated Items: CE 001 Wet Scrubber - High Efficiency

GP 005 Emission Units subject to MACT

SV 001 Rotary Hearth Furnace Stack Vent

What to do	Why to do it
EMISSION AND OPERATING LIMITS	hdr
Opacity: less than or equal to 10 percent opacity using 6-minute Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour Average [Front-half particulate matter is a surrogate for the capture of metals HAPs]	Title I Condition: 40 Section CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Particulate Matter < 10 micron: less than or equal to 0.015 grains/dry standard cubic foot using 3-hour Block Average	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000
Operate and maintain the Product Cooler (EU013), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate the wet scrubber (CE001) to control particulate emissions.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE001) once each calendar week while EU013 is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
MONITORING REQUIREMENTS	hdr
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT opacity limit.	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate initial compliance with the BACT particulate matter limit and with the case-by-case MACT limit for metals HAPs (for which PM is a surrogate).	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Initial Performance Test: due 90 days after the Initial Performance Test Trigger Date to demonstrate compliance with the BACT PM10 limit.	Title I Condition: 40 CFR Section 52.21(j): BACT; Minn. R. 7007.3000

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 017 Emergency Generator 2**

Associated Items: SV 011 Emergency Generator Stack Vent

What to do	Why to do it
EMISSION & OPERATING LIMITS	hdr
Visible Emissions: less than or equal to 20 percent once operating temperatures have been obtained	Minn. R. 7011.2300, subp. 1
The Permittee shall comply with the emission standards in table 1 to subpart IIII for all pollutants.	40 CFR Section 60.4205(a)
Prior to October 1, 2010, diesel fuel must meet the requirements of 40 CFR Section 80.510(a) for nonroad diesel fuel as follows: Sulfur content, 500 ppm maximum; A minimum cetane index of 40 or a maximum aromatic content of 35 volume percent.	40 CFR Section 60.4207(a) 40 CFR Section 60.4207(b) Most stringent, meets limit required by Minn. R. 7011.2300
On and after October 1, 2010, diesel fuel must meet the requirements of 40 CFR Section 80.510(b) for nonroad diesel fuel as follows: Sulfur content, 15 ppm maximum; A minimum cetane index of 40 or a maximum aromatic content of 35 volume percent.	40 CFR Section 60.4207(a) 40 CFR Section 60.4207(b) Most stringent, meets limit required by Minn. R. 7011.2300
Annual operation for maintenance and readiness testing is limited to 100 hrs/yr.	40 CFR Section 60.4211(e)
MONITORING REQUIREMENTS	hdr
Fuel Supplier Certification: The Permittee shall obtain and maintain a fuel supplier certification for each shipment of distillate fuel oil, certifying that the sulfur content meets the requirements above.	Minn. R. 7007.0800, subps. 4 & 5
The engine must be equipped with a nonresettable hours-of-operation meter.	40 CFR Section 60.4209(a)
The Permittee shall keep the records or perform the tests specified in one of the methods in 40 CFR Section 60.4211.	40 CFR Section 60.4211(b)
RECORDKEEPING REQUIREMENTS	hdr
Daily Recordkeeping -- Hours of Operation. The Permittee shall record each day of operation, the number of hours of operation.	Minn. R. 7007.0800, subp. 4 & 5
Monthly Recordkeeping -- Hours of operation. By the 15th of the month, the Permittee shall calculate and record the following: 1) The hours of operation for back-up generator (EU017) during the previous month as recorded by the hour clock. 2) The 12 month rolling sum hours of operation for the previous 12 month period by summing the monthly hours of operation data for the previous 12 months.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
RECIPROCATING INTERNAL COMBUSTION ENGINE (RICE) NOTIFICATION REQUIREMENTS	hdr
Submit: due 120 days after Initial Startup of the RICE an Initial Notification required by 40 CFR 63 Subpart ZZZZ.	40 CFR Section 63.6645(c)
The Initial Notification should include the information in 40 CFR Section 63.9(b)(2)(i) through (v), a statement that the stationary RICE has no additional requirements, and an explanation of the basis of the exclusion.	40 CFR Section 63.9(b)(2)(i)-(v); 40 CFR Section 63.6645(d)
Hours of Operation: The Permittee shall maintain documentation on site that the unit is an emergency diesel generator by design that qualifies under the U.S. EPA memorandum entitled "Calculating Potential to Emit (PTE) for Emergency Generators" dated September 6, 1995, limiting hours of operation to 500 hours per year.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.0310

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **EU 018 Recycled Fines Crusher**

Associated Items: CE 017 Fabric Filter - Low Temperature, i.e., T<180 Degrees F

What to do	Why to do it
Opacity: less than or equal to 20 percent opacity	Minn. R. 7011.0715 subp. 1.B
Front-half Particulate Matter: less than or equal to 0.010 grains/dry standard cubic foot using a 3-hour average. This limit is more stringent than Minn. R. 7011.0715 (12.7 lb/hr).	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7011.0715, subp. 1.A
PM < 10 micron: less than or equal to 0.010 grains/dry standard cubic foot using 3-hour average.	Minn. R. ch. 7009
Operate and maintain the Recycled Fines Crusher (EU 018), including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions.	40 CFR Section 63.43 (g): MACT and Minn. R. 7007.3010
Operate the baghouse (CE 017) at all times the emission unit is operating to control particulate emissions.	40 CFR Section 63.43 (g): MACT and Minn. R. 7007.3010
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the control equipment (CE 017) once each calendar week while EU 018 is in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs. Corrective action may be in the form of discontinuing venting emissions to the atmosphere through CE 017.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **CE 001 Wet Scrubber - High Efficiency**

Associated Items: EU 001 Rotary Hearth Furnace (RHF)

EU 013 Product Cooler

MR 003 RHF - SO2 Monitor

MR 006 RHF - Differential Pressure

MR 007 RHF - Scrubber Water Flow

MR 008 RHF - pH

What to do	Why to do it
CAM REQUIREMENTS	hdr
Measure the pressure drop across the wet scrubber with a differential pressure transducer.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
Measure the wet scrubber liquid flow rate using a flow meter.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
Measure the pH of the scrubber water with a pH meter. [This is an indicator of the alkalinity of the scrubber water.]	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
Monitor scrubber performance for particulate matter control by monitoring pressure drop across the wet scrubber and liquid flow rate.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
Monitor scrubber performance for fluoride control by monitoring pressure drop across the wet scrubber, liquid flow rate, and pH.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
An excursion of the pressure drop is defined as a pressure drop less than TBD inches of water at TBD offgas flow rate.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
An excursion of the liquid flow rate is defined as a scrubber liquid flow rate of less than TBD gallons per minute and greater than TBD gallons per minute for a TBD offgas flow rate.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
An excursion shall trigger an inspection, a corrective action as necessary, and a report.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
Calibrate the differential pressure transducer reading on at least an annual basis, or more frequently if required by the manufacturer's specifications. The reading shall be accurate to within (1) one inch of water gauge pressure (250 pascals); or (2) two percent of span.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
MACT LIMITATIONS	hdr
Maintain the daily average pressure drop and daily average scrubber water flow rate at or above the minimum levels established during the initial performance test for a given RHF offgas flow rate.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
MACT OPERATION AND MAINTENANCE REQUIREMENTS	hdr
Install, operate, and maintain a CPMS according to the requirements in this permit and monitor the daily average pressure drop, daily average scrubber water flow rate, and pH according to the applicable requirements.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200

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Prepare and at all times operate according to a written operation and maintenance plan for the wet scrubber installed to meet the particulate matter emission limit for EU001. Submit the site-specific operation and maintenance plan to the Administrator on or before the start of operation. The submitted plan must explain why the chosen practices (i.e., quantified objectives) are effective in performing corrective actions. Maintain a current copy of the operation and maintenance plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart. Each operation and maintenance plan must address the elements in paragraphs (1) through (3), below. (1) Preventative maintenance for the wet scrubber, including a preventative maintenance schedule that is consistent with the manufacturer's instructions for routine and long-term maintenance. (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
(Continued from above:) (2) In the event you exceed an established operating limit for the scrubber, you must initiate corrective action to determine the cause of the operating limit exceedance and complete the corrective action within 10 calendar days. The corrective action procedures you take must be consistent with the installation, operation, and maintenance procedures listed in your site-specific CPMS monitoring plan. (3) Good combustion practices. Identify and implement a set of site-specific GCP for the RHF. These GCP should correspond to your standard operating procedures for maintaining the proper and efficient combustion within the furnace.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
MACT ESTABLISHING AND DEMONSTRATING INITIAL COMPLIANCE WITH THE OPERATING LIMITS	hdr
Establish site-specific operating limits according to the procedures in paragraphs (1) and (2). (1) Using the required CPMS, measure and record the pressure drop and scrubber water flow rate every 15 minutes during each run of the particulate matter performance test. (2) Calculate and record the average pressure drop and scrubber water flow rate for each individual test run. Your operating limits are established as the lowest average pressure drop and the lowest average scrubber water flow rate corresponding to any of the three test runs. You may change the operating limits for any air pollution control device as long as you meet the requirements in paragraphs (1) through (3), below. (1) Submit a written notification to the Administrator of your request to conduct a new performance test to revise the operating limit. (2) Conduct a performance test to demonstrate compliance with the applicable PM emission limitation. (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
(Continued from above) (3) Establish revised operating limits according to the applicable procedures to establish site-specific operating limits, above.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R. 7017.0200
MACT INSTALLATION, OPERATION, AND MAINTENANCE REQUIREMENTS FOR THE MONITORING EQUIPMENT	hdr

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Develop and make available for inspection upon request by the permitting authority a site-specific monitoring plan that addresses the requirements in paragraphs (1) through (7). (1) Installation of the CPMS sampling probe or other interface at a measurement location relative to each affected emission unit such that the measurement is representative of control of the exhaust emissions (e.g., on or downstream of the last control device). (2) Performance and equipment specifications for the sample interface, the parametric signal analyzer, and the data collection and reduction system. (3) Performance evaluation procedures and acceptance criteria (e.g., calibrations). (4) Ongoing operation and maintenance procedures in accordance with the general requirements of 63.8(c)(1), (3), (4)(ii), (7), and (8). (5) Ongoing data quality assurance procedures in accordance with the general requirements of 63.8(d). (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 63.8(c)(1), (3), (4)(ii), (7), and (8); 40 CFR Section 64.5 and Minn. R. 7017.0200
(continued from above) (6) Ongoing recordkeeping and reporting procedures in accordance with the general requirements of 63.10(c), (e)(1), and (e)(2)(i). (7) Corrective action procedures that you will follow in the event an air pollution control device exceeds an established operating limit as required for this emission unit (EU001).	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 63.10(c), (e)(1), and (e)(2)(i); 40 CFR Section 64.5 and Minn. R. 7017.0200
(1) Each CPMS must complete a minimum of one cycle of operation for each successive 15-minute period and must have valid data for at least 95 percent of every daily averaging period. (2) Each CPMS must determine and record the daily average of all recorded readings.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
Conduct a performance evaluation of each CPMS in accordance with your site-specific monitoring plan. Operate and maintain the CPMS in continuous operation according to the site-specific monitoring plan.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
DEMONSTRATING CONTINUOUS COMPLIANCE - MONITORING AND COLLECTING DATA	hdr
(a) Except for monitoring malfunctions, associated repairs, and required quality assurance or control activities (including as applicable, calibration checks and required zero and span adjustments), monitor continuously (or collect data at all required intervals) at all times an affected source is operating. (b) Do not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels, or to fulfill a minimum data availability requirement. Use all the data collected during all other periods in assessing compliance. (c) A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not considered malfunctions.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
DEMONSTRATING CONTINUOUS COMPLIANCE WITH EMISSION LIMITATIONS	hdr
The mean concentration of particulate matter for the RHF must be maintained at or below the particulate emission limit. Demonstrate continuous compliance by completing the requirements of paragraphs (1) through (4) of this section. (1) Maintain the daily average pressure drop and daily average scrubber water flow rate at or above the minimum levels established during the initial or subsequent performance test. (2) Operate and maintain each wet scrubber CPMS and record all information needed to document conformance with these requirements. (3) Collect and reduce monitoring data for pressure drop and scrubber water flow rate and record all information needed to document conformance with these requirements. (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200

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(Continued from above) (4) If the daily average pressure drop or daily average scrubber water flow rate is below the operating limits established for a corresponding emission unit or group of similar emission units, then follow the corrective action procedures in the following paragraph.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
If the daily average operating parameter value for an emission unit or group of similar emission units does not meet the corresponding established operating limit, follow the procedures in paragraphs (1) through (4) of this section. (1) Initiate and complete the initial corrective action within 10 calendar days and demonstrate that the initial corrective action was successful. During any period of corrective action, continue to monitor and record all required operating parameters for equipment that remains in operation. After 10 calendar days, measure and record the daily average operating parameter value for the emission unit or group of similar emission units on which corrective action was taken. After the initial corrective action, if the daily average operating parameter value for the emission unit or group of similar emission units meets the operating limit established for the corresponding unit or group, then the corrective action was successful and (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
(continued from above) the emission unit or group of similar emission units is in compliance with the established operating limits. (2) If the initial corrective action required in paragraph (1) (immediately preceding) was not successful, then complete an additional corrective action within 10 calendar days and demonstrate that the subsequent corrective action was successful. During any period of corrective action, continue to monitor and record all required operating parameters for equipment that remains in operation. After the second set of 10 calendar days allowed to implement corrective action, measure and record the daily average operating parameter value for the emission unit or group of similar emission units again. If the daily average operating parameter value for the emission unit or group of similar emission units meets the operating limit established for the corresponding unit or group, then the corrective action was successful and the (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
(continued from above) emission unit or group of similar emission units is in compliance with the established operating limits. (3) If the second attempt at corrective action required in paragraph (2) (immediately preceding) was not successful, then you must repeat the procedures of paragraph (2) until the corrective action is successful. If the third attempt at corrective action is unsuccessful, you must conduct another performance test in accordance with the procedures in this permit and report to the Administrator as a deviation the third unsuccessful attempt at corrective action. (4) After the third unsuccessful attempt at corrective action, submit to the Administrator the written report required in paragraph (3) (immediately preceding) within 5 calendar days after the third unsuccessful attempt at corrective action. This report must notify the Administrator that a deviation has occurred and document the types of corrective measures taken to address (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
(continued from above) the problem unit that resulted in the deviation of established operating parameters and the resulting operating limits.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
COMPLIANCE WITH OPERATING AND MAINTENANCE REQUIREMENTS	hdr

Demonstrate continuous compliance with the operation and maintenance requirements by completing the requirements of paragraphs (1) through (3), below. (1) Perform preventative maintenance for each control device in accordance with this permit and record all information needed to document conformance with these requirements; (2) Initiate and complete the corrective action for a CPMS when an established operating limit is exceeded for the wet scrubber in accordance with this permit and record all information needed to document conformance with these requirements; and record all information needed to document conformance with these requirements. (3) Implement and maintain good combustion practices for the RHF in accordance with this permit and record all information needed to document conformance with these requirements.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
REPORTING REQUIREMENTS	hdr
(a) Deviations. Report each instance in which an emission limitation was not met. This includes periods of startup, shutdown, and malfunction in accordance with the paragraph (b), below. Report each instance in which the work practice standards in this permit were not met and each instance in which the operation and maintenance requirement in this permit were not met. These instances are deviations from the emission limitations, work practice standards, and operation and maintenance requirements in this subpart. Report these deviations in accordance with the requirements in this permit. (CONTINUED)	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; Minn. R. 7007.3010; 40 CFR Section 64.5 and Minn. R 7017.0200
(continued from above) (b) Startups, shutdowns, and malfunctions. During periods of startup, shutdown, and malfunction, operate in accordance with your startup, shutdown, and malfunction plan and the requirements in paragraphs (1) and (2), below. (1) Consistent with 40 CFR Section 63.6(e) and 63.7(e)(1), deviations that occur during a period of startup, shutdown, or malfunction are not violations if it is demonstrated to the Administrator's satisfaction that the emission unit and control equipment were operating in accordance with the startup, shutdown, and malfunction plan. (2) The Administrator will determine whether deviations that occur during a period of startup, shutdown, or malfunction are violations, according to the provisions in 40 CFR Section 63.6(e). [These startup, shutdown, and malfunction provisions apply only to the MACT (40 CFR 63.43(g)) limits. There is no startup, shutdown, and malfunction exception for the limits set under BACT (40 CFR 52.21).]	Title I Condition: 40 CFR Section 63.43(g): MACT; Minn. R. 7007.3010; 40 CFR Section 63.6(e) and 63.7(e)(1); 40 CFR Section 64.5

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Subject Item: **CE 017 Fabric Filter - Low Temperature, i.e., T<180 Degrees F**

Associated Items: EU 018 Recycled Fines Crusher

What to do	Why to do it
EMISSIONS LIMITATIONS AND OPERATING REQUIREMENTS	hdr
This baghouse is not subject to the Compliance Assurance Monitoring requirements for large pollutant-specific emissions unit.	40 CFR Section 63.43(g): case-by-case MACT; Minn. R. 7007.3010; 40 CFR Section 64.6; Minn. R. 7017.0200
Operate and maintain the baghouses and associated monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at least to the emission limitations.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
For baghouses without bag leak detection systems, the continuous parameter monitoring system (CPMS) is the system that measures the differential pressure drop across the baghouse. For each required CPMS, develop and make available for inspection upon request by the permitting authority a site-specific monitoring plan that addresses the requirements in paragraphs (1) through (7), below. (1) Installation of the CPMS sampling probe or other interface at a measurement location relative to each affected emission unit such that the measurement is representative of control of the exhaust emissions (e.g., on or downstream of the last control device). (2) Performance and equipment specifications for the sample interface, the parametric signal analyzer, and the data collection and reduction system. (CONTINUED)	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.8(c)(1), (3), (4)(ii), (7), and (8)
(continued from above) (3) Performance evaluation procedures and acceptance criteria (e.g., calibrations). (4) Ongoing operation and maintenance procedures in accordance with the general requirements of 40 CFR Section 63.8(c)(1), (3), (4)(ii), (7), and (8). (5) Ongoing data quality assurance procedures in accordance with the general requirements of 40 CFR Section 63.8(d). (6) Ongoing recordkeeping and reporting procedures in accordance with the general requirements of 40 CFR Section 63.10(c), (e)(1), and (e)(2)(i). (7) Corrective action procedures that you will follow in the event an air pollution control device exceeds an established operating limit.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.8(d); 40 CFR Section 63.10(c), (e)(1), and (e)(2)(i)
Unless otherwise specified, each CPMS must meet the requirements in paragraphs (1) and (2), below. (1) Each CPMS must complete a minimum of one cycle of operation for each successive 15-minute period while the associated emission unit(s) is in operation and must have valid data for at least 95 percent of every daily averaging period. (2) Each CPMS must determine and record the daily average of all recorded readings while the associated emission unit(s) was in operation.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Conduct a performance evaluation of each CPMS in accordance with the site-specific monitoring plan.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Operate and maintain the CPMS in continuous operation according to the site-specific monitoring plan.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING AND COLLECTING DATA	hdr
Except for monitoring malfunctions, associated repairs, and required quality assurance or control activities (including as applicable, calibration checks and required zero and span adjustments), monitor continuously (or collect data at all required intervals) at all times an affected source is operating.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Do not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels, or to fulfill a minimum data availability requirement. All the data collected during all other periods must be used in assessing compliance.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010

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A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not considered malfunctions.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Prepare and at all times operate according to a written operation and maintenance plan for CE017 (which may be the operation and maintenance plan for GP004). Submit the site-specific operation and maintenance plan to the Administrator on or before the start of operation. The plan you submit must explain why the chosen practices (i.e., quantified objectives) are effective in performing corrective actions. Maintain a current copy of the operation and maintenance plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart. Each operation and maintenance plan must address the elements in paragraphs (1) and (2), below. (CONTINUED)	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
(Continued from above) (1) Preventative maintenance for each control device, including a preventative maintenance schedule that is consistent with the manufacturer's instructions for routine and long-term maintenance. (2) In the event an established operating limit for a baghouse is exceeded, initiate corrective action to determine the cause of the operating limit exceedance and complete the corrective action within 10 calendar days. The corrective action procedures taken must be consistent with the installation, operation, and maintenance procedures listed in the facility's site-specific CPMS monitoring plan.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
MONITORING REQUIREMENTS	hdr
Install, calibrate, maintain, and operate a continuous parameter monitoring system (CPMS) for measuring and recording pressure drop across the control equipment by the startup date.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010; 40 CFR Section 63.8(c)(1),(2),(3),(4)
The Permittee shall develop and implement a CMS quality control program. As part of the quality control program, the Permittee shall develop and submit to the Commissioner for approval upon request a site-specific performance evaluation test plan for the performance evaluation required in 40 CFR 63.8 (e)(3)(i), according to the procedures specified in paragraph (e). Each quality control program shall include, at a minimum, a written protocol that describes procedures for each of the operations listed in items (1) through (6) below. (1) Initial and any subsequent calibration of the CMS; (2) Determination and adjustment of the calibration drift of the CMS; (3) Preventive maintenance of the CMS, including spare parts inventory; (4) Data recording, calculations, and reporting; (5) Accuracy audit procedures, including sampling and analysis methods; and (6) Program of corrective action for a malfunctioning CMS. (CONTINUED)	40 CFR Section 63.8(d): MACT and Minn. R. 7007.3010
(Continued from above) The Permittee shall keep these written procedures on record for the life of the affected source or until the affected source is no longer subject to the provisions of this part, to be made available for inspection, upon request, by the Commissioner. If the performance evaluation plan is revised, the Permittee shall keep previous (i.e., superseded) versions of the performance evaluation plan on record to be made available for inspection, upon request, by the Commissioner, for a period of 5 years after each revision to the plan. Where relevant, e.g., program of corrective action for a malfunctioning CMS, these written procedures may be incorporated as part of the affected source's startup, shutdown, and malfunction plan to avoid duplication of planning and recordkeeping efforts.	40 CFR Section 63.8(d): MACT and Minn. R. 7007.3010

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Install, operate, and maintain a pressure drop monitoring system to monitor the relative change in pressure drop according to the requirements in this permit. Conduct inspections at their specified frequencies according to the requirements in paragraphs (1) through (8), below. (1) Monitor the pressure drop across each baghouse cell each day to ensure pressure drop is within the normal operating range. (2) Confirm that dust is being removed from hoppers through weekly visual inspections or other means of ensuring the proper functioning of removal mechanisms. (3) Check the compressed air supply of pulse-jet baghouses each day. (4) Monitor cleaning cycles to ensure proper operation using an appropriate methodology. (5) Check bag cleaning mechanisms for proper functioning through monthly visual inspections or equivalent means. (CONTINUED)	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
(continued from above) (5) Check bag cleaning mechanisms for proper functioning through monthly visual inspections or equivalent means. (6) Make monthly visual checks of bag tension on reverse air and shaker-type baghouses to ensure that bags are not kinked (kneed or bent) or lying on their sides. If it is a shaker-type baghouses that has self-tensioning (spring-loaded) devices, this check is not needed. (7) Confirm the physical integrity of the baghouse through quarterly visual inspections of the baghouse interior for air leaks. (8) Inspect fans for wear, material buildup, and corrosion through quarterly visual inspections, vibration detectors, or equivalent means.	40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
RECORDKEEPING	hdr
QA Plan: Develop and implement a written quality assurance plan that covers the pressure drop CPMS. The plan shall be on site and available for inspection within 30 days after monitor certification. The plan shall contain all of the information required by 40 CFR Section 63.8(d).	40 CFR Section 63.8(d)(2); Minn. R. 7017.1170, subp. 2
Recordkeeping: The owner or operator must retain records of all pressure drop CPMS monitoring data and support information for a period of five years from the date of the monitoring, sample, measurement, or report. Records shall be kept at the source.	40 CFR Section 63.10(b); Minn. R. 7017.1130

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: FS 009 Roads

What to do	Why to do it
EMISSION LIMITATIONS	hdr
Opacity: less than or equal to 5 percent opacity using 6-minute Average	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000
Install asphalt or concrete surfaces or chemical agents on all active truck haul roads of the coal handling facility when the coal throughput by truck is 200,000 tons per year or greater. All paved roads and areas shall be cleaned to minimize the discharge to the atmosphere of fugitive particulate emissions in accordance with the fugitive dust plan. Such cleaning shall be accomplished in a manner which minimizes resuspension of particulate matter. Access areas surrounding coal stockpiles and parking facilities which are located within a coal handling facility shall be treated with water, oils, or chemical agents.	Minn. R. 7011.1105 A(1)
VISIBLE EMISSIONS REQUIREMENTS	hdr
Check for visible emissions (during daylight hours) from the roads while in operation.	Minn. R. 7007.0800, subp. 4
Corrective Actions: If visible emissions (VEs) are observed, determine the cause and take corrective actions as soon as possible to eliminate the VEs.	Minn. R. 7007.0800, subp. 2
Recordkeeping: Record the time and date of each VE inspection, and whether or not any VEs were observed. If VEs were observed, also record a brief description of the type of corrective actions taken, and the date the actions were taken.	Minn. R. 7007.0800, subp. 5
WORK PRACTICE STANDARDS	hdr
Prepare, and at all times operate according to, a fugitive dust emissions control plan that describes in detail the measures that will be put in place to control fugitive dust emissions from the locations listed in paragraphs (1) through (5), below. (1) Stockpiles (includes, but is not limited to, stockpiles of uncrushed coal, crushed coal, or slag); (2) Material transfer points; (3) Plant roadways; (4) Nugget loading areas; and (5) Yard areas.	Title I Condition: 40 CFR Section 52.21(j): BACT and Minn. R. 7007.3000; Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Maintain a current copy of the fugitive dust emissions control plan onsite. It must be available for inspection upon request. Keep the plan for the life of the affected source or until the affected source is no longer subject to the requirements of this subpart.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
For each work practice standard and operation and maintenance requirement that applies where initial compliance is not demonstrated using a performance test, demonstrate initial compliance within 30 calendar days after initial startup. Demonstrate continuous compliance with the work practice standard requirements by operating in accordance with the fugitive dust emissions control plan at all times.	Title I Condition: 40 CFR Section 63.43(g): MACT and Minn. R. 7007.3010
Clean up all coal spilled on roads or access areas as soon as practicable using methods that minimize the amount of dust suspended. Control fugitive particulate emissions by dust suppression methods on such operations so that fugitive particulate emissions are minimized. However, during freezing temperatures, owners or operators shall not be required to apply water or dust suppressants. No nonessential coal handling operations shall be conducted that are not shielded from the wind or enclosed in a building when steady wind speeds exceed 30 miles per hour as determined at the nearest official station of the United States Weather Bureau or by wind speed instruments on or adjacent to the site. This does not authorize the use of surface hardening agents, wetting or chemical agents, foam agents, and oils that may cause ground water or surface water contamination in violation of any applicable water pollution law.	Minn. R. 7011.1105.A.; Minn. R. 7011.1120; Minn. R. 7011.1125; Minn. R. 7011.1140
Hold initial notifications, all other reports, testing and compliance data for at least five years.	40 CFR Section 63.10(b); Minn. R. 7007.0800, subp. 6(A)(2)
Follow fugitive dust emissions control plan for applicable recordkeeping requirements, including weekly visibility checks.	40 CFR Section 63.6(e); 40 CFR Section 63.8(b)); Minn. R. 7007.0800, subp. 6(A)(2)

Paved Road Silt Load Tests: 4 tests shall be conducted during a 12-month timeframe. Silt loading tests shall be conducted in accordance with EPA guidance in Appendix C.1 and Appendix C.2 of AP-42. Each silt load test shall include a separate test for each of 3 paved road segments in accordance with a performance test plan approved by the Commissioner. Each test result shall also include silt load values for PM10 and PM2.5. The 3 paved road segments that shall be tested are between the west entrance to the property at Highway 135 and West Road, the transition between the West Road and Main Road, and the transition between Main Road and Unpaved road. If tested silt load values are found to be greater than those assumed in the air impact modeling for PM10 or PM2.5, then the Permittee shall either remodel using the tested values, or propose changes to the road cleaning method and/or frequency to reduce the silt load values to those assumed in the modeling. (CONTINUED)	40 CFR Section 52.21(k)
(continued from above) The asumed silt load values are listed in the modeling documents. Schedule the silt load tests for each calendar quarter of 2010 with at least 60 days between tests. A scheduled test date may be changed due to weather conditions by written notice to the Commissioner. At least one of the four tests must be done in the month of January, February, or December.	40 CFR Section 52.21(k)

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Subject Item: **MR 004 RHF - NOx Monitor**

Associated Items: EU 001 Rotary Hearth Furnace (RHF)

What to do	Why to do it
MONITORING AND COLLECTING DATA	hdr
Do not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels, or to fulfill a minimum data availability requirement. All the data collected during all other periods must be used in assessing compliance.	Minn. R. 7007.0800, subp. 2
Installation Notification: submitted October 6, 2009.	Minn. R. 7017.1040, subp. 1
CEMS Installation: install CEMS such that representative measurements of emissions or process parameters from the source are obtained. In addition the CEMS shall be located according to procedures contained in the applicable performance specifications of 40 CFR pt. 60, Appendix B.	Minn. R. 7017.1040, subp. 2
When two or more emission units required to be monitored with a CEMS are not subject to the same emission limit, a separate CEMS shall be installed on each emission unit.	Minn. R. 7017.1040, subp. 3
CEMS Certification Test: due within 90 days after the due date of the first excess emissions report required for the CEMS. Follow the Performance Specifications listed in 40 CFR pt. 60, Appendix B.	Minn. R. 7017.1050, subp. 1
CEMS Certification Test Plan: due 30 days before CEMS Certification Test	Minn. R. 7017.1060, subp. 1 & 2
CEMS Certification Test Pretest Meeting: due 7 days before CEMS Certification Test.	Minn. R. 7017.1060, subp. 3
All CEMS must be certified according to the appropriate performance specifications listed in 40 CFR pt. 60, Appendix B.	Minn. R. 7017.1070, subp. 1
CEMS Certification Test Report: due 45 days after CEMS Certification Test	Minn. R. 7017.1080, subp. 1, 2, & 4
CEMS Certification Test Report - Microfiche Copy: due 105 days after CEMS Certification Test	Minn. R. 7017.1080, subp. 3
Continuous Operation: CEMS must be operated and data recorded during all periods of emission unit operation including periods of emission unit start-up, shutdown, or malfunction except for periods of acceptable monitor downtime. This requirement applies whether or not a numerical emission limit applies during these periods. A CEMS must not be bypassed except in emergencies where failure to bypass would endanger human health, safety, or plant equipment. Acceptable monitor downtime includes reasonable periods as listed in Items A, B, C and D of Minn. R. 7017.1090, subp. 2.	Minn. R. 7017.1090, subp. 1
Excess Emissions/Downtime Reports (EERs): due 30 days after end of each calendar quarter following CEMS Certification Test (Submit Deviations Reporting Form DRF-1 as amended). The EER shall indicate all periods of monitor bypass and all periods of exceedances of the limit including exceedances allowed by an applicable standard, i.e. during startup, shutdown, and malfunctions.	Minn. R. 7017.1110, subp. 1 & 2
Recordkeeping: The owner or operator must retain records of all CEMS monitoring data and support information for a period of five years from the date of the monitoring sample, measurement or report. Records shall be kept at the source.	Minn. R. 7007.1130
All data points collected by a CEMS shall be used to calculate individual hourly emission averages unless another applicable requirement or compliance document requires more frequent averaging. Each hourly average starts at the beginning of the hour and ends at the beginning of the following hour. In order for an hour of data to be considered valid, it must contain the following minimum number of data points during the hour: - four data points, equally spaced, if the emission unit operated during the entire hour; - two data points, at least 15 minutes apart, during periods of monitor calibration, and periods of time to conduct quality control audits or routine maintenance; and - one data point if the emission unit operated for 15 minutes or less during the hour. Monitoring data shall be recorded in the same units of measurement and averaging period as the facility's emission standard.	Minn. R. 7017.1160

QA Plan: Develop and implement a written quality assurance plan that covers each CEMS. The plan shall be on site and available for inspection within 30 days after monitor certification. The plan shall contain all of the information required by 40 CFR part 60, Appendix F, section 3.	Minn. R. 7017.1170, subp. 2
CEMS Daily Calibration Drift (CD) Test: The CD shall be quantified and recorded at zero (low-level) and upscale (high-level) gas concentrations at least once daily. The CEMS shall be adjusted whenever the CD exceeds twice the specification of 40 CFR part 60, Appendix B. 40 CFR part 60, Appendix F, shall be used to determine out-of-control periods for CEMS. Follow the procedures in 40 CFR part 60, Appendix F.	Minn. R. 7017.1170, subp. 3
Cylinder Gas Audit (CGA): due before end of each calendar half-year following CEMS Certification Test. Conduct CGA at least 3 months apart and not greater than 8 months apart. Follow the procedures in 40 CFR pt. 60, Appendix F.	Minn. R. 7017.1170, subp. 4
Cylinder Gas Audit (CGA) Results Summary: due 30 days after end of each calendar half-year following Cylinder Gas Audit (CGA).	Minn. R. 7017.1180, subp. 1
CEMS Relative Accuracy Test Audit (RATA): due before end of each calendar year following CEMS Certification Test. Follow the procedures in 40 CFR pt. 60, Appendix F, as amended.	Minn. R. 7017.1170, subp. 5
Relative Accuracy Test Audit (RATA) Notification: due 30 days before CEMS Relative Accuracy Test Audit (RATA)).	Minn. R. 7017.1180, subp 2
Relative Accuracy Test Audit (RATA) Results Summary: due 30 days after end of each calendar quarter in which the CEMS RATA was conducted.	Minn. R. 7017.1180, subp. 3
CEM Certification Test: Written notification of the planned test date shall be postmarked or received at least 30 days before the planned test date.	Minn. R. 7017.2030, subp. 1

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Also, where required by an applicable rule or permit condition, send to the Permit Technical Advisor notices of:
- accumulated insignificant activities,
- installation of control equipment,
- replacement of an emissions unit, and
- changes that contravene a permit term.

Send submittals that are required to be submitted to the U.S. EPA regional office to:

Mr. George Czerniak
Air and Radiation Branch
EPA Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

Table B lists most of the submittals required by this permit. Please note that some submittal requirements may appear in Table A or, if applicable, within a compliance schedule located in Table C. Table B is divided into two sections in order to separately list one-time only and recurrent submittal requirements.

Send submittals that are required by the Acid Rain Program to:

U.S. Environmental Protection Agency
Clean Air Markets Division
1200 Pennsylvania Avenue NW (6204N)
Washington, D.C. 20460

Send any application for a permit or permit amendment to:

AQ Permit Technical Advisor
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Each submittal must be postmarked or received by the date specified in the applicable Table. Those submittals required by parts 7007.0100 to 7007.1850 must be certified by a responsible official, defined in Minn. R. 7007.0100, subp. 21. Other submittals shall be certified as appropriate if certification is required by an applicable rule or permit condition.

Unless another person is identified in the applicable Table, send all other submittals to:

AQ Compliance Tracking Coordinator
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

TABLE B: ONE TIME SUBMITTALS OR NOTIFICATIONS

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

What to send	When to send	Portion of Facility Affected
Application for Permit Reissuance	due 180 days before expiration of Existing Permit	Total Facility
Notification of compliance status	due 60 days after Performance Test	GP005
Notification of the Actual Date of Initial Startup	due 15 days after Initial Startup	EU008
Notification of the Actual Date of Initial Startup	due 15 days after Initial Startup of each listed EU.	GP005
Notification of the Actual Date of Initial Startup	due 15 days after Initial Startup of the rotary hearth furnace using form NT-01. Submit the name and number of the control device (or emissions unit) and the actual date of initial startup the control device (or emissions unit).	EU001
Notification of the Anticipated Date of Initial Startup	due 30 days before Anticipated Date of Initial Startup of the rotary hearth furnace	EU001
Notification of the Anticipated Date of Initial Startup	due 30 days before Anticipated Date of Initial Startup. Submit the name and number of each unit and the anticipated date of initial startup of each unit.	GP005
Notification of the Date Construction Began	due 30 days after Start Of Construction of the rotary hearth furnace	EU001
Notification of the Date Construction Began	due 30 days after Start Of Construction. Submit the name and number of each unit and the date construction of each unit began.	GP005
Notification of the Date Construction Began	due 30 days after Start Of Construction. Submit the name and number of each unit and the date construction of each unit began.	EU008
Performance Test Notification (written)	due 60 days before Performance Test. Simultaneously provide written notification of the date the performance evaluation of the continuous monitoring system is scheduled to begin.	GP005
Testing Frequency Plan	due 60 days after Initial Performance Test for opacity, particulate matter, and particulate matter less than ten microns in diameter. The plan shall specify a testing frequency based on the test data and MPCA guidance. Future performance tests based on one-year (12 month), 36 month, and 60 month intervals, or as applicable, shall be required upon written approval of the MPCA.	EU007, EU008, EU010, EU013
Testing Frequency Plan	due 60 days after Initial Performance Test for opacity, particulate matter, particulate matter less than ten microns in diameter, and nitrogen oxides. The plan shall specify a testing frequency based on the test data and MPCA guidance. Future performance tests based on one-year (12 month), 36 month, and 60 month intervals, or as applicable, shall be required upon written approval of the MPCA.	EU004
Testing Frequency Plan	due 60 days after Initial Performance Test for opacity, particulate matter, particulate matter less than ten microns in diameter, carbon monoxide, nitrogen oxides, and volatile organic compounds. The plan shall specify a testing frequency based on the test data and MPCA guidance. Future performance tests based on one-year (12 month), 36 month, and 60 month intervals, or as applicable, shall be required upon written approval of the MPCA.	EU002

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

Testing Frequency Plan	due 60 days after Initial Performance Test for opacity, particulate matter, particulate matter less than ten microns in diameter, volatile organic compounds, nitrogen oxides, and carbon monoxide. The plan shall specify a testing frequency based on the test data and MPCA guidance. Future performance tests based on one-year (12 month), 36 month, and 60 month intervals, or as applicable, shall be required upon written approval of the MPCA.	EU003, EU005, EU006, EU012
Testing Frequency Plan	due 60 days after Initial Performance Test for opacity, PM, PM10, VOC, lead, fluoride, and sulfuric acid mist emissions. The plan shall specify a testing frequency based on the test data and MPCA guidance. Future performance tests based on one-year (12 month), 36 month, and 60 month intervals, or as applicable, shall be required upon written approval of the MPCA.	EU001

TABLE B: RECURRENT SUBMITTALS

Facility Name: Mesabi Nugget Delaware LLC

Permit Number: 13700318 - 003

What to send	When to send	Portion of Facility Affected
Excess Emissions/Downtime Reports (EER's)	due 30 days after end of each calendar quarter following Initial Startup of the Monitor. Submit Deviations Reporting Form DRF-1 as amended. The EER must contain all of the information requested in 40 CFR Section 63.10(c)(3)(v). The EER shall indicate all periods of monitor bypass and all periods of exceedances of the limit including exceedances allowed by an applicable standard (I.e., during startup, shutdown, and malfunction).	GP005
Semiannual Deviations Report	due 30 days after end of each calendar half-year starting 01/25/2007 . The first semiannual report submitted by the Permittee shall cover the calendar half-year in which the permit is issued. The first report of each calendar year covers January 1 - June 30. The second report of each calendar year covers July 1 - December 31. If no deviations have occurred, the Permittee shall submit the report stating no deviations.	Total Facility
Semiannual Deviations Report	due 30 days after end of each calendar half-year starting 01/27/2007 . The first semiannual report submitted by the Permittee shall cover the calendar half-year in which the permit is issued. The first report of each calendar year covers January 1 - June 30. The second report of each calendar year covers July 1 - December 31. If no deviations have occurred, the Permittee shall submit the report stating no deviations.	FS009
Compliance Certification	due 31 days after end of each calendar year starting 01/25/2007 (for the previous calendar year). To be submitted on a form approved by the Commissioner, both to the Commissioner and to the US EPA regional office in Chicago. This report covers all deviations experienced during the calendar year.	Total Facility

Appendix A

(Not used in Permit Number13700318-003)

Appendix B

Insignificant Activities

Space heaters fueled by kerosene, natural gas, or propane
Infrared electric ovens
Storage tanks with a combined total tankage of ≤ 10,000 gallons of gasoline
Storage tanks with a combined total tankage of ≤ 10,000 gallons of non-HAP VOCs and with a vapor pressure of ≤ 1.0 psia at 60 ºF.
Laboratory activities, including equipment for forging, pressing, drawing, spinning or extruding hot metals
Equipment used for hydraulic or hydrostatic testing
Brazing, soldering, or welding equipment for maintenance-related activities
Alkaline/phosphate cleaners and associated cleaners and burners
Infrequent use of spray paint equipment for routine housekeeping or plant upkeep activities not associated with primary production processes
Hot water heaters (2), 5 MMBtu/hr each
Silos (dolomite – 1, limestone – 2, coal – 2)
Emergency piles for nuggets, slag, bird shot nuggets, product separation surge, pellets bypass, recycle coal #2
Material handling operations (coal, limestone, dolomite, slag, nuggets)
Wind erosion (coal, limestone, dolomite, slag, nuggets)
Green Ball Drum/Disc
Pneumatic conveying of water treatment materials
Parts washers
Feederbreaker

APPENDIX MATERIAL
Facility Name: Mesabi Nugget
Permit Number: 13700318-003

Appendix C.1

Modeling Parameters (PER001)

Introduction

For this project, both Class I and Class II modeling were conducted. Class II modeling was conducted first, and contains higher emission rates than the permit limits in the permit. However, because the modeling at the higher emission rates showed attainment and maintenance of the NAAQS and increment, the Class II modeling was not repeated with the lower, permitted emission rates.

Class II modeling includes all sources except insignificant activities. Class I modeling includes only those sources which are expected to impact the Class I areas. Except for emission rates, modeled parameters are identical between Class I and Class II modeling

Table 1a – Class II Modeling – Stack Sources <Ruth prepares>

MPCA ID	Nugget ID	Source Description	Emission Rates (g/s)					Modeled Parameters			
			PM10	NOX	SO2	CO	Lead	Stack Height (m)	Stack Exit Temp. (K)	Exit Velocity (m/s)	Stack Exit Diameter (m)
SV001	SV201	RHF	10.30	31.5	28.42	13.98	0.121	60	358	25	4.23
SV002	SV202	Pulverizer	2.04	0.37	0.0044	0 . 0 0	0.00015	40	355	25	1.98
SV003	SV203	Coal Flux Unload	0.358	0	0	0	0	30	298	25	1.26
SV004	SV204	Rail Loadout	0.358	0	0	0	0	30	298	25	1.26
SV007	SV207	RHF Building Baghouse	0.540	0	0	0	0	40	298	25	1.55
SV009	SV208A	Process Water Cooling Tower	0.0230	0	0	0	0	18.7	311	5.1	2.7
	SV208B	Process Water Cooling Tower	0.0230	0	0	0	0	18.7	311	5.1	2.7
	SV208C	Process Water Cooling Tower	0.0230	0	0	0	0	18.7	311	5.1	2.7
	SV208D	Process Water Cooling Tower	0.0230	0	0	0	0	18.7	311	5.1	2.7
	SV208E	Process Water Cooling Tower	0.0230	0	0	0	0	18.7	311	5.1	2.7
	SV208F	Process Water Cooling Tower	0.0230	0	0	0	0	18.7	311	5.1	2.7
SV010	SV209A	Clean Water Cooling Tower	0.0090	0	0	0	0	10.7	311	5.1	2.7
	SV209B	Clean Water Cooling Tower	0.0090	0	0	0	0	10.7	311	5.1	2.7
	SV209C	Clean Water Cooling Tower	0.0090	0	0	0	0	10.7	311	5.1	2.7

APPENDIX MATERIAL
Facility Name: Mesabi Nugget
Permit Number: 13700318-003

Table 1b – Class II modeling – Fugitive Emission Sources

Emission Unit ID	Source Description	Modeled Parameters			
		PM10 Emission Rate (g/s)	Release Height (m)	Sigma-Y (m)	Sigma-Z (m)
FS034	Coal Material Handling	4.10E-02	5	3.544	4.65
FS035	Flux Material Handling	9.30E-02	5	3.544	4.65
FS037	Slag Material Handling	9.00E-02	5	3.544	4.65
FS038	Coal Wind Erosion	1.00E+00	5	3.544	4.65
FS039	Flux Wind Erosion	1.00E+00	5	3.544	4.65
FS041	Slag Wind Erosion	1.00E+00	5	3.544	4.65
SV205	RHF Roof Monitor	2.23E-01	30	5.581	14
PR001	Paved Road Segment	5.53E-03	3	9.3	2.79
PR002	Paved Road Segment	5.53E-03	3	9.3	2.79
PR003	Paved Road Segment	5.53E-03	3	9.3	2.79
PR004	Paved Road Segment	5.53E-03	3	9.3	2.79
PR005	Paved Road Segment	5.53E-03	3	9.3	2.79
PR006	Paved Road Segment	5.53E-03	3	9.3	2.79
PR007	Paved Road Segment	5.53E-03	3	9.3	2.79
PR008	Paved Road Segment	5.53E-03	3	9.3	2.79
PR009	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 10	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 11	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 12	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 13	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 14	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 15	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 16	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 17	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 18	Paved Road Segment	5.53E-03	3	9.3	2.79
PR0 19	Paved Road Segment	5.53E-03	3	9.3	2.79
PR020	Paved Road Segment	5.53E-03	3	9.3	2.79
PR021	Paved Road Segment	5.53E-03	3	9.3	2.79
PR022	Paved Road Segment	5.53E-03	3	9.3	2.79
PR023	Paved Road Segment	5.53E-03	3	9.3	2.79
PR024	Paved Road Segment	5.53E-03	3	9.3	2.79
PR025	Paved Road Segment	5.53E-03	3	9.3	2.79
PR026	Paved Road Segment	5.53E-03	3	9.3	2.79
PR027	Paved Road Segment	5.53E-03	3	9.3	2.79
PR028	Paved Road Segment	5.53E-03	3	9.3	2.79
PR029	Paved Road Segment	5.53E-03	3	9.3	2.79
PR030	Paved Road Segment	5.53E-03	3	9.3	2.79
PR031	Paved Road Segment	5.53E-03	3	9.3	2.79

APPENDIX MATERIAL
Facility Name: Mesabi Nugget
Permit Number: 13700318-003

Table 1b – Class II modeling – Fugitive Emission Sources (continued)

Emission Unit ID	Source Description	Modeled Parameters			
		PM10 Emission Rate (g/s)	Release Height (m)	Sigma-Y (m)	Sigma-Z (m)
PR032	Paved Road Segment	5.53E-03	3	9.3	2.79
PR033	Paved Road Segment	5.53E-03	3	9.3	2.79
PR034	Paved Road Segment	5.53E-03	3	9.3	2.79
PR035	Paved Road Segment	5.53E-03	3	9.3	2.79
PR036	Paved Road Segment	5.53E-03	3	9.3	2.79
PR037	Paved Road Segment	5.53E-03	3	9.3	2.79
PR038	Paved Road Segment	5.53E-03	3	9.3	2.79
PR039	Paved Road Segment	5.53E-03	3	9.3	2.79
PR040	Paved Road Segment	5.53E-03	3	9.3	2.79
PR041	Paved Road Segment	5.53E-03	3	9.3	2.79
PR042	Paved Road Segment	5.53E-03	3	9.3	2.79
PR043	Paved Road Segment	5.53E-03	3	9.3	2.79
PR044	Paved Road Segment	5.53E-03	3	9.3	2.79
PR045	Paved Road Segment	5.53E-03	3	9.3	2.79
PR046	Paved Road Segment	5.53E-03	3	9.3	2.79
PR047	Paved Road Segment	5.53E-03	3	9.3	2.79
PR048	Paved Road Segment	5.53E-03	3	9.3	2.79
PR049	Paved Road Segment	5.53E-03	3	9.3	2.79
PR050	Paved Road Segment	5.53E-03	3	9.3	2.79
PR051	Paved Road Segment	5.53E-03	3	9.3	2.79
PR052	Paved Road Segment	5.53E-03	3	9.3	2.79
PR053	Paved Road Segment	5.53E-03	3	9.3	2.79
PR054	Paved Road Segment	5.53E-03	3	9.3	2.79
PR055	Paved Road Segment	5.53E-03	3	9.3	2.79
PR056	Paved Road Segment	5.53E-03	3	9.3	2.79
PR057	Paved Road Segment	5.53E-03	3	9.3	2.79
PR058	Paved Road Segment	5.53E-03	3	9.3	2.79
PR059	Paved Road Segment	5.53E-03	3	9.3	2.79
PR060	Paved Road Segment	5.53E-03	3	9.3	2.79
PR061	Paved Road Segment	5.53E-03	3	9.3	2.79
PR062	Paved Road Segment	5.53E-03	3	9.3	2.79
PR063	Paved Road Segment	5.53E-03	3	9.3	2.79
PR064	Paved Road Segment	5.53E-03	3	9.3	2.79
PR065	Paved Road Segment	5.53E-03	3	9.3	2.79
PR066	Paved Road Segment	5.53E-03	3	9.3	2.79
PR067	Paved Road Segment	5.53E-03	3	9.3	2.79
PR068	Paved Road Segment	5.53E-03	3	9.3	2.79
PR069	Paved Road Segment	5.53E-03	3	9.3	2.79
PR070	Paved Road Segment	5.53E-03	3	9.3	2.79
PR071	Paved Road Segment	5.53E-03	3	9.3	2.79
PR072	Paved Road Segment	5.53E-03	3	9.3	2.79

Table 1b – Class II modeling – Fugitive Emission Sources (continued)

Emission Unit ID	Source Description	Modeled Parameters			
		PM10 Emission Rate (g/s)	Release Height (m)	Sigma-Y (m)	Sigma-Z (m)
PR073	Paved Road Segment	5.53E-03	3	9.3	2.79
PR074	Paved Road Segment	5.53E-03	3	9.3	2.79
PR075	Paved Road Segment	5.53E-03	3	9.3	2.79
PR076	Paved Road Segment	5.53E-03	3	9.3	2.79
PR077	Paved Road Segment	5.53E-03	3	9.3	2.79
PR078	Paved Road Segment	5.53E-03	3	9.3	2.79
PR079	Paved Road Segment	5.53E-03	3	9.3	2.79
PR080	Paved Road Segment	5.53E-03	3	9.3	2.79
PR081	Paved Road Segment	5.53E-03	3	9.3	2.79
PR082	Paved Road Segment	5.53E-03	3	9.3	2.79
PR083	Paved Road Segment	5.53E-03	3	9.3	2.79
PR084	Paved Road Segment	5.53E-03	3	9.3	2.79
PR085	Paved Road Segment	5.53E-03	3	9.3	2.79

APPENDIX MATERIAL
Facility Name: Mesabi Nugget
Permit Number: 13700318-003

Table 2a Class I Modeling Parameters – Stack Sources

MPCA ID	Nugget ID	Includes Emission Units	Source Description	Emission Rates (g/s)			Modeled Parameters			
				PM10	NOX	SO2	Stack Height (m)	Stack Exit Temp. (K)	Exit Velocity (m/s)	Stack Exit Diameter (m)
SV001	SV201	EU001, 002, 003, 013	RHF	10.3	26.96	11.98	60	358	25	4.23
SV002	SV202	EU004, 005, 006, 012	Pulverizer	2.04	0.37	0.0044	40	355	25	1.98
SV003	SV203	EU 007	Coal Flux Unload	0.358	0	0	30	298	25	1.26
SV004	SV204	EU 008	Rail Loadout	0.358	0	0	30	298	25	1.26
SV007	SV207	EU010	RHF Building Baghouse	0.540	0	0	40	298	25	1.55

Class I modeling SO2 emissions levels for the RHF (SV201), were reduced from those levels modeled in the Class II modeling. Since Class II modeling showed attainment and maintenance of the NAAQS and increment at the higher levels, it was unnecessary to revise the Class II model, as further reductions would not change the acceptability of the original results.

Class I levels reflected in this table are from the modeling performed on April 22, 2005, with reductions in SO2. These values correspond to the spreadsheet CALCS_superseded_05_09_05. Only certain fugitive sources were modeled in the Class I analysis – see table below.

Emergency sources, including the RHF Bypass stack (SV 008) and the emergency diesel generator (EU 011) were not modeled in the Class I analysis.

Stack parameters (height, exit temperature, exit velocity, exit diameter) were not changed between Class I and II modeling.

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Table 2b Class I Modeling Parameters – Area Sources

MPCA Emission ID	Nugget Emission ID	Source Description	Modeled Parameters			
			PM10 Emission Rate (g/s)	Release Height (m)	Sigma-Y (m)	Sigma-Z (m)
FS 001	FS034	Coal Material Handling	4.13E-02	5	3.544	4.65
FS 003	FS035	Flux Material Handling	9.27E-02	5	3.544	4.65
FS 005	FS037	Slag Material Handling	8.97E-02	5	3.544	4.65
SV 005	SV205	RHF Roof Monitor	2.23E-01	30	5.581	14

Only these fugitive sources were modeled in Class I modeling. Other fugitive PM sources, such as nugget material handling (FS 007) and paved roads (FS 009) were not modeled in the Class I analysis, as they consist of small, low level, coarse particulate emissions which will not affect the Class I areas. Fugitive VOC sources such as parts washer (FS 010) were not modeled because they are low, cold, minor sources of VOC which will not affect the Class I areas. Finally, insignificant sources were not modeled, including cooling towers, emergency and recycle materials piles, and wind erosion off storage piles because they consist of low level, coarse particulate emissions which will not affect the Class I areas.

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Appendix C.2

Modeling Parameters (PER003)

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Table 1: Model Options

Mesabi Nugget, LLC
Phase I Permit Amendment Modeling Report
Summary of Selected Model Options

Option	Selection		
Model	AERMOD version 07026		
Building Downwash	BPIPPRM version 04274		
Meteorological Data	5 year period 2001-2005		
Surface Station	Hibbing, MN (NWS Station 94931)		
Upper Air Station	International Falls, MN (NWS Station 14918)		
Terrain	Elevated – Receptor grid processed using AERMAP version 09040		
Receptor Grid	50-m spacing along boundary.		
	200-m spacing out to1 kilometer.		
	2 km spaced 10 degree polar grid out 8 km from ambient air boundary		
POLLUTANT	**AVG PERIOD**	**Standard Evaluated**	
		NAAQS	**INCREMENT**
PM10	24 HOUR / ANNUAL	YES	YES
PM2.5	24 HOUR / ANNUAL	YES	NA
Option	**Selection**		
COntrol Pathway	DFAULT selected		

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Table 2: Point Sources

Source ID	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Emission Rate [g/s]	Gas Exit Temperature [K]	Gas Exit Velocity [m/s]	Inside Diameter [m]	Description
SV001	560874.8	5270799	512.65	60	10.3	354.9	21.45	4.23	RHF and Green Ball Dryer
SV002	560996	5270768	509.29	40	2.04	343.97	5.31	1.98	Pulverizer
SV003	561325.5	5270586	481.52	30	0.358	298	56.77	1.26	Coal/Flux Unloading
SV004	561336.5	5270622	490.8	30	0.358	298	18.92	1.26	Railcar Loadout
SV007	560764.7	5270591	499.37	40	0.54	322.8	26.7	1.55	Material Transfer Operations
SV09A	560871.4	5270546	496.22	18.7	0.023	324.3	55.28	2.7	Cooling Tower 9 Cell A
SV09B	560880.6	5270547	496.24	18.7	0.023	324.3	55.28	2.7	Cooling Tower 9 Cell B
SV10A	560897.9	5270550	496.23	18.7	0.023	311.9	44.97	2.7	Cooling Tower 10 Cell A
SV10B	560906.8	5270552	496.21	18.7	0.023	311.9	44.97	2.7	Cooling Tower 10 Cell B

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Table 3: Volume Sources

Source ID	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Emission Rate [g/s]	Side Length [m]	Building Height [m]	Initial Lateral Dimension [m]	Initial Vertical Dimension [m]	Description
FS034	561164.3	5270676	496.25	5	0.041	15.05		3.5	4.65	Coal Material Handling
FS038	561164.3	5270676	496.25	5	1	15.05		3.5	4.65	Coal Wind Erosion
FS035	561261.7	5270725	496.53	5	0.093	15.05		3.5	4.65	Flux Material Handling
FS039	561261.7	5270725	496.53	5	1	15.05		3.5	4.65	Flux Wind Erosion
FS037	560773.4	5270534	495.64	5	0.09	15.05		3.5	4.65	Slag Material Handling
FS041	560773.4	5270534	495.64	5	1	15.05		3.5	4.65	Slag Wind Erosion
FS010	561498.2	5270800	497.11	5	0.227	15.05		3.5	4.65	Concentrate Material Handling
FS011	561498.2	5270800	497.11	5	1	15.05		3.5	4.65	Concentrate Wind Erosion
SV005	560759	5270711	512.41	30.48	0.223	24.08		5.6	14.18	RHF Roof Monitor
SV012	560957.4	5270763	511.7	24.08	0.117	24.08		5.6	11.2	Pulverizer Roof Monitor
MAIN059	562079.8	5271158	513.39	3.11	0.00925	59.98		13.95	2.89	
MAIN060	562067.2	5271185	514.68	3.11	0.00925	59.98		13.95	2.89	
MAIN061	562054.6	5271212	516.45	3.11	0.00925	59.98		13.95	2.89	
MAIN062	562042	5271239	518.3	3.11	0.00925	59.98		13.95	2.89	
MAIN063	562029.4	5271267	520.24	3.11	0.00925	59.98		13.95	2.89	
MAIN064	562017.7	5271294	521.67	3.11	0.00925	59.98		13.95	2.89	
MAIN065	562006.5	5271322	524.01	3.11	0.00925	59.98		13.95	2.89	
MAIN066	561995.3	5271350	525.95	3.11	0.00925	59.98		13.95	2.89	
MAIN067	561984.5	5271378	528.3	3.11	0.00925	59.98		13.95	2.89	
MAIN068	561970.5	5271404	529.28	3.11	0.00925	59.98		13.95	2.89	
MAIN069	561952.8	5271428	530.24	3.11	0.00925	59.98		13.95	2.89	
MAIN070	561934.2	5271452	530.84	3.11	0.00925	59.98		13.95	2.89	
MAIN071	561910.3	5271470	533.14	3.11	0.00925	59.98		13.95	2.89	

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MAIN072	561883.4	5271483	534.39	3.11	0.00925	59.98	13.95	2.89
MAIN073	561854.9	5271492	534.68	3.11	0.00925	59.98	13.95	2.89
MAIN074	561825	5271491	534.26	3.11	0.00925	59.98	13.95	2.89
MAIN075	561795.8	5271485	536.47	3.11	0.00925	59.98	13.95	2.89
MAIN076	561767.5	5271475	537.1	3.11	0.00925	59.98	13.95	2.89
MAIN077	561739.4	5271465	537	3.11	0.00925	59.98	13.95	2.89
MAIN078	561711.6	5271454	536.92	3.11	0.00925	59.98	13.95	2.89
MAIN079	561683.8	5271442	534.87	3.11	0.00925	59.98	13.95	2.89
MAIN080	561656	5271431	532.62	3.11	0.00925	59.98	13.95	2.89
MAIN081	561628.2	5271420	533.78	3.11	0.00925	59.98	13.95	2.89
MAIN082	561600.4	5271408	534.09	3.11	0.00925	59.98	13.95	2.89
MAIN083	561572.6	5271397	530.67	3.11	0.00925	59.98	13.95	2.89
MAIN084	561545.2	5271385	531.5	3.11	0.00925	59.98	13.95	2.89
MAIN085	561517.8	5271373	529.97	3.11	0.00925	59.98	13.95	2.89
MAIN086	561490.3	5271361	529.37	3.11	0.00925	59.98	13.95	2.89
MAIN087	561462.9	5271348	529.73	3.11	0.00925	59.98	13.95	2.89
MAIN088	561435.5	5271336	526.67	3.11	0.00925	59.98	13.95	2.89
MAIN089	561408	5271324	528.01	3.11	0.00925	59.98	13.95	2.89
MAIN090	561380.6	5271312	528.38	3.11	0.00925	59.98	13.95	2.89
MAIN091	561353.2	5271300	525.47	3.11	0.00925	59.98	13.95	2.89
MAIN092	561325.9	5271287	527.24	3.11	0.00925	59.98	13.95	2.89
MAIN093	561298.6	5271275	523.98	3.11	0.00925	59.98	13.95	2.89
MAIN094	561271.3	5271262	522.96	3.11	0.00925	59.98	13.95	2.89
MAIN095	561243.8	5271250	524.65	3.11	0.00925	59.98	13.95	2.89
MAIN096	561215.1	5271242	522.01	3.11	0.00925	59.98	13.95	2.89
MAIN097	561185.5	5271237	521.27	3.11	0.00925	59.98	13.95	2.89
MAIN098	561155.9	5271232	521.68	3.11	0.00925	59.98	13.95	2.89

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MAIN099	561126	5271229	521.25	3.11	0.00925	59.98	13.95	2.89
MAIN100	561096.2	5271226	522.84	3.11	0.00925	59.98	13.95	2.89
MAIN101	561066.3	5271223	523.04	3.11	0.00925	59.98	13.95	2.89
MAIN102	561036.5	5271220	524.42	3.11	0.00925	59.98	13.95	2.89
MAIN103	561006.8	5271216	525.44	3.11	0.00925	59.98	13.95	2.89
MAIN104	560978.3	5271207	525.57	3.11	0.00925	59.98	13.95	2.89
MAIN105	560949.8	5271198	524.66	3.11	0.00925	59.98	13.95	2.89
MAIN106	560923.1	5271184	522.41	3.11	0.00925	59.98	13.95	2.89
MAIN107	560898.3	5271168	521.4	3.11	0.00925	59.98	13.95	2.89
MAIN108	560874.3	5271149	521.57	3.11	0.00925	59.98	13.95	2.89
MAIN109	560850.4	5271131	521.33	3.11	0.00925	59.98	13.95	2.89
MAIN110	560826.5	5271113	521.13	3.11	0.00925	59.98	13.95	2.89
MAIN111	560802.6	5271095	521.55	3.11	0.00925	59.98	13.95	2.89
MAIN112	560779.1	5271076	520.21	3.11	0.00925	59.98	13.95	2.89
MAIN113	560755.8	5271058	519.38	3.11	0.00925	59.98	13.95	2.89
MAIN114	560732.6	5271039	517.9	3.11	0.00925	59.98	13.95	2.89
MAIN115	560709.3	5271020	516.77	3.11	0.00925	59.98	13.95	2.89
MAIN116	560686	5271001	516.44	3.11	0.00925	59.98	13.95	2.89
MAIN117	560662.7	5270982	516.13	3.11	0.00925	59.98	13.95	2.89
MAIN118	560639.4	5270963	515.94	3.11	0.00925	59.98	13.95	2.89
MAIN119	560616.2	5270944	515.54	3.11	0.00925	59.98	13.95	2.89
WEST009	560597.8	5270929	515.11	3.11	0.0136	59.98	13.95	2.89
WEST010	560574	5270911	514.68	3.11	0.0136	59.98	13.95	2.89
WEST011	560550.2	5270892	513.86	3.11	0.0136	59.98	13.95	2.89
WEST012	560526.4	5270874	512.25	3.11	0.0136	59.98	13.95	2.89
WEST013	560503.2	5270855	509.84	3.11	0.0136	59.98	13.95	2.89
WEST014	560479.4	5270837	508.89	3.11	0.0136	59.98	13.95	2.89

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WEST015	560454.7	5270820	509.01	3.11	0.0136	59.98	13.95	2.89
WEST016	560428.9	5270804	509.06	3.11	0.0136	59.98	13.95	2.89
WEST017	560403.1	5270789	508.16	3.11	0.0136	59.98	13.95	2.89
WEST018	560376.8	5270775	507.8	3.11	0.0136	59.98	13.95	2.89
WEST019	560349.8	5270762	507.36	3.11	0.0136	59.98	13.95	2.89
WEST020	560322.3	5270750	506.73	3.11	0.0136	59.98	13.95	2.89
WEST021	560294.7	5270738	505.97	3.11	0.0136	59.98	13.95	2.89
WEST022	560267.2	5270726	503.82	3.11	0.0136	59.98	13.95	2.89
WEST023	560239.6	5270714	502.41	3.11	0.0136	59.98	13.95	2.89
WEST024	560212	5270702	501.2	3.11	0.0136	59.98	13.95	2.89
WEST025	560184.3	5270691	500.75	3.11	0.0136	59.98	13.95	2.89
WEST026	560156.5	5270680	500.1	3.11	0.0136	59.98	13.95	2.89
WEST027	560128.7	5270668	499.51	3.11	0.0136	59.98	13.95	2.89
WEST028	560100.3	5270659	498.35	3.11	0.0136	59.98	13.95	2.89
WEST029	560071.7	5270650	498.2	3.11	0.0136	59.98	13.95	2.89
WEST030	560043.1	5270641	498.66	3.11	0.0136	59.98	13.95	2.89
WEST031	560014.6	5270631	499.82	3.11	0.0136	59.98	13.95	2.89
WEST032	559986	5270622	502.13	3.11	0.0136	59.98	13.95	2.89
WEST033	559957.4	5270613	501.82	3.11	0.0136	59.98	13.95	2.89
WEST034	559928.7	5270604	498.64	3.11	0.0136	59.98	13.95	2.89
WEST035	559900	5270596	496.43	3.11	0.0136	59.98	13.95	2.89
WEST036	559871.2	5270587	495.36	3.11	0.0136	59.98	13.95	2.89
WEST037	559842.4	5270579	494.64	3.11	0.0136	59.98	13.95	2.89
WEST038	559813.7	5270570	493.57	3.11	0.0136	59.98	13.95	2.89
WEST039	559784.9	5270562	492.26	3.11	0.0136	59.98	13.95	2.89
WEST040	559756.2	5270553	491.55	3.11	0.0136	59.98	13.95	2.89
WEST041	559727.4	5270545	491.41	3.11	0.0136	59.98	13.95	2.89

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WEST042	559698.7	5270536	491.1	3.11	0.0136	59.98		13.95	2.89
WEST043	559670	5270527	490.96	3.11	0.0136	59.98		13.95	2.89
WEST044	559641.2	5270519	490.93	3.11	0.0136	59.98		13.95	2.89
WEST045	559612.5	5270510	490.91	3.11	0.0136	59.98		13.95	2.89
WEST046	559583.8	5270501	490.91	3.11	0.0136	59.98		13.95	2.89
WEST047	559555.1	5270493	490.92	3.11	0.0136	59.98		13.95	2.89
WEST048	559526.4	5270484	490.93	3.11	0.0136	59.98		13.95	2.89
WEST049	559497.6	5270475	491.35	3.11	0.0136	59.98		13.95	2.89
WEST050	559468.9	5270467	492.26	3.11	0.0136	59.98		13.95	2.89
WEST051	559440.1	5270458	492.87	3.11	0.0136	59.98		13.95	2.89
WEST052	559411.3	5270450	493.12	3.11	0.0136	59.98		13.95	2.89
WEST053	559382.5	5270441	493.33	3.11	0.0136	59.98		13.95	2.89
WEST054	559353.7	5270433	493.4	3.11	0.0136	59.98		13.95	2.89
WEST055	559324.9	5270425	493.39	3.11	0.0136	59.98		13.95	2.89
WEST056	559296	5270417	493.39	3.11	0.0136	59.98		13.95	2.89
WEST057	559267	5270409	493.25	3.11	0.0136	59.98		13.95	2.89
WEST058	559238	5270401	492.96	3.11	0.0136	59.98		13.95	2.89
WEST059	559208.8	5270394	493.05	3.11	0.0136	59.98		13.95	2.89
WEST060	559179.5	5270388	493.11	3.11	0.0136	59.98		13.95	2.89
WEST061	559150.2	5270382	493.32	3.11	0.0136	59.98		13.95	2.89
WEST062	559120.7	5270376	493.75	3.11	0.0136	59.98		13.95	2.89
WEST063	559091.1	5270371	493.91	3.11	0.0136	59.98		13.95	2.89
WEST064	559061.6	5270366	493.91	3.11	0.0136	59.98		13.95	2.89
WEST065	559031.9	5270361	493.89	3.11	0.0136	59.98		13.95	2.89
WEST066	559002.3	5270357	493.86	3.11	0.0136	59.98		13.95	2.89
WEST067	558972.7	5270352	493.74	3.11	0.0136	59.98		13.95	2.89
WEST068	558943	5270347	493.7	3.11	0.0136	59.98		13.95	2.89

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WEST069	558913.4	5270343	493.58	3.11	0.0136	59.98		13.95	2.89
WEST070	558883.7	5270338	493.25	3.11	0.0136	59.98		13.95	2.89
WEST071	558854.1	5270334	493.12	3.11	0.0136	59.98		13.95	2.89
WEST072	558824.4	5270329	492.59	3.11	0.0136	59.98		13.95	2.89
WEST073	558794.7	5270325	491.63	3.11	0.0136	59.98		13.95	2.89
WEST074	558765	5270320	490.8	3.11	0.0136	59.98		13.95	2.89
WEST075	558735.3	5270317	489.69	3.11	0.0136	59.98		13.95	2.89
WEST076	558705.3	5270317	488.76	3.11	0.0136	59.98		13.95	2.89
WEST077	558676.5	5270325	488.02	3.11	0.0136	59.98		13.95	2.89
WEST078	558648.7	5270336	486.67	3.11	0.0136	59.98		13.95	2.89
WEST079	558622.6	5270351	485.23	3.11	0.0136	59.98		13.95	2.89
WEST080	558599.8	5270370	484.85	3.11	0.0136	59.98		13.95	2.89
WEST081	558582	5270394	484.84	3.11	0.0136	59.98		13.95	2.89
WEST082	558567.2	5270420	484.87	3.11	0.0136	59.98		13.95	2.89
WEST083	558554.4	5270447	485.54	3.11	0.0136	59.98		13.95	2.89
WEST084	558541.5	5270474	487.05	3.11	0.0136	59.98		13.95	2.89
WEST085	558528.5	5270501	488.05	3.11	0.0136	59.98		13.95	2.89
WEST086	558515.4	5270528	489.02	3.11	0.0136	59.98		13.95	2.89
WEST087	558502.2	5270555	489.77	3.11	0.0136	59.98		13.95	2.89
WEST088	558489.1	5270582	490.14	3.11	0.0136	59.98		13.95	2.89
WEST089	558476	5270609	490.59	3.11	0.0136	59.98		13.95	2.89
WEST090	558463.2	5270636	491.47	3.11	0.0136	59.98		13.95	2.89
WEST091	558450.6	5270664	491.76	3.11	0.0136	59.98		13.95	2.89
WEST092	558438.1	5270691	491.91	3.11	0.0136	59.98		13.95	2.89
WEST093	558425.9	5270718	492.42	3.11	0.0136	59.98		13.95	2.89
WEST094	558413.8	5270746	493.44	3.11	0.0136	59.98		13.95	2.89
WEST095	558401.9	5270773	494.24	3.11	0.0136	59.98		13.95	2.89

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WEST096	558391	5270801	494.52	3.11	0.0136	59.98	13.95	2.89
WEST097	558382.2	5270830	494.72	3.11	0.0136	59.98	13.95	2.89
WEST098	558374	5270859	495.12	3.11	0.0136	59.98	13.95	2.89
WEST099	558366.2	5270888	496.34	3.11	0.0136	59.98	13.95	2.89
WEST100	558355.3	5270915	497.09	3.11	0.0136	59.98	13.95	2.89
WEST101	558332.2	5270934	497.56	3.11	0.0136	59.98	13.95	2.89
UPVD001	562081	5271136	512.08	3.11	0.00311	59.98	13.95	2.89
UPVD002	562054.1	5271123	512.1	3.11	0.00439	59.98	13.95	2.89
UPVD003	562027.2	5271110	512.42	3.11	0.00621	59.98	13.95	2.89
UPVD004	562003	5271092	513.03	3.11	0.00761	59.98	13.95	2.89
UPVD005	561978.7	5271074	513.41	3.11	0.0108	59.98	13.95	2.89
UPVD006	561954.4	5271057	513.41	3.11	0.0108	59.98	13.95	2.89
UPVD007	561930.5	5271039	511.76	3.11	0.0108	59.98	13.95	2.89
UPVD008	561906.4	5271021	509.65	3.11	0.0108	59.98	13.95	2.89
UPVD009	561880.3	5271006	510.78	3.11	0.0108	59.98	13.95	2.89
UPVD010	561853.2	5270993	510.21	3.11	0.0108	59.98	13.95	2.89
UPVD011	561825.1	5270983	509.07	3.11	0.0108	59.98	13.95	2.89
UPVD012	561797.9	5270971	506.29	3.11	0.0108	59.98	13.95	2.89
UPVD013	561772.3	5270956	501.75	3.11	0.0108	59.98	13.95	2.89
UPVD014	561760.1	5270928	499.2	3.11	0.0108	59.98	13.95	2.89
UPVD015	561750.6	5270900	498.29	3.11	0.0108	59.98	13.95	2.89
UPVD016	561747	5270870	497.35	3.11	0.0108	59.98	13.95	2.89
UPVD017	561739.9	5270842	496.43	3.11	0.0108	59.98	13.95	2.89
UPVD018	561725.1	5270816	495.65	3.11	0.0108	59.98	13.95	2.89
UPVD019	561705.2	5270796	495.13	3.11	0.0108	59.98	13.95	2.89
UPVD020	561676	5270789	495.12	3.11	0.0108	59.98	13.95	2.89
UPVD021	561646.4	5270785	495.26	3.11	0.0108	59.98	13.95	2.89

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UPVD022	561616.5	5270783	495.45	3.11	0.0108	59.98		13.95	2.89	
UPVD023	561586.7	5270783	495.74	3.11	0.0108	59.98		13.95	2.89	
UPVD024	561557	5270787	496.33	3.11	0.0108	59.98		13.95	2.89	
UPVD025	561527.5	5270793	496.85	3.11	0.0108	59.98		13.95	2.89	
UPVD026	561498.2	5270800	497.11	3.11	0.0108	59.98		13.95	2.89	
LECSV002	563186.1	5264463	440.23	16.76	0.003969	3.65		0.85	9.91	Coal Crusher
LECSV009	563079.9	5264381	439.52	11.9	0.0119	0.61		0.14	5.52	Lime Bin Vent

APPENDIX MATERIAL
Facility Name: Mesabi Nugget
Permit Number: 13700318-003

Table 4: Area Sources

Source ID	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	24-HR Emission Rate [g/(s-m2)]	Annual Emission Rate [g/(s-m2)]	X Side Length [m]	Y Side Length [m]	Initial Vertical Dimension [m]	Description
FS01	557343.4	**4921802**	213	1	5.51E-06	4.72E-06	39	74	1.7	Unpaved Parking Lot
FS02A	557688.2	4921511	213.85	1	3.30E-08	2.74E-08	16.5	98.5	1.7	Vehicle Traffic - Paved Roads
FS02C	557639.6	4921596	214.01	1	3.30E-08	2.74E-08	100	52	1.7	Vehicle Traffic - Paved Roads
FS03	557542.5	4921760	214	1	1.10E-06	6.57E-08	52	23	2	Paved Roads - Shipping
FS04A	557488.7	4921818	213.08	1	5.29E-06	3.65E-06	8	42.5	2	Paved Road Deliveries
FS04B	557503.8	4921756	214	1	5.29E-06	3.65E-06	24	81	2	Paved Road Deliveries
FS04C	557441	4921773	213	1	5.29E-06	3.65E-06	27	21.5	2	Paved Road Deliveries
FS04D	557471.3	4921731	213.35	1	5.29E-06	3.65E-06	12	72	2	Paved Road Deliveries
FS02B	557594.7	4921612	213.93	1	3.30E-08	2.74E-08	136.5	16.3	1.7	Paved Front Parking Lot
FS04E	557463.9	4921723	213.35	1	5.29E-06	3.65E-06	11.5	34.5	2	Paved Delivery Road
FS05	557356.2	4921792	214	1	1.40E-08	1.02E-08	38.5	16	1.7	Paved Parking

Table 5: Modeling Results

Phase I Permit Amendment Dispersion Modeling Results

Model Run	Pollutant	Averaging Period	Standard (µg/m³)	Maximum Modeled Concentration (µg/m³) [1]	Background (µg/m³) [2]	Total Modeled Concentration (µg/m³) [3]	Percent of Standard
PSD Increment	PM_{10}	24-hour	30	20	--	20	65
		Annual	17	3.0	--	3.0	18
NAAQS/MAAQS	PM_{10}	24-hour	150	70	26	96	64
		Annual *	50	14	12	26	53
	$PM_{2.5}$	24-hour	35	8.8	17	26	74
		Annual	15	2.7	6.0	8.7	58

[1] PM_{10} 24-hour increment is H2H of five individual years.
PM_{10} 24-hour NAAQS is H6H over five years.
$PM_{2.5}$ 24-hour NAAQS is 5-year average of H8H concentrations.
Annual concentrations are highest of five individual years.

[2] PM_{10} background concentrations reflect Option 2 values taken from an updated Table 6 of MPCA's Modeling Guidance for Title V Air Dispersion Modeling (Version 2.2, dated October 22, 2004).
PM2.5 background values from Virginia, MN 2006-2008 Monitoring Data.

[3] NAAQS/MAAQS concentration includes modeled concentration plus background.

* Annual PM_{10} standard is MAAQS only

APPENDIX MATERIAL

Facility Name:	Mesabi Nugget
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Appendix D: Determination of Allowances

Needed to Address Visibility Impacts

To determine the allowances needed to be retired for a calendar year, follow these steps:

1. Identify the emissions of SO_2, NO_X, PM_{10}, and sulfuric acid mist, in tons, from the Mesabi Nugget facility during the specified calendar year. Add those emissions together to determine the facility's ***Q***, or total emissions affecting visibility. Divide ***Q*** by the distance of the Mesabi Nugget facility from the nearest portion of the Boundary Waters Canoe Area Wilderness, ***d***. If ***Q***/***d*** is less than 10, no further analysis is needed.

2. [***Q***/***d*** greater than or equal to 10.] Identify the nearest facility from which allowances are available. Determine the distance (***d1***) of that facility from the nearest portion of the Boundary Waters. Mesabi Nugget will need to acquire (and retire) at least the number of allowances (of vintage equivalent to the calendar year in which Mesabi Nugget's emissions occurred) determined by subtracting ten from the ***Q/d*** for Mesabi Nugget and multiplying the result by ***d1*** (i.e., ((***Q/d*** -10) * ***d1***)). The result must be rounded up to the next full allowance. If the resulting number of allowances (***A1***) can be acquired from that facility, no further analysis is needed. However, if the facility with allowances has fewer than quantity ***A1*** allowances available, Mesabi Nugget will need to acquire the maximum number of allowances (***B1***) available and then move on to step 3. (Additional allowances will also be needed from at least one more facility.)

3. [(***Q***/***d*** - ***B1/d1***) greater than or equal to 10]. Identify the next nearest facility from which allowances are available. Determine the distance (***d2***) of that facility from the nearest portion of the Boundary Waters. In addition to the allowances (***B1***) acquired in step 2, Mesabi Nugget will need to acquire (and retire) at least the number of allowances (of vintage equivalent to the calendar year in which Mesabi Nugget's emissions occurred) determined by subtracting 10 from the difference between ***Q/d*** and ***B1/d1*** and multiplying the result by ***d2*** (i.e., ((***Q/d*** - ***B1/d1***) – 10)* ***d2***). The result must be rounded up to the next full allowance. If the resulting number of allowances (***A2***) can be acquired from that facility, no further analysis is needed. (In this case, Mesabi Nugget would need to acquire the number of allowances ***B1*** from the first facility and the number of allowances ***A2*** from the second facility.) If the number of allowances ***A2*** cannot be acquired from the second facility with available allowances, Mesabi Nugget will need to acquire the maximum number of allowances (***B2***) available and then move on to step 4. (Additional allowances will also be needed from at least one more facility.)

4. [(***Q***/***d*** – (***B1/d1*** + ***B2/d2***)) greater than or equal to 10]. The quantity of allowances, ***A3***, to be sought from the third facility will equal ((***Q***/***d*** – (10 + ***B1/d1*** + ***B2/d2***)) * ***d3***). This determination can be continued at successive facilities until Mesabi Nugget is able to acquire all remaining needed allowances at a facility.

NOTE: Should a future trading program administered by USEPA include allowances for sulfur dioxide or nitrogen oxides, these would also be acceptable in combination or as a substitute for the Acid Rain program sulfur dioxide allowances

Example:

1. Assume that the Mesabi Nugget facility emits 200 tons of SO_2, 450 tons of NO_X, 300 tons of PM_{10} and 50 tons of sulfuric acid mist in 2007. ***Q*** equals 200 + 450 + 300 + 50 = 1000 tons. Let ***d*** equal 34 km, so ***Q/d*** equals 29.41. This is greater than 10, so step 2 is needed.
2. Assume that a power plant located 51 kilometers (i.e., ***d1*** = 51) away from the BWCAW owns allowances and is willing to let Mesabi Nugget acquire up to 800 allowances. Calculating ***Q/d*** **–** 10 results in 19.41. Multiplying by ***d1*** results in 990 (***A1***). But only 800 allowances (***B1***) are available, so Mesabi Nugget acquires them and moves on to step 3.
3. Assume that another power plant located 80 km away from the BWCAW (i.e., ***d2*** = 80) owns allowances and is willing to let Mesabi Nugget acquire up to 500 allowances. Calculating ***Q/d*** **–** ***B1***/***d1*** **–** 10 results in 3.73. Multiplying by ***d2*** results in 298.04. Mesabi Nugget must acquire at least the number of allowances determined in this way (only whole allowances are available), so it must acquire 299 allowances from this second power plant. This power plant has that number available, so Mesabi Nugget acquires 299 allowances from the second power plant in addition to the 800 acquired from the first power plant. All credits must be of the same vintage that Mesabi Nugget emitted the pollution being address.

That would complete the needed allowance acquisitions for that calendar year. No further steps are needed.

TECHNICAL SUPPORT DOCUMENT
For
AIR EMISSION PERMIT NO. 13700318-003
Major Amendment

This technical support document (TSD) is intended for all parties interested in the permit and to meet the requirements that have been set forth by the federal and state regulations (40 CFR § 70.7(a)(5) and Minn. R. 7007.0850, subp. 1). The purpose of this document is to provide the legal and factual justification for each applicable requirement or policy decision considered in the determination to issue the permit.

1. General Information

1.1 Applicant and Stationary Source Location:

Table 1. Applicant and Source Address

Applicant/Address	Stationary Source/Address (SIC Code: 3312)
Mesabi Nugget Delaware LLC 6500 County Road 666 PO Box 235 Hoyt Lakes, MN 55750 Co-permittee: Steel Dynamics Inc 6714 Pointe Inverness Way, Ste 200 Fort Wayne, IN 46804	Mesabi Nugget Delaware LLC 6500 County Road 666 Hoyt Lakes, MN 55750
Contact: Jasmine Scheuring, Environmental Engineer Phone: 218-225-7331	

1.2 Facility Description

Mesabi Nugget is a 600,000 metric ton per year iron nugget production scale demonstration facility. The facility is near Hoyt Lakes, Minnesota, on a portion of the site formerly occupied by the LTV Steel Mining Company taconite mining and processing facility. Iron nuggets produced by the facility are approximately 96 to 98 percent iron and can be fed directly to electric arc furnaces (also known as mini-mills) as well as to conventional integrated iron and steel manufacturing facilities.

The iron nugget process produces iron directly from finely ground iron ore and coal. This technology has not yet been demonstrated in a facility of this size. Data gathered from a pilot plant located at the Northshore Mining Company taconite processing facility in Silver Bay, Minnesota were used to develop emission estimates used in the permit application and permitting review.

The facility includes a rotary hearth furnace (RHF), a product separator, coal pulverizers, flux pulverizers, green ball dryers, product coolers, and materials handling operations. The RHF is the major source of air pollutants, with significant emissions of carbon monoxide (CO), nitrogen oxides (NO_X), sulfur dioxide (SO_2), particulate matter (PM) and particulate matter less than ten microns in diameter (PM_{10}), volatile organic compounds (VOCs), lead, fluorides, sulfuric acid mist, and hazardous air pollutants (HAPs). The green ball dryer generates combustion gases (CO, NO_X, and VOCs) and particulate emissions. The coal and flux pulverizers also generate combustion gases. The other emission units primarily generate particulate emissions.

The pollution controls on the RHF include an air infiltration system to reduce CO, VOC, and volatile HAP emissions and wet scrubbers to control SO_2, particulate matter, lead, fluoride, sulfuric acid mist, and particulate HAP emissions. Fabric filters (baghouses) are used on most other equipment to control particulate emissions, including particulate HAPs.

The facility will initially operate using raw materials that were successful in producing iron nuggets at the pilot plant to demonstrate that iron nuggets can be successfully made at this larger scale. However, the applicant has also indicated that the raw materials may change to advance economic, environmental, or technological agendas.

1.3 Description of the Activities Allowed by this Permit Action

The minor amendments are DQ number 2872 and are being rolled into a major amendment, which is DQ number 2782.

The first minor amendment permits construction and operation of a second emergency generator to ensure that the facility can maintain power to parts of the facility that could otherwise be unsafe if forced into a cold shutdown.

The second minor amendment permits construction and operation of a recycled fines crusher. The crusher is being added to crush recovered concentrate fragments to prevent scrapping concentrate fines that are otherwise too large to be processed.

The third minor amendment permits construction and operation of a concentrate feeder breaker. It also permits the outdoor storage of taconite concentrate. The feeder breaker will be used to break up concentrate if it is frozen together since the concentrate will be stored outdoors.

The major (PSD) amendment permits a change in operation of concentrate receiving from being delivered to the facility primarily by rail to being delivered to the facility primarily by road or rail. The main pollutants of concern are PM_{10} and $PM_{2.5}$, which are emitted from trucks driving on paved roads.

The second major (PSD) amendment permits a change in the greenball dryer NO_X emission rate limit (on a lb/MMBtu basis). The initial permit action included a lb/hr limit that was calculated incorrectly and a lb/MMBtu limit that has no clear basis. The NO_X emission rate limit (on a lb/hr basis) was removed because it was redundant. Also, the final design of the greenball dryer has changed, and the fuel use limits have changed accordingly.

This permit action is rolling in three independent minor amendments with two major (PSD) amendments. The facility was initially classified as a 250 tpy, major PSD source and was not major for any other reason. The activities allowed by the moderate permit amendment primarily consist of fugitive source PM_{10} emissions. Fugitive source emissions are included in the potential to emit calculations (September 30, 2009 stay of the December 2008 rule that exempted some facilities), which determine whether the PSD significance thresholds have been exceeded. The activities allowed by this permit action exceed the PSD significance thresholds. The second major amendment is major for PSD because BACT-determined NO_X limits on the greenball dryer are being changed.

1.4. Facility Emissions:

Table 2.1. Title I Emissions Increase[1] Summary – Greenball Dryer NO_X Limit Increase (EU 002)

Pollutant	**Emissions Increase from the Modification** (tpy)	**Limited Emissions Increase from the Modifi-cation** (tpy)	**Source-wide Contempo-raneous Increases and Decreases** (tpy)	**Net Emission Increase** (tpy)	**PSD/112(g) Significant Thresholds for major sources** (tpy)	**NSR/ 112(g) Review Required?(** Yes/No)
NO_x	42.7	29.6	NA	29.6	40	No

The NOx limit increase is a Title I change because it is part of an MPCA-initiated reopening, it is changing a BACT limit, and because it is a synthetic minor modification.

[1] Table 2.1 quantifies the NOx emissions due to the Greenball Dryer Duct Burners, assuming no previous emissions. However, the current permit already allows 29.6 tpy of NOx to be emitted, so there is no increase in annual allowable NOx emissions.

Table 2.2. Title I Emissions Increase Summary – Concentrate Truck Delivery (FS 009)

Pollutant	**Emissions Increase from the Modification** (tpy)	**Limited Emissions Increase from the Modifi-cation** (tpy)	**Source-wide Contempo-raneous Increases and Decreases** (tpy)	**Net Emission Increase** (tpy)	**PSD/112(g) Significant Thresholds for major sources** (tpy)	**NSR/ 112(g) Review Required?(** Yes/No)
PM_{10}	≥ 67.7	67.7	NA	67.7	15	Yes
$PM_{2.5}$	≥ 10.2	10.2	NA	10.2	10	Yes
Total HAPs	≥ 0.02	< 0.02	NA	< 0.02	10/25	No

PM_{10} and PM2.5 emissions depend on the silt load value that was assumed to be ~10 g/m^2.
Contemporaneous increases and decreases are not applicable because the plant is under construction and there have been no relevant changes since the issuance of the initial permit.
An NSR review is required for PM_{10} and $PM_{2.5}$. See discussions below on PM_{10} and $PM_{2.5}$ BACT and modeling.

Allowance of concentrate delivery by truck only, if necessary, is a Title I change because the MPCA considers this to be a change in the facility's method of operation and the resulting increases in PM_{10} (~ 68 tpy) and $PM_{2.5}$ (~ 10 tpy) are greater than the PSD significance thresholds for modifications to major PSD sources (15 tpy and 10 tpy, respectively). A new BACT analysis was not completed. The MPCA considers the original BACT analysis for fugitive road dust to be sufficient. PSD modeling has been updated to take into account all modifications included in this amendment.

Table 2.3. Title I Emissions Increase Summary – Emergency Generator (EU 017)

Pollutant	**Emissions Increase from the Modification** (tpy)	**Limited Emissions Increase from the Modifi-cation** (tpy)	**Source-wide Contempo-raneous Increases and Decreases** (tpy)	**Net Emission Increase** (tpy)	**PSD/112(g) Significant Thresholds for major sources** (tpy)	**NSR/ 112(g) Review Required?** (Yes/No)
PM	0.8	0.05	NA	0.05	25	No
PM_{10}	0.8	0.04	NA	0.04	15	No
$PM_{2.5}$	0.7	0.04	NA	0.04	10	No
NO_X	23.9	1.37	NA	1.37	40	No
SO_2	0.6	0.03	NA	0.03	40	No
CO	13.8	0.79	NA	0.79	100	No
Ozone (VOC)	1.6	0.09	NA	0.09	40	No
Total HAPs	< 0.1	< 0.1	NA	< 0.1	10/25	No

This is not a Title I change. The application used the generator manufacturer's hourly emission rates to determine an uncontrolled yearly emission rate based on 8760 hours of operation. None of the PSD significance thresholds are exceeded as a result of this addition. MPCA staff also verified that emissions due to this change do not exceed PSD significance thresholds when using emissions rates required by the NSPS.

Table 2.4. Title I Emissions Increase Summary – Recycled Fines Crusher (EU 018)

Pollutant	**Emissions Increase from the Modification** (tpy)	**Limited Emissions Increase from the Modifi-cation** (tpy)	**Source-wide Contempo-raneous Increases and Decreases** (tpy)	**Net Emission Increase** (tpy)	**PSD/112(g) Significant Thresholds for major sources** (tpy)	**NSR/ 112(g) Review Required?** (Yes/No)
PM	4.1	4.1	NA	4.1	25	No
PM_{10}	4.1	4.1	NA	4.1	15	No
$PM_{2.5}$	4.1	4.1	NA	4.1	10	No
Total HAPs	< 0.01	< 0.01	NA	< 0.01	10/25	No

This is not a Title I change. The application used the baghouse manufacturer's hourly emission rate (0.010 gr/dscf) to determine a controlled yearly emission rate. An uncontrolled emission rate cannot be obtained because the baghouse is an integral part of the process. None of the PSD significance thresholds are exceeded as a result of this addition.

Table 2.5. Title I Emissions Increase Summary – Outdoor Concentrate Storage (FS 010 and FS 011)

Pollutant	**Emissions Increase from the Modification** (tpy)	**Limited Emissions Increase from the Modification** (tpy)	**Source-wide Contemporaneous Increases and Decreases** (tpy)	**Net Emission Increase** (tpy)	**PSD/112(g) Significant Thresholds for major sources** (tpy)	**NSR/ 112(g) Review Required?** (Yes/No)
PM	13.1	13.1	NA	13.1	25	No
PM_{10}	5.6	5.6	NA	5.6	15	No
$PM_{2.5}$	0.8	0.8	NA	0.8	10	No
Total HAPs	< 0.1	< 0.1	NA	< 0.1	10/25	No

This is not a Title I change. The application used the AP-42 emission factor equation for wind erosion. Moisture content of concentrate was assumed to be that of wind-dried concentrate. None of the PSD significance thresholds are exceeded as a result of this addition.

Table 3.1. Non-Title I Emissions Increase Summary – Emergency Generator (EU 017)

Pollutant	**After Change** (lb/hr)	**Before Change** (lb/hr)	**Net Change** (lb/hr)	**Insignificant Modification Thresholds** (lb/hr <)	**Minor and Moderate Amendment Thresholds** (lb/hr < or ≥)	**Type of Amendment** (Minor or Moderate)
PM_{10}	0.17	0.0	0.17	0.855	3.42	
NO_x	5.47	0.0	5.47	2.28	9.13	Minor
SO_2	0.14	0.0	0.14	2.28	9.13	
CO	3.16	0.0	3.16	5.70	22.80	
VOC	0.36	0.0	0.36	2.28	9.13	

Table 3.2. Non-Title I Emissions Increase Summary – Recycled Fines Crusher (EU 018)

Pollutant	**After Change** (lb/hr)	**Before Change** (lb/hr)	**Net Change** (lb/hr)	**Insignificant Modification Thresholds** (lb/hr <)	**Minor and Moderate Amendment Thresholds** (lb/hr < or ≥)	**Type of Amendment** (Minor or Moderate)
PM_{10}	0.93	0.0	0.93	0.855	3.42	Minor

Table 3.3. Non-Title I Emissions Increase Summary – Outdoor Concentrate Storage (FS 010 and FS 011)

Pollutant	**After Change** (lb/hr)	**Before Change** (lb/hr)	**Net Change** (lb/hr)	**Insignificant Modification Thresholds** (lb/hr <)	**Minor and Moderate Amendment Thresholds** (lb/hr < or ≥)	**Type of Amendment** (Minor or Moderate)
PM_{10}	2.35	0.0	2.35	0.855	3.42	Minor

Table 4. Total Facility Potential to Emit Summary

	PM_{10} tpy	**$PM_{2.5}$** tpy	**SO_2** tpy	**NO_x** tpy	**CO** tpy	**VOC** tpy	**Single HAP** tpy	**All HAPs** tpy
Total Facility Limited Potential Emissions	587	509	417	955	450	167	63	210

Table 5. Facility Classification

Classification	**Major/Affected Source**	**Synthetic Minor**	**Minor**
PSD	NO_X, SO2, CO, PM_{10}, $PM_{2.5}$	VOC	
Part 70 Permit Program	NOx, SO2, CO, PM_{10}, $PM_{2.5}$, VOC,		
Part 63 NESHAP	X		

Pollutants in the Major/Affected Source column emit more than 250 tpy. VOC's are less than 250 tpy but exceed 40 tpy.

2. Regulatory and/or Statutory Basis

<u>New Source Review</u>

As of the date of issuance of this permit, Minnesota had no non-attainment areas under NSR. The facility is currently permitted as a major PSD source because its emissions are greater than 250 tpy. The facility is not major for any other reason.

This permit amendment authorizes the following changes and additions:

- Greenball Dryer (EU 002) Duct Burner lb NOx/MMBtu Limit Increase. This change (from 0.09 lb NOx/MMBtu to 0.25 lb NOx/Btu) is being completed as an agency-initiated reopening. The limit is a BACT limit, so this change follows the major amendment process. The NOx limit in the initial permit was erroneously calculated. While the lb NOx/MMBtu limit is increasing, the size of burners is decreasing (from 205 MMBtu/hr to 39 MMBtu/hr), so the amount of fuel used is decreasing from

352 million cubic feet/year to 232 million cubic feet per year. The total annual NOx emissions of 29.6 tpy do not increase from this change.

- Concentrate Truck Delivery (FS 009). This authorizes taconite concentrate to be delivered by truck only, if the facility chooses. The MPCA considers this to be a change in the method of operation. The total increase in PM_{10} and $PM_{2.5}$ emissions (including fugitives) due to this increased truck traffic is significant (exceeds 15 tpy and 10 tpy, respectively), so this is a major amendment under PSD. The MPCA considers the previously completed Fugitive Dust Control Plan to be BACT for the increased truck traffic.
- Emergency Generator (EU 017). A second emergency generator is being added. This is a minor amendment. The increase in emissions does not exceed significance thresholds.
- Recycled Fines Crusher (EU 018). A recycled fines crusher is being added. This is a minor amendment. The increase in emissions does not exceed significance thresholds.
- Outside Handling and Storage of Taconite Concentrate (FS 010 and FS 011). Taconite handling and storage were initially permitted to occur inside but will now be done outside. The increase in emissions does not exceed significance thresholds. Outside handling and storage of concentrate requires a Feederbreaker to break apart frozen chunks of concentrate during cold weather periods of time.
- The minor amendments included are independent of each other and independent of the major amendments.

The EPA deemed an Endangered Species Act (ESA) analysis necessary. The ESA analysis has been completed.

Part 70 Permit Program

The facility is a major source under the Part 70 permit program. With this permit amendment, the facility remains a major source under the Part 70 permit program. The bullet points above explain the changes being authorized in this permit amendment.

New Source Performance Standards (NSPS)

Two New Source Performance Standards are applicable to new operations at this facility. The Emergency Generator (EU 017) triggers 40 CFR pt. 60, subp. IIII and outside concentrate handling and storage (FS 010 and FS 011) triggers 40 CFR pt. 60, subp. LL.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

One NESHAP is applicable a new operation at this facility. The Emergency Generator (EU 017) triggers 40 CFR 63, subp. ZZZZ).

Compliance Assurance Monitoring (CAM)

The facility is a Part 70 major source, this is an amendment to the first-time permit, and there is one unit (EU 018) with a limit and add-on control. However, EU 018 is not a major source (based on controlled emissions), so CAM does not apply to the modifications allowed in this permit amendment.

Environmental Review

The increase in emissions due to each separate change or addition authorized in this permit is much less than the 250 tpy threshold. There is no other mandatory reason for completing environmental review for this project. Thus, environmental review is not necessary for this amendment. An Environmental Impact Statement is currently being completed for the Mesabi Nugget Phase II project.

AERA

None of the usual factors for requesting an updated AERA (e.g. increase in emissions of one single criteria pollutant exceeds 250 tons per year) prompted such a request by the project team. No new risk analysis was done. The AERA results will, however, be updated within the context of the ongoing Phase II Mesabi Nugget EIS.

Minnesota State Rules

Portions of the facility are subject to the following Minnesota Standards of Performance:

- Minn. R. 7011.2700 Standards of Performance for New Metallic Mineral Processing Plants.

Table 6. Regulatory Overview of Units Affected by the Modification/Permit Amendment

Level*	Applicable Regulations	Comments:
GP 007, GP 008, EU 009, and FS 009	40 CFR 52.21(j): BACT and Minn. R. 7007.3000; Minn. R. 7007.0800, subp. 4	Removed the initial and subsequent opacity performance test requirements. The permit already contains a weekly visible emissions check, which is equally or more effective in detecting visible emissions.
GP 010	40 CFR pt. 60, subp. LL Minn. R. 7011.2700 40 CFR pt. 63, subp. B	Standards of Performance for Metallic Mineral Processing Plants. Permit authorizes outdoor concentrate unloading and stockpiling. Previous permit allowed indoor unloading and stockpiling. Requirements for Control Technology Determinations for Major Sources in Accordance with Clean Air Act Sections 112(g) and 112(j). Requires a case-by-case MACT determination when no NESHAP has been promulgated. Authority to require a fugitive emissions control plan onsite.
EU 002	Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000	The NOx limit was changed from 0.09 lbs/MMBtu to 0.25 lbs/MMBtu because the previous limit was incorrectly calculated. The new limit is based on the expected inlet air temperature. The duty of the duct burners (39 MMBtu/hr) has changed from the initially permitted design (205 MMBtu/hr). The annual NOx emissions of 29.6 tpy is not changing, so the fuel use will be reduced from 352 million cubic feet/year to 232 million cubic feet/year. The net effect is that the duct burners can be used 6072 hr/year. The 6.8 lb NOx/hr limit has been removed from the permit because a lb/hr limit is redundant.
EU 017	40 CFR pt. 60, subp. IIII Minn. R. 7011.2300	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. • Limits hydrocarbons, nitrogen oxides, carbon monoxide and particulate matter. • Limits sulfur content of fuel. The limit becomes more stringent on October 1, 2010. • Limit on annual hours of testing. Sets opacity limit for the engine.
EU 018	40 CFR pt. 63, subp. B	Requirements for Control Technology Determinations for Major Sources in Accordance with Clean Air Act Sections

Level*	Applicable Regulations	Comments:
	     Minn. R. 7011.0715 subp. 1.B Minn. R. ch. 7009	112(g) and 112(j). Requires a case-by-case MACT determination when no NESHAP has been promulgated. Specifically, limits were but on Front-half Particulate Matter and PM_{10}. Sets opacity limit. PM_{10} limit is used to show compliance with the ambient air standards through modeling.
CE 017	None	There are monitoring, preventative maintenance, and corrective action requirements based on 40 CFR pt. 63, subp. B. These are described in the periodic monitoring tables.

*Where the requirement appears in the permit (e.g., EU, SV, GP, etc.).

3. Technical Information

3.1 Increase Analysis

Emissions increase calculations are described in section 1.4 Facility Emissions. The spreadsheets containing detailed calculations are available upon request.

3.2 Periodic Monitoring

In accordance with the Clean Air Act, it is the responsibility of the owner or operator of a facility to have sufficient knowledge of the facility to certify that the facility is in compliance with all applicable requirements.

In evaluating the monitoring included in the permit, the MPCA considers the following:

- The likelihood of violating the applicable requirements;
- Whether add-on controls are necessary to meet the emission limits;
- The variability of emissions over time;
- The type of monitoring, process, maintenance, or control equipment data already available for the emission unit;
- The technical and economic feasibility of possible periodic monitoring methods; and
- The kind of monitoring found on similar units elsewhere.

The table below summarizes the periodic monitoring requirements for those emission units for which the monitoring required by the applicable requirement is nonexistent or inadequate.

Table 7. Periodic Monitoring

Level*	Requirement (rule basis)	Additional Monitoring	Discussion
GP 010	Opacity ≤ 10 percent, using a 6-minute average. 40 CFR pt. 60, subp. LL	Weekly visibility checks required. Recordkeeping: Maintain watering records for stockpile operations. Fugitive dust control plan.	
EU 002	NOx ≤ 0.25 lbs/MMBtu. Fuel use ≤ 232 million cubic feet/year. Title I Condition: 40 CFR 52.21(j): BACT and Minn. R. 7007.3000	Continuous monitoring of inlet air temperature. Gas flow metering	A lbs/MMBtu versus inlet air temperature curve is used to find the lbs/MMBtu for a given temperature. Hourly temperature averages are calculated from the continuous data. Then, three hour block averages are calculated from the hourly averages, and the corresponding lbs/MMBtu is determined from the curve. Gas metering data is recorded on a daily basis. This data is used to calculate a monthly total. A 12-month rolling sum is calculated based on the monthly totals.
EU 017	Opacity ≤ 20 percent Minn. R. 7011.2300 Nonroad diesel fuel sulfur content ≤ 500 ppm prior to October 1, 2010. Nonroad diesel fuel sulfur content ≤ 15 ppm on or after October 1, 2010. Operation for maintenance and readiness testing ≤ 100	Visibility check during each readiness test. Obtain and maintain fuel supplier sulfur content certification. Nonresettable hours-of-operation meter. Obtain and maintain	

Level*	Requirement (rule basis)	Additional Monitoring	Discussion
	hrs/yr. Comply with emissions standards in Table 1 to subp. IIII for all pollutants. 40 CFR pt. 60, subp. IIII	engine manufacturer certification.	
EU 018	Opacity ≤ 20 percent? Minn. R. 7011.0715 subp. 1.B Front-half Particulate Matter ≤ 0.010 grains/dry standard cubic foot. 40 CFR pt. 63, subp. B Minn. R. 7011.0715 subp. 1.B PM_{10} ≤ 0.010 grains/dry standard cubic foot. 40 CFR pt. 63, subp. B	Initial performance test and weekly visible emissions check. Weekly visible emissions check and continuous parameter monitoring system to measure pressure drop (each successive 15 minute period).	
CE 017	No additional limits.		All limits are described at the emission unit it controls (EU 018).

*Where the requirement appears in the permit (e.g., EU, SV, GP, etc.).

3.3 Insignificant Activities

Mesabi Nugget has several operations which are classified as insignificant activities. These are listed in Appendix B to the permit. This permit action adds one additional insignificant activity as described below.

Table 8. Insignificant Activities

Insignificant Activity	General Applicable Emission limit	Discussion
Feederbreaker.	PM, variable depending on airflow Opacity ≤ 20% (with exceptions) (Minn. R. 7011.0715 and Minn. R. 7011.610)	Due to the moisture content of the concentrate, the feederbreaker is expected to emit less than 2000 lb/year of all pollutants.

3.4 Dispersion Modeling Analysis

The Ambient Air Impact (for PM_{10} and $PM_{2.5}$) is available in Attachment 1.

3.5 Comments Received

Public Notice Period: 11/5/09 – 12/4/09
EPA 45-day Review Period: 11/5/09 – 1/7/10

Comments were received from the Fond du Lac Band of Lake Superior Chippewa and EPA Region 5. MPCA received email confirmation from all parties that the MPCA response to comments was adequate to address their concerns. None of the comments requested a change in the draft permit. Resolution of the comments did not result in changes to the permit. As a result, the MPCA can proceed with two-stage issuance for this permit. A list of the comments and the MPCA's response is given below.

Comments were not received from the EPA during the additional 15-day review period. As a result, no changes to the permit were made.

3.5.1 Fond du Lac Band of Lake Superior Chippewa Comment

My comment is in reference to 40 CFR 52.21(r)(4) which requires that an updated BACT analysis be performed anytime BACT limits are changed, as this permit seeks to do for the greenball dryer. It does not appear that this update was done. Even though the original BACT analysis was done recently and the outcome may not change, I feel the update is needed in order to be consistent with EPA policy.

MPCA Response:

In response to the comment you made on the Mesabi Nugget Phase I permit, Barr submitted a supporting document. It contains a table that lists all NOx control technologies, technical feasibility, and economic feasibility and concludes that Low NOx Burners are BACT. The document is available upon request.

3.5.2 EPA Region 5 Comments

1) In the TSD, MPCA states that this permit action rolls three independent minor amendments with two major (PSD) amendments. On what basis were these activities deemed minor activities? Upon review of the permit, it seems like these activities would be related and should be aggregated for purposes of NSR applicability.

MPCA Response:
The different activities do not depend on one another. The owner will be updating their permit application to indicate why the activities are independent from each other.

Because the different activities do not depend on one another, the MPCA determined the three activities to be minor because they do not exceed minor amendment thresholds under Minnesota state rules (on a lb/hr basis).

A letter submitted by Barr to the MPCA that indicates why the activities are independent from each other was included as part of the MPCA's response to this comment. The letter is available upon request.

2) Please explain the basis for which the decision was made to modify the NOx BACT limits for the greenball dryer duct burner (EU 002) and the fuel usage condition that these limits were based upon, and not revisit the BACT analysis. Previous agency guidance about revising BACT conditions has also been rendered in documents such as Nov. 19, 1987 memo from OAQPS to R6 [http://www.epa.gov/region07/programs/artd/air/nsr/nsrmemos/ogden.pdf]; "Any time a permit limit founded in BACT is being considered for revision, a corresponding reevaluation (or reopening) of the original BACT determination is necessary." Please provide the reevaluation of the original BACT determination for this condition.

MPCA Response:
The original BACT stated that low-NOx burners are BACT for NOx emissions from the Greenball Dryer (EU002). From the original BACT:
"Natural gas burners are intended to heat the dryer during startup periods or when sufficient preheated air is not available from the Itmk3 process [note: this is the rotary hearth furnace in the permit]. Pollutant emissions from combustion during these periods will be minimized by the use of natural gas in combination with low NOx burners and good combustion practices. We expect that the dryers will operate on preheated air at a minimum of 80 percent availability. Because the first step in a maintenance shutdown (See Part III.A.5 above) is to stop the forward feed, there should be no need for natural gas firing during shutdown."

The final design of the burners is smaller than originally planned. The original design planned to use 205 MMBtu/hr burners, and the final design will utilize 39 MMBtu/hr burners. Also, the originally permitted fuel use was 352 million standard cubic feet per year and will decrease to 232 million standard cubic feet per year. The annual NOx emissions of 29.6 tpy do not increase.

The MPCA accepts the original BACT determination as BACT.

Two documents submitted by Barr to the MPCA were included as part of the MPCA's response to this comment. The first document explains why the NOx limit changes were made. The second document contains a table that lists all NOx control technologies, technical feasibility, and economic feasibility and concludes that Low NOx Burners are BACT. Both documents are available upon request.

3) Please explain Table 2.1. Title 1 Emissions Increase Summary - Greenball Dryer NOx Limit Increase (EU002). The table states the NOx emissions increase from the modification is 42.7 tpy but is limited to 29.6 tpy, with a net emissions increase of 29.6 tpy NOx - an amount below the NSR threshold. I don't see anywhere in the TSD how the PTE is limited and do not understand the statement in the TSD (Section 2. Regulatory and/or Statutory Basis) that "The total annual NOx emissions of 29.6 tpy do not increase from this change". This seems contradictory to the chart, which clearly states that the emissions increase from the modification is 42.7 tpy.

MPCA Response:
A footnote will be added to Table 2.1 in the TSD. It will state, "Table 2.1 quantifies the NOx emissions due to the Greenball Dryer Duct Burners, assuming no previous emissions. However, the current permit

already allows 29.6 tpy of NOx to be emitted, so there is no increase in annual allowable NOx emissions."

4) For the Concentrate Truck Delivery (FS009), please provide or explain how the previously completed Fugitive Dust Control Plan is BACT for this permit modification. The Fugitive Dust Control Plan does not seem to be part of the public notice documents for this permit and I couldn't find it in the original permit docs available on PCA's website.

MPCA Response:
The original BACT stated that a Fugitive Dust Control Plan is BACT for the fugitive particulate matter emissions from road dust. From the original BACT:

"It is impractical to totally enclose the roads leading into the Mesabi Nugget facility. Therefore, the next most effective methods: paving, wet suppression and good housekeeping will be used to control fugitive emissions as described above and in the fugitive dust control plan."

The MPCA has reviewed the old BACT. It is thorough and covers all technologies. No new technologies have been developed since the original BACT was completed. The draft BACT analysis for the Mesabi Nugget Phase II project concludes that the Fugitive Dust Control Plan is BACT for fugitive dust.

The MPCA accepts the proposed Fugitive Dust Control Plan as BACT.

Copies of the BACT determination and Fugitive Dust Control Plan from the 2005 application and the Fugitive Dust Control Plan for the current permit action application were also forwarded in response to this comment.

5) The TSD states "At this time, a new Endangered Species Act (ESA) analysis has not been done. The EPA has not yet determined if an analysis will be necessary." Please indicate in the final TSD that EPA deemed an ESA analysis necessary and (once it is complete) that it was complete prior to permit issuance.

MPCA Response:
The TSD currently states, "At this time, a new Endangered Species Act (ESA) analysis has not been done. The EPA has not yet determined if an analysis will be necessary." This language will be updated to say, "The EPA deemed an Endangered Species Act (ESA) analysis necessary. The ESA analysis has been completed."

4. Conclusion

Based on the information provided by Mesabi Nugget, the MPCA has reasonable assurance that the proposed operation of the emission facility, as described in the Air Emission Permit No. 13700318-003 and this TSD, will not cause or contribute to a violation of applicable federal regulations and Minnesota Rules.

Staff Members on Permit Team: Joseph Miller (permit writer/engineer)
Steven Palzkill (enforcement)
Andy Place (stack testing)
David Beil (peer reviewer)

AQ File No. 4238; DQ 2782, 2872

The following information is available upon request:

1. Emissions Increase Calculation Spreadsheets
2. Facility Description and CD-01 Forms
3. Standardized Mobile Source (SMS) Spreadsheet

ATTACHMENT 1

Ambient Air Impact (PM_{10} and $PM_{2.5}$)

DEPARTMENT:	POLLUTION CONTROL AGENCY	SF-00006-05 (4/86) STATE OF MINNESOTA Office Memorandum
DATE:	10/22/2009	
TO:	Joe Miller Air Quality Permits Industrial	
FROM:	Ruth Roberson Research Scientist Risk Assessment/Air Modeling Unit EAO	
PHONE:	651.757.2672	
SUBJECT:	Mesabi Nugget Phase I Permit Amendment -Air Dispersion Modeling for PM_{10} and $PM_{2.5}$	

Air Dispersion Modeling Review

Class II air dispersion modeling was conducted by Barr Engineering on behalf of the Mesabi Nugget Delaware facility located in Hoyt Lakes, MN. The Class II modeling includes analysis for the criteria pollutants PM_{10} and $PM_{2.5}$ for attainment of National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) increments established by the U.S. EPA and the Minnesota Ambient Air Quality Standards (MAAQS) established by the Minnesota Pollution Control Agency.

Modeling Summary

The ambient air quality impact analysis was conducted using the AMS/EPA Regulatory Model (AERMOD version 07026). Meteorology, building downwash, and terrain, were considered in the modeling analysis (Table 1). The inputs used in the dispersion model included specific building dimensions and point, area, and volume source parameters (Tables 2-4). The modeling analysis also incorporated as-built modifications to stack parameters and source locations made during the final design process and accounts for additional truck traffic within the facility due to the changes in the concentrate delivery system. The current modeling analysis is an update and revision of the Phase I Project Permit Application modeling report, and follows the procedures used in the Phase I Project Permit Application modeling analysis. The modeling updates and revisions incorporated in the current analysis include: (1) switching from the ISC-PRIME model to EPA's preferred model AERMOD; (2) changing the meteorological data set from Hibbing, MN 1972 – 1976 to Hibbing, MN 2001 – 2005; and (3) evaluating PM2.5 NAAQS impacts. The Class II modeling analysis evaluated the NAAQS and PSD increment impacts for PM_{10} and $PM_{2.5}$ (No $PM_{2.5}$ increment has been promulgated).

Summary of Impacts

PM10 NAAQS

The 24-hour and annual PM10 NAAQS was run as a single 5 year run for 2001-2005 using hourly emission rates. The 24-hour PM_{10} concentration, including nearby sources and the MPCA Option 2 background concentration of 26 μg/m^3 resulted in a maximum modeled concentration of 96 μg/m^3 which is 64 percent of the standard. The maximum modeled annual PM_{10} concentration, including nearby sources and a background concentration of 12 μg/m^3 was 26 μg/m^3, which is below the MAAQS of 50 μg/m^{3}and 53 percent of the standard.

PM_{10} Increment
The maximum modeled 24-hour PM_{10} concentration was 20 μg/m^3 this is 65 percent of the 24-hour increment of 30 μg/m^3.
The maximum annual PM_{10} increment concentration was 3.0 μg/m^3 this is 18 percent of the annual increment of 17 μg/m^3.

$PM_{2.5}$ NAAQS
The 24-hour and annual $PM_{2.5}$ NAAQS were run as a single 5 year run for 2001-2005 using hourly emission rates. The $PM_{2.5}$ 24-hour NAAQS result is the average high 8th high (H8H) concentration out of 5 years of meteorology data. The maximum H8H $PM_{2.5}$ concentration, including a background concentration of 17 μg/m3 and nearby sources, was 26 μg/m3 which is 74 percent of the NAAQS standard of 35μg/m^3. The maximum annual $PM_{2.5}$ concentration, including nearby sources and a background concentration of 6 μg/m3 was 8.4 μg/m3 which is 56 percent of the NAAQS standard of 15 μg/m3.

cc: Shelley Burman
AQ File 2177

Table 1: Model Options

Mesabi Nugget, LLC
Phase I Permit Amendment Modeling Report
Summary of Selected Model Options

Option	Selection		
Model	AERMOD version 07026		
Building Downwash	BPIPPRM version 04274		
Meteorological Data	5 year period 2001-2005		
Surface Station	Hibbing, MN (NWS Station 94931)		
Upper Air Station	International Falls, MN (NWS Station 14918)		
Terrain	Elevated – Receptor grid processed using AERMAP version 09040		
Receptor Grid	50-m spacing along boundary.		
	200-m spacing out to1 kilometer.		
	2 km spaced 10 degree polar grid out 8 km from ambient air boundary		
POLLUTANT	**AVG PERIOD**	**Standard Evaluated**	
		NAAQS	**INCREMENT**
PM10	24 HOUR / ANNUAL	YES	YES
PM2.5	24 HOUR / ANNUAL	YES	NA
Option	**Selection**		
COntrol Pathway	DFAULT selected		

Table 2: Point Sources

Source ID	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Emission Rate [g/s]	Gas Exit Temperature [K]	Gas Exit Velocity [m/s]	Inside Diameter [m]	Description
SV001	560874.8	5270799	512.65	60	10.3	354.9	21.45	4.23	RHF and Green Ball Dryer
SV002	560996	5270768	509.29	40	2.04	343.97	5.31	1.98	Pulverizer
SV003	561325.5	5270586	481.52	30	0.358	298	56.77	1.26	Coal/Flux Unloading
SV004	561336.5	5270622	490.8	30	0.358	298	18.92	1.26	Railcar Loadout
SV007	560764.7	5270591	499.37	40	0.54	322.8	26.7	1.55	Material Transfer Operations
SV09A	560871.4	5270546	496.22	18.7	0.023	324.3	55.28	2.7	Cooling Tower 9 Cell A
SV09B	560880.6	5270547	496.24	18.7	0.023	324.3	55.28	2.7	Cooling Tower 9 Cell B
SV10A	560897.9	5270550	496.23	18.7	0.023	311.9	44.97	2.7	Cooling Tower 10 Cell A
SV10B	560906.8	5270552	496.21	18.7	0.023	311.9	44.97	2.7	Cooling Tower 10 Cell B

Table 3: Volume Sources

Source ID	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Emission Rate [g/s]	Side Length [m]	Building Height [m]	Initial Lateral Dimension [m]	Initial Vertical Dimension [m]	Description
FS034	561164.3	5270676	496.25	5	0.041	15.05		3.5	4.65	Coal Material Handling
FS038	561164.3	5270676	496.25	5	1	15.05		3.5	4.65	Coal Wind Erosion
FS035	561261.7	5270725	496.53	5	0.093	15.05		3.5	4.65	Flux Material Handling
FS039	561261.7	5270725	496.53	5	1	15.05		3.5	4.65	Flux Wind Erosion
FS037	560773.4	5270534	495.64	5	0.09	15.05		3.5	4.65	Slag Material Handling
FS041	560773.4	5270534	495.64	5	1	15.05		3.5	4.65	Slag Wind Erosion
FS010	561498.2	5270800	497.11	5	0.227	15.05		3.5	4.65	Concentrate Material Handling
FS011	561498.2	5270800	497.11	5	1	15.05		3.5	4.65	Concentrate Wind Erosion
SV005	560759	5270711	512.41	30.48	0.223	24.08		5.6	14.18	RHF Roof Monitor
SV012	560957.4	5270763	511.7	24.08	0.117	24.08		5.6	11.2	Pulverizer Roof Monitor
MAIN059	562079.8	5271158	513.39	3.11	0.00925	59.98		13.95	2.89	
MAIN060	562067.2	5271185	514.68	3.11	0.00925	59.98		13.95	2.89	
MAIN061	562054.6	5271212	516.45	3.11	0.00925	59.98		13.95	2.89	
MAIN062	562042	5271239	518.3	3.11	0.00925	59.98		13.95	2.89	
MAIN063	562029.	527126	520.24	3.11	0.00925	59.98		13.95	2.89	

	4	7								
MAIN064	562017.7	5271294	521.67	3.11	0.00925	59.98		13.95	2.89	
MAIN065	562006.5	5271322	524.01	3.11	0.00925	59.98		13.95	2.89	
MAIN066	561995.3	5271350	525.95	3.11	0.00925	59.98		13.95	2.89	
MAIN067	561984.5	5271378	528.3	3.11	0.00925	59.98		13.95	2.89	
MAIN068	561970.5	5271404	529.28	3.11	0.00925	59.98		13.95	2.89	
MAIN069	561952.8	5271428	530.24	3.11	0.00925	59.98		13.95	2.89	
MAIN070	561934.2	5271452	530.84	3.11	0.00925	59.98		13.95	2.89	
MAIN071	561910.3	5271470	533.14	3.11	0.00925	59.98		13.95	2.89	
MAIN072	561883.4	5271483	534.39	3.11	0.00925	59.98		13.95	2.89	
MAIN073	561854.9	5271492	534.68	3.11	0.00925	59.98		13.95	2.89	
MAIN074	561825	5271491	534.26	3.11	0.00925	59.98		13.95	2.89	
MAIN075	561795.8	5271485	536.47	3.11	0.00925	59.98		13.95	2.89	
MAIN076	561767.5	5271475	537.1	3.11	0.00925	59.98		13.95	2.89	
MAIN077	561739.4	5271465	537	3.11	0.00925	59.98		13.95	2.89	
MAIN078	561711.6	5271454	536.92	3.11	0.00925	59.98		13.95	2.89	
MAIN079	561683.8	5271442	534.87	3.11	0.00925	59.98		13.95	2.89	
MAIN080	561656	5271431	532.62	3.11	0.00925	59.98		13.95	2.89	

MAIN081	561628.2	5271420	533.78	3.11	0.00925	59.98		13.95	2.89	
MAIN082	561600.4	5271408	534.09	3.11	0.00925	59.98		13.95	2.89	
MAIN083	561572.6	5271397	530.67	3.11	0.00925	59.98		13.95	2.89	
MAIN084	561545.2	5271385	531.5	3.11	0.00925	59.98		13.95	2.89	
MAIN085	561517.8	5271373	529.97	3.11	0.00925	59.98		13.95	2.89	
MAIN086	561490.3	5271361	529.37	3.11	0.00925	59.98		13.95	2.89	
MAIN087	561462.9	5271348	529.73	3.11	0.00925	59.98		13.95	2.89	
MAIN088	561435.5	5271336	526.67	3.11	0.00925	59.98		13.95	2.89	
MAIN089	561408	5271324	528.01	3.11	0.00925	59.98		13.95	2.89	
MAIN090	561380.6	5271312	528.38	3.11	0.00925	59.98		13.95	2.89	
MAIN091	561353.2	5271300	525.47	3.11	0.00925	59.98		13.95	2.89	
MAIN092	561325.9	5271287	527.24	3.11	0.00925	59.98		13.95	2.89	
MAIN093	561298.6	5271275	523.98	3.11	0.00925	59.98		13.95	2.89	
MAIN094	561271.3	5271262	522.96	3.11	0.00925	59.98		13.95	2.89	
MAIN095	561243.8	5271250	524.65	3.11	0.00925	59.98		13.95	2.89	
MAIN096	561215.1	5271242	522.01	3.11	0.00925	59.98		13.95	2.89	
MAIN097	561185.5	5271237	521.27	3.11	0.00925	59.98		13.95	2.89	
MAIN098	561155.	527123	521.68	3.11	0.00925	59.98		13.95	2.89	

	9	2								
MAIN099	561126	5271229	521.25	3.11	0.00925	59.98		13.95	2.89	
MAIN100	561096.2	5271226	522.84	3.11	0.00925	59.98		13.95	2.89	
MAIN101	561066.3	5271223	523.04	3.11	0.00925	59.98		13.95	2.89	
MAIN102	561036.5	5271220	524.42	3.11	0.00925	59.98		13.95	2.89	
MAIN103	561006.8	5271216	525.44	3.11	0.00925	59.98		13.95	2.89	
MAIN104	560978.3	5271207	525.57	3.11	0.00925	59.98		13.95	2.89	
MAIN105	560949.8	5271198	524.66	3.11	0.00925	59.98		13.95	2.89	
MAIN106	560923.1	5271184	522.41	3.11	0.00925	59.98		13.95	2.89	
MAIN107	560898.3	5271168	521.4	3.11	0.00925	59.98		13.95	2.89	
MAIN108	560874.3	5271149	521.57	3.11	0.00925	59.98		13.95	2.89	
MAIN109	560850.4	5271131	521.33	3.11	0.00925	59.98		13.95	2.89	
MAIN110	560826.5	5271113	521.13	3.11	0.00925	59.98		13.95	2.89	
MAIN111	560802.6	5271095	521.55	3.11	0.00925	59.98		13.95	2.89	
MAIN112	560779.1	5271076	520.21	3.11	0.00925	59.98		13.95	2.89	
MAIN113	560755.8	5271058	519.38	3.11	0.00925	59.98		13.95	2.89	
MAIN114	560732.6	5271039	517.9	3.11	0.00925	59.98		13.95	2.89	
MAIN115	560709.3	5271020	516.77	3.11	0.00925	59.98		13.95	2.89	

MAIN116	560686	5271001	516.44	3.11	0.00925	59.98		13.95	2.89
MAIN117	560662.7	5270982	516.13	3.11	0.00925	59.98		13.95	2.89
MAIN118	560639.4	5270963	515.94	3.11	0.00925	59.98		13.95	2.89
MAIN119	560616.2	5270944	515.54	3.11	0.00925	59.98		13.95	2.89
WEST009	560597.8	5270929	515.11	3.11	0.0136	59.98		13.95	2.89
WEST010	560574	5270911	514.68	3.11	0.0136	59.98		13.95	2.89
WEST011	560550.2	5270892	513.86	3.11	0.0136	59.98		13.95	2.89
WEST012	560526.4	5270874	512.25	3.11	0.0136	59.98		13.95	2.89
WEST013	560503.2	5270855	509.84	3.11	0.0136	59.98		13.95	2.89
WEST014	560479.4	5270837	508.89	3.11	0.0136	59.98		13.95	2.89
WEST015	560454.7	5270820	509.01	3.11	0.0136	59.98		13.95	2.89
WEST016	560428.9	5270804	509.06	3.11	0.0136	59.98		13.95	2.89
WEST017	560403.1	5270789	508.16	3.11	0.0136	59.98		13.95	2.89
WEST018	560376.8	5270775	507.8	3.11	0.0136	59.98		13.95	2.89
WEST019	560349.8	5270762	507.36	3.11	0.0136	59.98		13.95	2.89
WEST020	560322.3	5270750	506.73	3.11	0.0136	59.98		13.95	2.89
WEST021	560294.7	5270738	505.97	3.11	0.0136	59.98		13.95	2.89
WEST022	560267.	527072	503.82	3.11	0.0136	59.98		13.95	2.89

	2	6								
WEST023	560239.6	5270714	502.41	3.11	0.0136	59.98		13.95	2.89	
WEST024	560212	5270702	501.2	3.11	0.0136	59.98		13.95	2.89	
WEST025	560184.3	5270691	500.75	3.11	0.0136	59.98		13.95	2.89	
WEST026	560156.5	5270680	500.1	3.11	0.0136	59.98		13.95	2.89	
WEST027	560128.7	5270668	499.51	3.11	0.0136	59.98		13.95	2.89	
WEST028	560100.3	5270659	498.35	3.11	0.0136	59.98		13.95	2.89	
WEST029	560071.7	5270650	498.2	3.11	0.0136	59.98		13.95	2.89	
WEST030	560043.1	5270641	498.66	3.11	0.0136	59.98		13.95	2.89	
WEST031	560014.6	5270631	499.82	3.11	0.0136	59.98		13.95	2.89	
WEST032	559986	5270622	502.13	3.11	0.0136	59.98		13.95	2.89	
WEST033	559957.4	5270613	501.82	3.11	0.0136	59.98		13.95	2.89	
WEST034	559928.7	5270604	498.64	3.11	0.0136	59.98		13.95	2.89	
WEST035	559900	5270596	496.43	3.11	0.0136	59.98		13.95	2.89	
WEST036	559871.2	5270587	495.36	3.11	0.0136	59.98		13.95	2.89	
WEST037	559842.4	5270579	494.64	3.11	0.0136	59.98		13.95	2.89	
WEST038	559813.7	5270570	493.57	3.11	0.0136	59.98		13.95	2.89	
WEST039	559784.9	5270562	492.26	3.11	0.0136	59.98		13.95	2.89	

WEST040	559756.2	5270553	491.55	3.11	0.0136	59.98		13.95	2.89	
WEST041	559727.4	5270545	491.41	3.11	0.0136	59.98		13.95	2.89	
WEST042	559698.7	5270536	491.1	3.11	0.0136	59.98		13.95	2.89	
WEST043	559670	5270527	490.96	3.11	0.0136	59.98		13.95	2.89	
WEST044	559641.2	5270519	490.93	3.11	0.0136	59.98		13.95	2.89	
WEST045	559612.5	5270510	490.91	3.11	0.0136	59.98		13.95	2.89	
WEST046	559583.8	5270501	490.91	3.11	0.0136	59.98		13.95	2.89	
WEST047	559555.1	5270493	490.92	3.11	0.0136	59.98		13.95	2.89	
WEST048	559526.4	5270484	490.93	3.11	0.0136	59.98		13.95	2.89	
WEST049	559497.6	5270475	491.35	3.11	0.0136	59.98		13.95	2.89	
WEST050	559468.9	5270467	492.26	3.11	0.0136	59.98		13.95	2.89	
WEST051	559440.1	5270458	492.87	3.11	0.0136	59.98		13.95	2.89	
WEST052	559411.3	5270450	493.12	3.11	0.0136	59.98		13.95	2.89	
WEST053	559382.5	5270441	493.33	3.11	0.0136	59.98		13.95	2.89	
WEST054	559353.7	5270433	493.4	3.11	0.0136	59.98		13.95	2.89	
WEST055	559324.9	5270425	493.39	3.11	0.0136	59.98		13.95	2.89	
WEST056	559296	5270417	493.39	3.11	0.0136	59.98		13.95	2.89	
WEST057	559267	527040	493.25	3.11	0.0136	59.98		13.95	2.89	

		9								
WEST058	559238	5270401	492.96	3.11	0.0136	59.98		13.95	2.89	
WEST059	559208.8	5270394	493.05	3.11	0.0136	59.98		13.95	2.89	
WEST060	559179.5	5270388	493.11	3.11	0.0136	59.98		13.95	2.89	
WEST061	559150.2	5270382	493.32	3.11	0.0136	59.98		13.95	2.89	
WEST062	559120.7	5270376	493.75	3.11	0.0136	59.98		13.95	2.89	
WEST063	559091.1	5270371	493.91	3.11	0.0136	59.98		13.95	2.89	
WEST064	559061.6	5270366	493.91	3.11	0.0136	59.98		13.95	2.89	
WEST065	559031.9	5270361	493.89	3.11	0.0136	59.98		13.95	2.89	
WEST066	559002.3	5270357	493.86	3.11	0.0136	59.98		13.95	2.89	
WEST067	558972.7	5270352	493.74	3.11	0.0136	59.98		13.95	2.89	
WEST068	558943	5270347	493.7	3.11	0.0136	59.98		13.95	2.89	
WEST069	558913.4	5270343	493.58	3.11	0.0136	59.98		13.95	2.89	
WEST070	558883.7	5270338	493.25	3.11	0.0136	59.98		13.95	2.89	
WEST071	558854.1	5270334	493.12	3.11	0.0136	59.98		13.95	2.89	
WEST072	558824.4	5270329	492.59	3.11	0.0136	59.98		13.95	2.89	
WEST073	558794.7	5270325	491.63	3.11	0.0136	59.98		13.95	2.89	
WEST074	558765	5270320	490.8	3.11	0.0136	59.98		13.95	2.89	

WEST075	558735.3	5270317	489.69	3.11	0.0136	59.98		13.95	2.89	
WEST076	558705.3	5270317	488.76	3.11	0.0136	59.98		13.95	2.89	
WEST077	558676.5	5270325	488.02	3.11	0.0136	59.98		13.95	2.89	
WEST078	558648.7	5270336	486.67	3.11	0.0136	59.98		13.95	2.89	
WEST079	558622.6	5270351	485.23	3.11	0.0136	59.98		13.95	2.89	
WEST080	558599.8	5270370	484.85	3.11	0.0136	59.98		13.95	2.89	
WEST081	558582	5270394	484.84	3.11	0.0136	59.98		13.95	2.89	
WEST082	558567.2	5270420	484.87	3.11	0.0136	59.98		13.95	2.89	
WEST083	558554.4	5270447	485.54	3.11	0.0136	59.98		13.95	2.89	
WEST084	558541.5	5270474	487.05	3.11	0.0136	59.98		13.95	2.89	
WEST085	558528.5	5270501	488.05	3.11	0.0136	59.98		13.95	2.89	
WEST086	558515.4	5270528	489.02	3.11	0.0136	59.98		13.95	2.89	
WEST087	558502.2	5270555	489.77	3.11	0.0136	59.98		13.95	2.89	
WEST088	558489.1	5270582	490.14	3.11	0.0136	59.98		13.95	2.89	
WEST089	558476	5270609	490.59	3.11	0.0136	59.98		13.95	2.89	
WEST090	558463.2	5270636	491.47	3.11	0.0136	59.98		13.95	2.89	
WEST091	558450.6	5270664	491.76	3.11	0.0136	59.98		13.95	2.89	
WEST092	558438.	527069	491.91	3.11	0.0136	59.98		13.95	2.89	

	1	1								
WEST093	558425.9	5270718	492.42	3.11	0.0136	59.98		13.95	2.89	
WEST094	558413.8	5270746	493.44	3.11	0.0136	59.98		13.95	2.89	
WEST095	558401.9	5270773	494.24	3.11	0.0136	59.98		13.95	2.89	
WEST096	558391	5270801	494.52	3.11	0.0136	59.98		13.95	2.89	
WEST097	558382.2	5270830	494.72	3.11	0.0136	59.98		13.95	2.89	
WEST098	558374	5270859	495.12	3.11	0.0136	59.98		13.95	2.89	
WEST099	558366.2	5270888	496.34	3.11	0.0136	59.98		13.95	2.89	
WEST100	558355.3	5270915	497.09	3.11	0.0136	59.98		13.95	2.89	
WEST101	558332.2	5270934	497.56	3.11	0.0136	59.98		13.95	2.89	
UPVD001	562081	5271136	512.08	3.11	0.00311	59.98		13.95	2.89	
UPVD002	562054.1	5271123	512.1	3.11	0.00439	59.98		13.95	2.89	
UPVD003	562027.2	5271110	512.42	3.11	0.00621	59.98		13.95	2.89	
UPVD004	562003	5271092	513.03	3.11	0.00761	59.98		13.95	2.89	
UPVD005	561978.7	5271074	513.41	3.11	0.0108	59.98		13.95	2.89	
UPVD006	561954.4	5271057	513.41	3.11	0.0108	59.98		13.95	2.89	
UPVD007	561930.5	5271039	511.76	3.11	0.0108	59.98		13.95	2.89	
UPVD008	561906.4	5271021	509.65	3.11	0.0108	59.98		13.95	2.89	

UPVD009	561880.3	5271006	510.78	3.11	0.0108	59.98		13.95	2.89	
UPVD010	561853.2	5270993	510.21	3.11	0.0108	59.98		13.95	2.89	
UPVD011	561825.1	5270983	509.07	3.11	0.0108	59.98		13.95	2.89	
UPVD012	561797.9	5270971	506.29	3.11	0.0108	59.98		13.95	2.89	
UPVD013	561772.3	5270956	501.75	3.11	0.0108	59.98		13.95	2.89	
UPVD014	561760.1	5270928	499.2	3.11	0.0108	59.98		13.95	2.89	
UPVD015	561750.6	5270900	498.29	3.11	0.0108	59.98		13.95	2.89	
UPVD016	561747	5270870	497.35	3.11	0.0108	59.98		13.95	2.89	
UPVD017	561739.9	5270842	496.43	3.11	0.0108	59.98		13.95	2.89	
UPVD018	561725.1	5270816	495.65	3.11	0.0108	59.98		13.95	2.89	
UPVD019	561705.2	5270796	495.13	3.11	0.0108	59.98		13.95	2.89	
UPVD020	561676	5270789	495.12	3.11	0.0108	59.98		13.95	2.89	
UPVD021	561646.4	5270785	495.26	3.11	0.0108	59.98		13.95	2.89	
UPVD022	561616.5	5270783	495.45	3.11	0.0108	59.98		13.95	2.89	
UPVD023	561586.7	5270783	495.74	3.11	0.0108	59.98		13.95	2.89	
UPVD024	561557	5270787	496.33	3.11	0.0108	59.98		13.95	2.89	
UPVD025	561527.5	5270793	496.85	3.11	0.0108	59.98		13.95	2.89	
UPVD026	561498.	527080	497.11	3.11	0.0108	59.98		13.95	2.89	

	2	0								
LECSV002	563186.1	5264463	440.23	16.76	0.003969	3.65		0.85	9.91	Coal Crusher
LECSV009	563079.9	5264381	439.52	11.9	0.0119	0.61		0.14	5.52	Lime Bin Vent

Table 4: Area Sources

Source ID	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	24-HR Emission Rate [g/(s-m2)]	Annual Emission Rate [g/(s-m2)]	X Side Length [m]	Y Side Length [m]	Initial Vertical Dimension [m]	Description
FS01	557343.4	**4921802**	213	1	5.51E-06	4.72E-06	39	74	1.7	Unpaved Parking Lot
FS02A	557688.2	4921511	213.85	1	3.30E-08	2.74E-08	16.5	98.5	1.7	Vehicle Traffic - Paved Roads
FS02C	557639.6	4921596	214.01	1	3.30E-08	2.74E-08	100	52	1.7	Vehicle Traffic - Paved Roads
FS03	557542.5	4921760	214	1	1.10E-06	6.57E-08	52	23	2	Paved Roads - Shipping
FS04A	557488.7	4921818	213.08	1	5.29E-06	3.65E-06	8	42.5	2	Paved Road Deliveries
FS04B	557503.8	4921756	214	1	5.29E-06	3.65E-06	24	81	2	Paved Road Deliveries
FS04C	557441	4921773	213	1	5.29E-06	3.65E-06	27	21.5	2	Paved Road Deliveries
FS04D	557471.3	4921731	213.35	1	5.29E-06	3.65E-06	12	72	2	Paved Road Deliveries
FS02B	557594.7	4921612	213.93	1	3.30E-08	2.74E-08	136.5	16.3	1.7	Paved Front Parking Lot
FS04E	557463.9	4921723	213.35	1	5.29E-06	3.65E-06	11.5	34.5	2	Paved Delivery Road
FS05	557356.2	4921792	214	1	1.40E-08	1.02E-08	38.5	16	1.7	Paved Parking

Table 5: Modeling Results

Phase I Permit Amendment Dispersion Modeling Results

Model Run	Pollutant	Averaging Period	Standard ($\mu g/m^3$)	Maximum Modeled Concentration ($\mu g/m^3$) [1]	Background ($\mu g/m^3$) [2]	Total Modeled Concentration ($\mu g/m^3$) [3]	Percent of Standard
PSD Increment	PM_{10}	24-hour	30	20	--	20	65
		Annual	17	3.0	--	3.0	18
NAAQS/MAAQS	PM_{10}	24-hour	150	70	26	96	64
		Annual *	50	14	12	26	53
	$PM_{2.5}$	24-hour	35	8.8	17	26	74
		Annual	15	2.7	6.0	8.7	58

[1] PM_{10} 24-hour increment is H2H of five individual years.
PM_{10} 24-hour NAAQS is H6H over five years.
$PM_{2.5}$ 24-hour NAAQS is 5-year average of H8H concentrations.
Annual concentrations are highest of five individual years.

[2] PM_{10} background concentrations reflect Option 2 values taken from an updated Table 6 of MPCA's Modeling Guidance for Title V Air Dispersion Modeling (Version 2.2, dated October 22, 2004).
PM2.5 background values from Virginia, MN 2006-2008 Monitoring Data.

[3] NAAQS/MAAQS concentration includes modeled concentration plus background.

* Annual PM_{10} standard is MAAQS only

ATTACHMENT 5
CONSENT DECREE FOR
CASE NO. 0:17-cv-1606 (JUNE 26, 2017)

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MINNESOTA

UNITED STATES OF AMERICA and STATE OF MINNESOTA,	)	
Plaintiffs,	)	
v.	)	Case No. 0:17-cv-1606
MESABI NUGGET DELAWARE, LLC,	)	
Defendant.	)	

CONSENT DECREE

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WHEREAS, Plaintiffs United States of America, on behalf of the United States Environmental Protection Agency ("EPA"), and State of Minnesota (the "State"), on behalf of the Minnesota Pollution Control Agency ("MPCA"), have filed a Complaint in this action concurrently with this Consent Decree, alleging that Defendant Mesabi Nugget Delaware, LLC ("Mesabi Nugget" or "Defendant"), violated Sections 502 through 507 of the Clean Air Act ("CAA" or "Act"), 42 U.S.C. §§ 7661a through 7661f (Title V), and the federally-enforceable State Implementation Plan ("SIP") for Minnesota approved by EPA pursuant to Section 110 of the CAA, 42 U.S.C. § 7410, which incorporate and/or implement the Minnesota SIP and the Title V permit program;

WHEREAS, the Plaintiffs allege that at all times relevant to the Complaint, Mesabi Nugget owned and operated the Mesabi Nugget Delaware, LLC plant located at 6500 Highway 135 North, Aurora, Minnesota (the "Facility");

WHEREAS, the Plaintiffs allege that Defendant operated the Facility in excess of emission limits specified in its Title V permit, Permit Number 13700318-003 ("Title V Permit" or "Permit") issued by MPCA on January 8, 2010, and emitted particulate matter ("PM"), mercury, volatile organic compounds ("VOCs"), nitrogen oxide ("NO_x"), and carbon monoxide ("CO") from one or more emission units above applicable permit limits, in violation of the CAA;

WHEREAS, Defendant disputes the Plaintiffs' allegations and does not admit any liability to the United States or the State arising out of the transactions or occurrences alleged in the Complaint;

WHEREAS, Mesabi Nugget has idled operations at the Facility and currently anticipates the Facility remaining idled for at least two years, subject to market conditions that will affect the continuation of the idle;

WHEREAS, Plaintiffs have reviewed the Financial Information submitted by Mesabi Nugget to determine to what extent Mesabi Nugget is financially able to pay a civil penalty relating to the claims alleged in the Complaint. Based upon this Financial Information, Plaintiffs have determined that Mesabi Nugget has limited financial ability to pay a civil penalty;

WHEREAS, the Parties recognize, and this Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith, will avoid litigation among the Parties, and that this Consent Decree is fair, reasonable, and in the public interest;

NOW, THEREFORE, before the taking of any testimony, without the adjudication or admission of any issue of fact or law except as provided in Section I, and with the consent of the Parties, IT IS HEREBY ADJUDGED, ORDERED, AND DECREED as follows:

I. JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331, 1345, 1355, 1362, and 1367, and Section 113(b) of the CAA, 42 U.S.C. § 7413(b), and over the Parties. Venue lies in this District pursuant to Section 113(b) of the CAA, 42 U.S.C. § 7413(b), and 28 U.S.C. §§ 1391(b) and (c) and 1395(a), because the violations alleged in the Complaint are alleged to have occurred in, and Defendant conducts business in, this judicial district. For purposes of this Decree, or any action to enforce this Decree, Defendant consents to this Court's jurisdiction over this Consent Decree and any such action and consents to venue in this judicial district.

2. For purposes of this Consent Decree, Defendant agrees that the Complaint states claims upon which relief may be granted pursuant to Sections 165 and 502 of the CAA, 42 U.S.C. §§ 7475 and 7611a.

3. Notice of the commencement of this action has been given to the State of Minnesota, as required by Section 113 of the CAA, 42 U.S.C. § 7413.

II. APPLICABILITY

4. The obligations of this Consent Decree apply to and are binding upon the United States and the State, and upon Defendant and any successors, assigns, and other entities or persons otherwise bound by law.

5. No transfer of ownership or operation of the Facility, whether in compliance with the procedures of this Paragraph or otherwise, shall relieve Defendant of its obligations to ensure that the terms of this Consent Decree are implemented. At least 30 days prior to such transfer, Defendant shall provide a copy of this Consent Decree to the proposed transferee and shall simultaneously provide written notice of the prospective transfer, together with a copy of the proposed written agreement, to EPA Region 5, the United States Attorney for the District of Minnesota, the United States Department of Justice, and the State of Minnesota, in accordance with Section XV of this Decree (Notices and Submissions). Any attempt to transfer ownership or operation of the Facility without complying with this Paragraph constitutes a violation of this Consent Decree.

6. Defendant shall provide a copy of this Consent Decree to all officers, employees, and agents whose duties might reasonably include compliance with any provision of this Decree, as well as to any contractor retained to perform work required under this Consent Decree. Defendant shall condition any such contract upon performance of the work in conformity with the terms of this Consent Decree.

7. In any action to enforce this Consent Decree, Defendant shall not raise as a defense the failure by any of its officers, directors, employees, agents, or contractors to take any actions necessary to comply with the provisions of this Consent Decree.

8. Purpose. It is the express purpose of the Parties in entering this Consent Decree to further the objectives of the Act, as enunciated in Section 101 of the Act, 42 U.S.C. § 7401 *et seq*. All plans, reports, construction, maintenance and other obligations in this Consent Decree or resulting from the activities required by this Consent Decree shall have the objective of causing Defendant to come into and remain in full compliance with the terms of its applicable permits and the Act.

III. DEFINITIONS

9. Terms used in this Consent Decree that are defined in the CAA or in federal and state regulations promulgated pursuant to or authorized by the CAA shall have the meanings assigned to them in the CAA or such regulations, unless otherwise provided in this Decree. Whenever the terms set forth below are used in this Consent Decree, the following definitions shall apply:

a. "Bag Leak Detection System" or "BLDS" shall mean a device that monitors and records the relative change in particulate matter loading present downstream of a fabric filter air pollution control device.

b. "CAA" shall mean the Clean Air Act.

c. "Coal Pulverizer #1" shall mean emission unit EU004 from Defendant's Permit. Coal Pulverizer #1 is a mechanical device for grinding and drying coal or carbon substitutes.

d. “Coal Pulverizer #2” shall mean emission unit EU005 from Defendant’s Permit. Coal Pulverizer #2 is a mechanical device for grinding and drying coal or carbon substitutes.

e. “Complaint” shall mean the complaint filed by the United States and the State in this action.

f. “Consent Decree” or “Decree” shall mean this Consent Decree, and all appendices attached hereto (listed in Section XXIII).

g. “CO” shall mean carbon monoxide.

h. “Day” shall mean a calendar day unless expressly stated to be a business day. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or federal or State holiday, the period shall run until the close of business of the next business day. In the context of the 30-day block period for assessing mercury emissions, as described in Paragraphs 11 and 12 and Appendices A and B, “day” shall mean the 24-hour period that begins at 7:00 a.m.

i. “Defendant” or “Mesabi Nugget” shall mean Mesabi Nugget Delaware, LLC.

j. “Effective Date” shall have the meaning given in Section XV.

k. “EPA” shall mean the United States Environmental Protection Agency and any of its successor departments or agencies.

l. “Facility” shall mean Defendant’s plant located at 6500 Highway 135 North, Aurora, Minnesota.

m. “Financial Information” shall mean federal tax returns and audited financial statements for the years 2012, 2013, and 2014.

n. "Flux" shall mean fluxing agents and additives used in the production of iron nuggets.

o. "Flux Pulverizer #1" shall mean emission unit EU006 from the Defendant's Permit. Flux Pulverizer #1 is a mechanical device for grinding and drying flux.

p. "Malfunction" shall mean any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner, which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in whole or in part by poor maintenance or careless operation are not malfunctions.

q. "Material Transfer Operations" shall mean emission unit EU010 from the Defendant's Permit. The Material Transfer Operations equipment is used to transport certain raw materials, slag, and/or iron nuggets in certain portions of the plant.

r. "MPCA" shall mean the Minnesota Pollution Control Agency and any of its successor departments or agencies.

s. "Month" shall mean calendar month.

t. "Nugget" shall mean a nominal 96-98% pure metallic iron final product.

u. "NO_x" shall mean nitrogen oxides.

v. "Paragraph" shall mean a portion of this Consent Decree identified by an Arabic numeral.

w. "Particulate matter" or "PM" shall mean any airborne finely divided solid or liquid material with an aerodynamic diameter smaller than 100 microns.

x. "Parties" shall mean the United States, the State, and Defendant.

y. "Permit" shall mean Mesabi Nugget's Title V permit, Permit Number 13700318-003, issued by the MPCA on January 8, 2010.

z. "PTFE" shall mean polytetrafluoroethylene. PTFE is a coating sprayed onto different materials that reduces adhesion and wear from reactive and corrosive materials.

aa. "Rail Loadout" shall mean emission unit EU008 from Defendant's Permit. Rail Loadout equipment is used to transport iron nuggets and slag to the rail car loading area.

bb. "Re-Start Date" shall mean the date upon which the Facility returns to operational status from its current idled state. The Re-Start Date commences upon the placement of a cumulative total of 10,000 metric tons of dry balls in the Rotary Hearth Furnace after the Effective Date.

cc. "Rotary Hearth Furnace" or "RHF" shall mean emission unit EU001 from Defendant's Permit. The Rotary Hearth Furnace is used to transform the dry balls into Nuggets and slag.

dd. "Section" shall mean a portion of this Consent Decree identified by a Roman numeral.

ee. "Stack Testing" shall mean a compliance determination test that is conducted on a stack to measure the amount of a specific regulated pollutant, pollutants, or surrogates being emitted.

ff. "State" shall mean the State of Minnesota.

gg. "Title V Permit" shall mean a permit required by, or issued pursuant to, the requirements of 42 U.S.C. §§ 7661-7661f, and the implementing regulations at 40 C.F.R. Part 70.

hh. "Ton" or "Tons" shall mean short ton or short tons, unless its use is qualified by the word "metric." One short ton equals 2000 pounds.

ii. "United States" shall mean the United States of America, acting on behalf of EPA.

jj. "VOC" shall mean any volatile organic compound of carbon -- excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate -- that participates in atmospheric photochemical reactions, except as further defined in 40 C.F.R. § 51.100(s).

kk. "Wet Scrubber" shall mean an air pollution control device that directs a polluted gas stream into contact with a scrubbing liquid to control pollutants.

IV. COMPLIANCE REQUIREMENTS

A. Mercury Emissions from the Rotary Hearth Furnace

10. Use of Mercury Sorbent Trap Monitoring System.

a. Beginning on the Re-Start Date, Defendant shall operate and maintain, in accordance with Appendices A and B, a previously installed mercury sorbent trap monitoring system capable of monitoring the mercury emissions from the Rotary Hearth Furnace at all times when dry balls are being fed to the Rotary Hearth Furnace. Beginning on the Re-Start Date, Defendant shall operate and maintain, in accordance with Appendices A and B, other previously installed required monitoring systems for flow rate and for moisture or wet oxygen at the Rotary Hearth Furnace scrubber stack. No less than 60 Days prior to the anticipated Re-Start Date, Defendant shall submit a site-specific monitoring plan in accordance with Appendices A and B subject to approval under Paragraph 42. Upon approval by EPA, Defendant shall implement all aspects of the approved site-specific monitoring plan. Defendant shall certify the system, in accordance with Appendices A and B, no later than 120 days after the Re-Start Date.

b. Defendant shall demonstrate initial and continuous compliance with its permitted mercury limit through the use of the mercury sorbent trap monitoring system, in accordance with Appendices A and B.

c. Beginning on the Re-Start Date, the mercury sorbent trap monitoring system at the Rotary Hearth Furnace shall be in continuous operation to demonstrate compliance with the applicable mercury emission limit established in Paragraph 11 of this Consent Decree except during mercury sorbent trap monitoring system breakdowns, repairs, maintenance, or sorbent trap removal and replacement. Defendant shall take all steps reasonably necessary to avoid breakdowns and minimize downtime. These steps shall include, but are not limited to, operating and maintaining the sorbent trap monitoring system in accordance with best practices, and maintaining an adequate on-site inventory of spare parts or other supplies necessary to make rapid repairs to the equipment.

11. <u>Compliance with Mercury Emission Limit.</u> Beginning on the Re-Start Date, Defendant shall comply with the mercury emission limit of 0.0086 pounds per hour (lbs/hr) using a 30-day block average at the Rotary Hearth Furnace, as monitored, recorded, and analyzed by the mercury sorbent-trap monitoring system in accordance with Appendix A.

12. <u>Initial Demonstration of Compliance with Mercury Emission Limit.</u>

a. By no later than 60 days after initial certification of the mercury sorbent trap monitoring system, Defendant shall demonstrate initial compliance with the mercury emission limit in Paragraph 11 through the use of the mercury sorbent trap monitoring system in accordance with Paragraph 10. Initial compliance shall be demonstrated if the results of the first

30-day block period average emission rate obtained with the certified mercury sorbent trap monitoring system meet the mercury emission limit in Paragraph 11.

b. By no later than 75 days after the initial certification of the mercury sorbent trap monitoring system, Defendant shall submit the results of the initial demonstration of compliance to EPA and MPCA in accordance with Section XIV (Notices).

B. <u>Preventive Maintenance and Operations (PMO) Plans</u>

a. <u>Rotary Hearth Furnace</u>

13. Prior to the Re-Start Date, Defendant shall submit to EPA and MPCA a PMO Plan subject to approval under Paragraph 42 to implement enhanced maintenance and operation of the Rotary Hearth Furnace and all associated pollution control equipment. The PMO Plan shall be a compilation of Defendant's approaches for exercising good air pollution control practices and for minimizing excess emissions at the Rotary Hearth Furnace. The PMO Plan must include the following:

a. Annual inspections of the spray nozzles at the RHF's Wet Scrubber. Spray nozzles shall be replaced before the RHF's Wet Scrubber is put back into service following the inspection if corrosion that potentially affects the spray nozzle's performance is identified during the inspection.

b. Annual inspections of the Wet Scrubber packing. Wet Scrubber packing shall be cleaned or replaced if build-up and fouling that potentially affects the packing's performance are found during the inspection.

c. Procedures and documentation detailing the continued use of stainless steel spray nozzles for the packed bed section and schedule 80 carbon steel nozzles for the throat spray section of the Wet Scrubber.

d. Procedures and documentation detailing the operation of the adjustable venturi throat system and mist eliminators for improved performance of the RHF's Wet Scrubber.

14. Defendant shall apply to MPCA to incorporate all approved PMO Plans into Defendant's Title V Permit within 60 Days of such approval. Defendant shall comply with the most recently approved PMO Plan at all times, including periods of Startup, Shutdown, and Malfunction of the Rotary Hearth Furnace. If Defendant makes modifications to the operation and maintenance of the emission unit and associated pollution control equipment, the PMO Plan shall be modified to reflect current operation and maintenance practices. Defendant shall summarize all such modifications to PMO Plans and report them to EPA and MPCA on an annual basis. All such modifications to PMO Plans shall be subject to approval under Paragraph 42 of this Consent Decree.

b. <u>Coal Pulverizer #1 and Flux Pulverizer #1</u>

15. Prior to the Re-Start Date, Defendant shall submit to EPA and MPCA a PMO Plan subject to approval under Paragraph 42 to implement enhanced maintenance and operation of Coal Pulverizer #1, Flux Pulverizer #1, and all associated pollution control equipment. Each PMO Plan shall be a compilation of Defendant's approaches for exercising good air pollution control practices and for minimizing excess emissions at Coal Pulverizer #1 and Flux Pulverizer #1. The PMO Plan must include:

a. A site-specific monitoring plan for each Bag Leak Detection System in accordance with the specifications and requirements of Appendix C of this Consent Decree.

b. Procedures for recording and maintaining daily pressure drop readings of each baghouse.

c. Procedures for inspecting each emission unit's baghouse semiannually. Repairs of any deficiencies identified during the semiannual shutdown inspection must be completed before restarting the applicable emission unit.

d. Procedures and documentation detailing the continued use of PTFE-coated bags featuring double disks and six-inch wear cuffs, unless a performance test performed by Mesabi Nugget and accepted by MPCA demonstrates compliance with applicable particulate limits without their use.

e. Documentation that defines the new air-to-cloth ratio based on the use of PTFE-coated bags.

f. Procedures for annual maintenance of each emission unit's baghouse that includes the complete inspection of outlet piping and entire baghouse.

16. Defendant shall apply to MPCA to incorporate all approved PMO Plans into Defendant's Title V Permit within 60 Days of such approval. Defendant shall comply with the most recently approved PMO Plan for each unit at all times, including periods of Startup, Shutdown, and Malfunction of Coal Pulverizer #1 and Flux Pulverizer #1. If Defendant makes modifications to the operation and maintenance of an emission unit and associated pollution control equipment, the respective PMO Plan shall be modified to reflect current operation and maintenance practices. Defendant shall summarize all such modifications to PMO Plans and report them to EPA and MPCA on an annual basis. All such modifications to PMO Plans shall be subject to approval under Paragraph 42 of this Consent Decree.

c. <u>Rail Loadout and Material Transfer Operations</u>

17. Prior to the Re-Start Date, Defendant shall submit to EPA and MPCA a PMO Plan subject to approval under Paragraph 42 to implement enhanced maintenance and operation of the Rail Loadout, Material Transfer Operations, and all associated pollution control equipment. Each PMO Plan shall be a compilation of the Defendant's approaches for exercising good air pollution control practices and for minimizing excess emissions at the Rail Loadout and Material Transfer Operations. The PMO Plan must include the following:

a. Site-specific monitoring plans for each Bag Leak Detection System in accordance with the specifications and requirements of Appendix C of this Consent Decree.

b. Procedures for recording and maintaining daily pressure drop readings of each baghouse.

c. Procedures for inspecting each emission unit's baghouse semiannually. Repairs of any deficiencies identified during any semiannual shutdown inspection must be completed before restarting the applicable emission unit.

d. Procedures and documentation detailing the continued use of PTFE-coated bags featuring double disks and six-inch wear cuffs, unless a performance test performed by Mesabi Nugget and accepted by MPCA demonstrates compliance with applicable particulate limits without their use.

e. Documentation that defines the new air-to-cloth ratio based on the use of PTFE-coated bags.

f. Procedures for annual maintenance of each emission unit's baghouse that includes the complete inspection of outlet piping and entire baghouse.

g. Procedures for ensuring adequate face velocity of the pickup points of the baghouse system to collect particulate matter emissions without entraining raw materials.

h. Procedures for annual baghouse system performance evaluation that includes air flow rebalancing as necessary. Any deficiencies identified during annual baghouse system performance evaluation must be corrected before restarting the applicable emission unit.

18. Defendant shall apply to MPCA to incorporate all approved PMO Plans into Defendant's Title V Permit within 60 Days of such approval. Defendant shall comply with the most recently approved PMO Plan for each unit at all times, including periods of Startup, Shutdown, and Malfunction of the Rail Loadout, Material Transfer Operations. If Defendant makes modifications to the operation and maintenance of an emission unit and associated pollution control equipment, the respective PMO Plan shall be modified to reflect current operation and maintenance practices. Defendant shall summarize all such modifications to PMO Plans and report them to EPA and MPCA on an annual basis. All such modifications to PMO Plans shall be subject to approval under Paragraph 42 of this Consent Decree.

C. <u>Interim Emission Limits</u>

19. Beginning on the Effective Date of this Consent Decree, and continuing until MPCA issues, denies, or otherwise finally acts on Defendant's application for Permit modification, to be submitted pursuant to Paragraph 30 of this Consent Decree, Defendant shall comply with the following emission limits for each unit as specified in the tables below. These limits shall apply until the permit amendment contemplated under Section IV.F is completed:

Coal Pulverizer #1 -

Pollutant	Emission Limit
VOC	0.151 lbs/MMBtu
VOC	1.27 lbs/hr
NO_x	0.39 lbs/hr
NO_x	0.044 lbs/MMBtu
CO	1.22 lbs/hr
CO	0.112 lbs/MMBtu

Flux Pulverizer #1 -

Pollutant	Emission Limit
VOC	0.019 lbs/MMBtu
VOC	0.068 lbs/hr
NO_x	0.077 lbs/MMBtu
CO	0.16 lbs/MMBtu

Rotary Hearth Furnace -

Pollutant	Emission Limit
PM / PM10	0.0249 gr/dscf limit on p. A-27 of Permit
PM / PM10	0.0249 gr/dscf limit on p. A-28 of Permit

Green Ball Dryer –

Pollutant	Emission Limit
PM / PM10	80% (Front-Half) and 76.3% (PM10) control efficiencies on p. A-33 of Permit

D. Best Available Control Technology Analysis for PM, CO, VOC, and NO_x Emission Limits

20. No later than 45 days prior to the Re-Start Date, Defendant shall complete and submit for approval under Paragraph 42 a Best Available Control Technology analysis for PM

and PM/PM10 control efficiency emission limits on the Rotary Hearth Furnace and for PM/PM10 control efficiency limits on the Green Ball Dryer.

21. No later than 45 days prior to the Re-Start Date, Defendant must complete and submit for approval under Paragraph 42 a Best Available Control Technology analysis for CO and VOC emission limits on the following units:

a. Coal Pulverizer #1, EU004; and

b. Flux Pulverizer #1, EU006.

22. No later than 45 days prior to the Re-Start Date, Defendant must complete and submit for approval under Paragraph 42 an analysis for NO_x emission limits under Minnesota Rule 7007.1600, subpart 2C, on the Coal Pulverizer #1, EU004.

E. <u>Performance Testing of Emission Units</u>

23. Within 90 days of the date on which the Facility has produced a total of 100,000 metric tons of iron nuggets after Re-Start, and in no event later than 270 days after Re-Start, Defendant shall conduct stack tests measuring the emission rate of NO_x, VOC, and CO at Coal Pulverizer #1 and Flux Pulverizer #1, in accordance with the applicable requirements and methods of 40 C.F.R. Part 60, Appendix A.

24. Within 90 days of the date on which the Facility has produced a total of 100,000 metric tons of iron nuggets after Re-Start, and in no event later than 270 days after Re-Start, Defendant shall conduct stack tests measuring the emission rate of PM and PM10 at the RHF in accordance with applicable requirements and methods of 40 C.F.R. Part 60, Appendix A.

25. By no later than 30 days before any stack test required by this Consent Decree is conducted, Defendant shall submit in accordance with Section XIV (Notices) of this Consent Decree a notice of its intent to conduct such test for approval. This notification must include the

scheduled date of the test, an emissions test protocol, a description of the planned operating rate and operating conditions, and the procedures that will be used to measure and record operating parameters. If EPA or MPCA require any adjustments of the testing protocol or operating conditions, Defendant shall make such adjustments and conduct the stack test in conformity with EPA's or MPCA's requirements, in accordance with Paragraph 42.

26. By no later than 45 days after conducting a stack test required by this Consent Decree, Defendant shall submit in accordance with Section XIV (Notices) of this Consent Decree a report documenting the results of the stack test.

27. By no later than 90 days after conducting a stack test required by Paragraph E, Defendant shall submit in accordance with Section XIV (Notices) testing frequency plans for NO_x, VOC, and CO for Coal Pulverizer #1 and Flux Pulverizer #1. Each plan shall specify a testing frequency based on performance test data for each emission unit and established in accordance with MPCA's *Performance Testing for Stationary Source Emissions* guidance document.

28. Defendant shall conduct stack tests measuring the emission rate of PM and PM10 at the RHF in accordance with the applicable requirements of 40 C.F.R. Part 60, Appendix A every 12 calendar months beginning on the date of the stack test conducted pursuant to Paragraph 24. Upon three consecutive stack tests performed under this Paragraph 28 showing results less than 75% of the applicable PM and PM10 limits for the RHF, Defendant may reduce the testing frequency to once every two years.

F. Permit Amendment Requirements

29. Permits Prior to Construction or Installation. Where any compliance obligation under this Section requires Defendant to obtain a federal, state, or local permit or approval,

Defendant shall submit timely and complete applications and take all other actions necessary to obtain all such permits and approvals. Defendant may seek relief under the provisions of Section IX (Force Majeure) for any delay in the performance of any such obligation resulting from a failure to obtain, or a delay in obtaining, any permit or approval required to fulfill such obligation, if Defendant has submitted timely and complete applications and has taken all other actions necessary to obtain such permit(s) or approval(s).

30. Applications for Permits. Within 45 days of EPA's and MPCA's approval of the analyses completed pursuant to Paragraphs 20 through 22, Defendant shall submit an application to MPCA for amendment of its permit for the Facility, in accordance with State rules, including applicable administrative amendment provisions of such rules, incorporating the requirements set forth below and in Paragraph 31:

a. The limits for emissions established in Section IV.D and Appendix A;

b. The monitoring requirements established in Section IV.A and Appendices A and B;

c. The preventative maintenance and operation requirements set forth in Section IV.B; and

d. The testing requirements established in Section IV.E of this Consent Decree.

The emission limits referenced in subparagraph (a) above shall not exceed the interim emission limits established in Section IV.C.

31. $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) Compliance Modeling Demonstration. In the permit amendment application submitted pursuant to Paragraph 30, Mesabi Nugget shall include a refined modeling analysis to demonstrate compliance with the

$PM_{2.5}$ 24-hour and annual NAAQS. Mesabi Nugget shall conduct the modeling analysis in accordance with all final and effective versions of the MPCA air dispersion modeling guidance at the time modeling is required and shall include the most recent emissions data projections provided for the planned PolyMet project (unless PolyMet has provided notice that it no longer wishes to pursue this project).

32. Removal of Emission Unit EU005. Defendant shall remove emission unit EU005, Coal Pulverizer #2 in the permit amendment application required in Paragraph 30.

33. Following submission of the application for permit amendment, Defendant shall promptly submit any supplemental information that the MPCA requests to assist in its analysis of the permit materials and its development of the permit amendment.

34. Requirements incorporated into operating permits pursuant to this Section shall survive termination of this Consent Decree. For any application for permit amendment required by this Section, Defendant shall submit to EPA in the manner set forth in Section XIV (Notices), a copy of each application, as well as a copy of any permit proposed as a result of such application, to allow for timely participation in any public comment opportunity.

V. REPORTING REQUIREMENTS

35. After the lodging of this Consent Decree, until termination of this Decree pursuant to Section XVIII (Termination), Defendant shall submit in accordance with Section XIV (Notices) a progress report at the frequency described below that shall include:

a. Anticipated Re-Start Date;

b. Work performed and progress made toward implementing the requirements of Section IV (Compliance Requirements), including completion of any milestones;

c. Any significant modifications to previously-submitted design specifications of any pollution control system, or to monitoring equipment, required to comply with the requirements of Section IV (Compliance Requirements);

d. Any significant problems encountered or anticipated in complying with the requirements of Section IV (Compliance Requirements), including implemented or proposed solutions;

e. A summary of the emissions monitoring and testing data collected to demonstrate compliance with a requirement of this Consent Decree;

f. On and after the compliance dates for emission limits established under Section IV.C, a description of all periods of Startup, Shutdown, and Malfunction, including, to the extent known or capable of good-faith estimation, quantities of pollutant emitted during such periods and the causes of claimed Malfunctions;

g. On and after the compliance dates for emission limits established under Section IV.A, all information required to be reported in the applicable mercury sorbent trap monitoring system site-specific monitoring plan established by Appendices A and B of this Consent Decree;

h. Status of permit applications and a summary of all permitting activity required under Section IV of this Consent Decree; and

i. Any reports to MPCA pertaining to compliance with this Consent Decree or the CAA.

During the period prior to the Re-Start Date, this report shall be submitted by February 15 of each year and cover the preceding calendar year. After the Re-Start Date and until Termination of this Decree pursuant to Section XVIII (Termination), this report shall be submitted on a semi-annual basis by February 15 and August 15 of each year and cover the preceding January through June or July through December, as applicable.

36. If Defendant violates, or has reason to believe that it may violate, any requirement of this Consent Decree, including any emission limit or standard prescribed by this Consent Decree, Defendant shall notify the United States and the State of such violation or potential violation and its likely duration, in writing, within ten business Days of the Day Defendant first becomes aware of the violation or potential violation, with an explanation of the violation's likely cause and of the remedial steps taken, or to be taken, to prevent or minimize such violation. If the cause of a violation cannot be fully explained at the time the report is due, Defendant shall so state in the report, investigate the cause of the violation, and shall then submit an amendment to the report, including a full explanation of the cause of the violation, within 30 Days of the Day Defendant becomes aware of the cause of the violation. Nothing in this Paragraph or the following Paragraph relieves Defendant of its obligation to provide the notice required by Section IX (Force Majeure).

37. Whenever any violation of this Consent Decree or of any applicable permits or any other event affecting Defendant's performance under this Decree, or the performance of its Facility, may pose an immediate threat to the public health or welfare or the environment, Defendant shall notify EPA and the State orally or by electronic transmission as soon as possible,

but no later than 24 hours after Defendant first obtained knowledge of the violation or event. This procedure is in addition to the requirements set forth in the preceding Paragraph.

38. All reports shall be submitted to the persons designated in Section XIV (Notices).

39. Each report submitted by Defendant under this Section shall be signed by an official of the submitting party and include the following certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

This certification requirement does not apply to emergency or similar notifications where compliance would be impractical.

40. The reporting requirements of this Consent Decree do not relieve Defendant of any reporting obligations required by the CAA or implementing regulations, or by any other federal, state, or local law, regulation, permit, or other requirement. The reporting requirements of this Section are in addition to any other reports, plans, or submissions required by other Sections of this Consent Decree.

41. Any information provided pursuant to this Consent Decree may be used by the United States or the State in any proceeding to enforce the provisions of this Consent Decree and as otherwise permitted by law.

42. Approval of Deliverables. After review of any plan, report, or other item that is required to be submitted pursuant to this Consent Decree, except permit amendment applications

in Section IV.F, EPA after consultation with MPCA shall in writing: (a) approve the submission; (b) approve the submission upon specified conditions; (c) approve part of the submission and disapprove the remainder; or (d) disapprove the submission.

43. If the submission is approved pursuant to Paragraph 42(a), Defendant shall take all actions required by the plan, report, or other document, in accordance with the schedules and requirements of the plan, report, or other document, as approved. If the submission is conditionally approved or approved only in part, pursuant to Paragraph 42(b) or (c), Defendant shall, upon written direction from EPA, after consultation with MPCA, take all actions required by the approved plan, report, or other item that EPA, after consultation with MPCA, determines are technically severable from any disapproved portions, subject to Defendant's right to dispute only the specified conditions or the disapproved portions under Section X (Dispute Resolution).

44. If the submission is disapproved in whole or in part pursuant to Paragraph 42(c) or (d), Defendant shall, within 45 Days or such other time as the Parties agree to in writing, correct all deficiencies and resubmit the plan, report, or other item, or disapproved portion thereof, for approval, in accordance with the preceding Paragraphs. If the resubmission is approved in whole or in part, Defendant shall proceed in accordance with the preceding Paragraph.

45. Any stipulated penalties applicable to the original submission, as provided in Section VIII (Stipulated Penalties), shall accrue during the 45-Day period or other specified period, but shall not be payable unless the resubmission is untimely or is disapproved in whole or in part; provided that, if the original submission was so deficient as to constitute a material breach of Defendant's obligations under this Decree, the stipulated penalties applicable to the original submission shall be due and payable notwithstanding any subsequent resubmission.

46. If a resubmitted plan, report, or other item, or portion thereof, is disapproved in whole or in part, EPA, after consultation with MPCA, may again require Defendant to correct any deficiencies, in accordance with the preceding Paragraphs, or may itself/themselves correct any deficiencies, subject to Defendant's right to invoke Dispute Resolution and the right of the United States and the State to seek stipulated penalties as provided in the preceding Paragraphs.

VI. ADDITIONAL INJUNCTIVE RELIEF

47. As of the Effective Date of the Consent Decree, Coal Pulverizer #2, EU005, shall be permanently shut down. Defendant's application for amendment of its Permit submitted pursuant to Paragraph 30 shall also request removal of this unit from the Permit.

VII. CIVIL PENALTY

48. Within 30 Days after the Effective Date of this Consent Decree, Defendant shall pay the sum of $150,000 as a civil penalty, together with interest accruing from the date on which the Consent Decree is lodged with the Court, at the rate specified in 28 U.S.C. § 1961 as of the date of lodging. This penalty shall be split equally between the United States and the State.

49. Defendant shall pay the civil penalty of $75,000 due to the United States by FedWire Electronic Funds Transfer ("EFT") to the U.S. Department of Justice account, in accordance with instructions provided to Defendant by the Financial Litigation Unit ("FLU") of the U.S. Attorney's Office for the District of Minnesota after the Effective Date. The payment instructions provided by the FLU will include a Consolidated Debt Collection System ("CDCS") number, which Defendant shall use to identify all payments required to be made in accordance with this Consent Decree. The FLU will provide the payment instructions to:

Kevin Petz
Mesabi Nugget Delaware, LLC
P.O. Box 235
Hoyt Lakes, MN 55750
(218) 225-7327
kevin.petz@steeldynamics.com

on behalf of Defendant. Defendant may change the individual to receive payment instructions on its behalf by providing written notice of such change to the United States and EPA in accordance with Section XIV (Notices).

50. At the time of payment, Defendant shall send notice that payment has been made: (i) to EPA via email at cinwd_acctsreceivable@epa.gov or via regular mail at EPA Cincinnati Finance Office, 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268 and (ii) to the United States via email or regular mail in accordance with Section XIV. Such notice shall state that the payment is for the civil penalty owed pursuant to the Consent Decree in *United States, et al. v. Mesabi Nugget Delaware, LLC.*, and shall reference the civil action number, CDCS number and DOJ case number 90-5-2-1-10952.

51. Within 30 days of the Effective Date of this Consent Decree, Defendant shall pay a civil penalty of $75,000 to the State by check payable to the Minnesota Pollution Control Agency. Payments shall be sent by first class mail and delivered to:

MPCA Fiscal Services, 6th Floor
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155-4194

52. Defendant shall not deduct any penalties paid under this Decree pursuant to this Section or Section VIII (Stipulated Penalties) in calculating its federal or state or local income tax.

53. Defendant certifies that, to the best of its knowledge and belief, after thorough inquiry, it has submitted to Plaintiffs financial information that fairly, accurately, and materially sets forth its financial circumstances, and that those circumstances have not materially changed between the time the financial information was submitted to Plaintiffs and the time Defendant executes this Consent Decree.

VIII. STIPULATED PENALTIES

54. Defendant shall be liable for stipulated penalties to the United States and the State for violations of this Consent Decree as specified below, unless excused under Section IX (Force Majeure). A violation includes failing to perform any obligation required by the terms of this Decree, including any work plan or schedule approved under this Decree, according to all applicable requirements of this Decree and within the specified time schedules established by or approved under this Decree.

55. Late Payment of Civil Penalty. If the Defendant fails to pay the civil penalties required to be paid under Section VII (Civil Penalty) when due, Defendant shall pay a stipulated penalty of $5,000 per Day for each Day that the payment is late.

56. The following stipulated penalties shall accrue for each violation of any emission limit established under Section IV.A and IV.C of this Consent Decree:

Incidence of Noncompliance	Penalty per Violation
1st violation	$2,000
2nd – 5th violation	$5,000
Additional violations	$10,000

57. The following stipulated penalties shall accrue per violation per Day for each violation of any approved plan or schedule, failure to submit plans or schedules as required,

performance testing requirement, emissions monitoring requirement, permitting requirements, reporting requirements, or any other requirement imposed by this Consent Decree:

Period of Noncompliance	Penalty Per Violation Per Day
1st - 14th day	$500
15th - 30th day	$1,000
31st day and each day thereafter	$2,000

58. Stipulated Penalties' Accrual. Stipulated penalties under this Section shall begin to accrue on the Day after performance is due or on the Day a violation occurs, whichever is applicable, and shall continue to accrue until performance is satisfactorily completed or until the violation ceases. Stipulated penalties shall accrue simultaneously for separate violations of this Consent Decree.

59. Defendant shall pay stipulated penalties to the United States and the State within 30 Days of receiving a written demand by either Plaintiff. Defendant shall pay 50% of the total stipulated penalty amount due to the United States and 50% to the State. The Plaintiff making a demand for payment of a stipulated penalty shall simultaneously send a copy of the demand to the other Plaintiff.

60. Waiver of Payment. Either Plaintiff may in the unreviewable exercise of its discretion, reduce or waive stipulated penalties otherwise due it under this Consent Decree.

61. Disputes over Stipulated Penalties. Stipulated penalties shall continue to accrue as provided in Paragraph 58, during any Dispute Resolution, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA or the State that is not appealed to the Court, Defendant shall pay accrued penalties determined to be owing, together with interest, to the United States or the State within 30 Days of the effective date of the agreement or the receipt of EPA's or the State's decision or order.

b. If the dispute is appealed to the Court and the United States or the State prevails in whole or in part, Defendant shall pay all accrued penalties determined by the Court to be owing, together with interest, within 60 Days of receiving the Court's decision or order, except as provided in subparagraph c, below.

c. If any Party appeals the District Court's decision, Defendant shall pay all accrued penalties determined to be owing, together with interest, within 15 Days of receiving the final appellate court decision.

62. Manner of Payment of Stipulated Penalties. Defendant shall pay stipulated penalties owing to the United States and the State in the manner set forth and with the confirmation notices required by Section VII (Civil Penalty), except that the transmittal letter shall state that the payment is for stipulated penalties and shall state for which violation(s) the penalties are being paid.

63. If Defendant fails to pay stipulated penalties according to the terms of this Consent Decree, Defendant shall be liable for interest on such penalties, as provided for in 28 U.S.C. § 1961, accruing as of the date payment became due. Nothing in this Paragraph shall be construed to limit the United States or the State from seeking any remedy otherwise provided by law for Defendant's failure to pay any stipulated penalties.

64. The payment of penalties and interest, if any, shall not alter in any way Defendant's obligation to complete the performance of the requirements of this Consent Decree.

65. Non-Exclusivity of Remedy. Stipulated penalties are not the United States' exclusive remedy for violations of this Consent Decree. Subject to the provisions of Section XII

(Effect of Settlement/Reservation of Rights), the United States expressly reserves the right to seek any other relief it deems appropriate for Defendant's violation of this Decree or applicable law, including but not limited to an action against Defendant for statutory penalties, additional injunctive relief, mitigation or offset measures, and/or contempt. However, the amount of any statutory penalty assessed for a violation of this Consent Decree shall be reduced by an amount equal to the amount of any stipulated penalty assessed and paid pursuant to this Consent Decree.

IX. FORCE MAJEURE

66. "Force Majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of Defendant, of any entity controlled by Defendant, or of Defendant's contractors, which delays or prevents the performance of any obligation under this Consent Decree despite Defendant's best efforts to fulfill the obligation. The requirement that Defendant exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any such event (a) as it is occurring and (b) following the potential force majeure, such that the delay and any adverse effects of the delay are minimized. "Force Majeure" does not include Defendant's financial inability to perform any obligation under this Consent Decree.

67. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a Force Majeure event, Defendant shall provide notice orally or by electronic or facsimile transmission to EPA and MPCA within 72 hours of when Defendant first knew that the event might cause a delay. Within seven days thereafter, Defendant shall provide in writing to EPA and MPCA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to

be taken to prevent or mitigate the delay or the effect of the delay; Defendant's rationale for attributing such delay to a Force Majeure event if it intends to assert such a claim; and a statement as to whether, in the opinion of Defendant, such event may cause or contribute to an endangerment to public health, welfare or the environment. Defendant shall include with any notice all available documentation supporting the claim that the delay was attributable to a Force Majeure. Failure to comply with the above requirements shall preclude Defendant from asserting any claim of Force Majeure for that event for the period of time of such failure to comply, and for any additional delay caused by such failure. Defendant shall be deemed to know of any circumstance of which Defendant, any entity controlled by Defendant, or Defendant's contractors knew or should have known.

68. If EPA, after a reasonable opportunity for review and comment by MPCA, agrees that the delay or anticipated delay is attributable to a Force Majeure event, the time for performance of the obligations under this Consent Decree that are affected by the Force Majeure event will be extended by EPA, after a reasonable opportunity for review and comment by MPCA, for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the Force Majeure event shall not, of itself, extend the time for performance of any other obligation. EPA will notify Defendant in writing of the length of the extension, if any, for performance of the obligations affected by the Force Majeure event.

69. If EPA, after a reasonable opportunity for review and comment by MPCA, does not agree that the delay or anticipated delay has been or will be caused by a Force Majeure event, EPA will notify Defendant in writing of its decision.

70. If Defendant elects to invoke the dispute resolution procedures set forth in Section X (Dispute Resolution), it shall do so no later than 15 Days after receipt of EPA's notice.

In any such proceeding, Defendant shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Defendant complied with the requirements of Paragraphs 66 and 67 above. If Defendant carries this burden, the delay at issue shall be deemed not to be a violation by Defendant of the affected obligation of this Consent Decree identified to EPA and the Court.

X. DISPUTE RESOLUTION

71. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree. Defendant's failure to seek resolution of a dispute under this Section shall preclude Defendant from raising any such issue as a defense to an action by the United States or the State to enforce any obligation of Defendant arising under this Decree.

72. Informal Dispute Resolution. Any dispute subject to Dispute Resolution under this Consent Decree shall first be the subject of informal negotiations. The dispute shall be considered to have arisen when Defendant sends the United States and the State a written Notice of Dispute. Such Notice of Dispute shall state clearly the matter in dispute. The period of informal negotiations shall not exceed 20 Days from the date the dispute arises, unless that period is modified by written agreement. If the Parties cannot resolve a dispute by informal negotiations, then the position advanced by the United States shall be considered binding unless, within 30 Days after the conclusion of the informal negotiation period, Defendant invokes formal dispute resolution procedures as set forth below.

73. Formal Dispute Resolution. Defendant shall invoke formal dispute resolution procedures, within the time period provided in the preceding Paragraph, by serving on the United States and the State a written Statement of Position regarding the matter in dispute. The Statement of Position shall include, but need not be limited to, any factual data, analysis, or opinion supporting Defendant's position and any supporting documentation relied upon by Defendant.

74. The United States shall serve its Statement of Position within 45 Days of receipt of Defendants' Statement of Position. The United States' Statement of Position shall include, but need not be limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation relied upon by the United States. The United States' Statement of Position shall be binding on Defendant, unless Defendant files a motion for judicial review of the dispute in accordance with the following Paragraph.

75. Defendant may seek judicial review of the dispute by filing with the Court and serving on the United States, in accordance with Section XIV (Notices), a motion requesting judicial resolution of the dispute. The motion must be filed within ten Days of receipt of the United States' Statement of Position pursuant to the preceding Paragraph. The motion shall contain a written statement of Defendant's position on the matter in dispute, including any supporting factual data, analysis, opinion, or documentation, and shall set forth the relief requested and any schedule within which the dispute must be resolved for orderly implementation of the Consent Decree.

76. The United States, following consultation with the State, shall respond to Defendant's motion within the time period allowed by the Local Rules of this Court. Defendant may file a reply memorandum, to the extent permitted by the Local Rules.

77. Standard of Review

a. Disputes Concerning Matters Accorded Record Review. Except as otherwise provided in this Consent Decree, in any dispute brought under Paragraph 73 pertaining to the adequacy or appropriateness of plans, procedures to implement plans, schedules or any other items requiring approval by EPA and MPCA under this Consent Decree; the adequacy of the performance of work undertaken pursuant to this Consent Decree; and all other disputes that are accorded review on the administrative record under applicable principles of administrative law, Defendant shall have the burden of demonstrating, based on the administrative record, that the position of the United States is arbitrary and capricious or otherwise not in accordance with law.

b. Other Disputes. Except as otherwise provided in this Consent Decree, in any other dispute brought under Paragraph 73, Defendant shall bear the burden of demonstrating that its position complies with this Consent Decree and better furthers the objectives of this Consent Decree.

78. The invocation of dispute resolution procedures under this Section shall not, by itself, extend, postpone, or affect in any way any obligation of Defendant under this Consent Decree, unless and until final resolution of the dispute so provides. Stipulated penalties with respect to the disputed matter shall continue to accrue from the first Day of noncompliance, but payment shall be stayed pending resolution of the dispute as provided in Paragraph 61. If Defendant does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section VIII (Stipulated Penalties).

XI. INFORMATION COLLECTION AND RETENTION

79. The United States, the State, and their representatives, including attorneys, contractors, and consultants, shall have the right of entry into the Facility, at all reasonable times, upon presentation of credentials, to:

a. monitor the progress of activities required under this Consent Decree;

b. verify any data or information submitted to the United States or the State in accordance with the terms of this Consent Decree;

c. obtain samples and, upon request, splits of any samples taken by Defendant or its representatives, contractors, or consultants;

d. obtain documentary evidence, including photographs and similar data; and

e. assess Defendant's compliance with this Consent Decree.

80. Upon request, Defendant shall provide EPA and MPCA or their authorized representatives splits of any samples taken by Defendant. Upon request, EPA and MPCA shall provide Defendant splits of any samples taken by EPA or MPCA.

81. Until five years after the termination of this Consent Decree, Defendant shall retain, and shall instruct its contractors and agents to preserve, all non-identical copies of all documents, records, or other information (including documents, records, or other information in electronic form) in its or its contractors' or agents' possession or control, or that come into its or its contractors' or agents' possession or control, and that relates in any manner to Defendant's performance of its obligations under this Consent Decree. This information-retention requirement shall apply regardless of any contrary corporate or institutional policies or procedures. At any time during this information-retention period, upon request by the United

States or the State, Defendant shall provide copies of any documents, records, or other information required to be maintained under this Paragraph.

82. At the conclusion of the information-retention period provided in the preceding Paragraph, Defendant shall notify the United States and the State at least 90 Days prior to the destruction of any documents, records, or other information subject to the requirements of the preceding Paragraph and, upon request by the United States or the State, Defendant shall deliver any such documents, records, or other information to the Plaintiffs. Defendant may assert that certain documents, records, or other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Defendant asserts such a privilege, it shall provide the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of each author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by Defendant. However, no documents, records, or other information created or generated pursuant to the requirements of this Consent Decree shall be withheld on grounds of privilege.

83. Defendant may also assert that information required to be provided under this Section is protected as Confidential Business Information ("CBI") under 40 C.F.R. Part 2. As to any information that Defendant seeks to protect as CBI, Defendant shall follow the procedures set forth in 40 C.F.R. Part 2.

84. This Consent Decree in no way limits or affects any right of entry and inspection, or any right to obtain information, held by the United States or the State pursuant to applicable federal or state laws, regulations, or permits, nor does it limit or affect any duty or obligation of

Defendant to maintain documents, records, or other information imposed by applicable federal or state laws, regulations, or permits.

XII. EFFECT OF SETTLEMENT/RESERVATION OF RIGHTS

85. This Consent Decree resolves the civil claims of the United States and the State for the violations alleged in the Complaint filed in this action through the date of lodging.

86. The United States and the State reserve all legal and equitable remedies available to enforce the provisions of this Consent Decree. This Consent Decree shall not be construed to limit the rights of the United States or the State to obtain penalties or injunctive relief under the Act or implementing regulations, or under other federal or state laws, regulations, or permit conditions. The United States and the State further reserve all legal and equitable remedies to address any imminent and substantial endangerment to the public health or welfare or the environment arising at, or posed by, the Facility, whether related to the violations addressed in this Consent Decree or otherwise.

87. In any subsequent administrative or judicial proceeding initiated by the United States or the State for injunctive relief, civil penalties, other appropriate relief relating to the Facility or Defendant's violations, Defendant shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States or the State in the subsequent proceeding were or should have been brought in the instant case, except with respect to claims that have been specifically resolved pursuant to Paragraph 85.

88. Notwithstanding any other provision of this Consent Decree, Plaintiffs reserve, and this Consent Decree is without prejudice to, the right to reinstitute or reopen this action, or to

commence a new action seeking relief other than as provided in this Consent Decree, if the Financial Information provided by Defendant, or the financial certification made by Defendant in Paragraph 53, is false or, in any material respect, inaccurate.

89. This Consent Decree is not a permit, or a modification of any permit, under any federal, State, or local laws or regulations. Defendant is responsible for achieving and maintaining complete compliance with all applicable federal, State, and local laws, regulations, and permits; and Defendant's compliance with this Consent Decree shall be no defense to any action commenced pursuant to any such laws, regulations, or permits, except as set forth herein. The United States and the State do not, by their consent to the entry of this Consent Decree, warrant or aver in any manner that Defendant's compliance with any aspect of this Consent Decree will result in compliance with provisions of the CAA, or with any other provisions of federal, State, or local laws, regulations, or permits.

90. This Consent Decree does not limit or affect the rights of Defendant, the United States, or the State against any third parties, not party to this Consent Decree, nor does it limit the rights of third parties, not party to this Consent Decree, against Defendant, except as otherwise provided by law.

91. This Consent Decree shall not be construed to create rights in, or grant any cause of action to, any third party not a party to this Consent Decree.

XIII. COSTS

92. The Parties shall bear their own costs of this action, including attorneys' fees, except that the United States and the State shall be entitled to collect the costs (including attorneys' fees) incurred in any action necessary to collect any portion of the civil penalty or any stipulated penalties due but not paid by Defendant.

XIV. NOTICES

93. Unless otherwise specified in this Decree, whenever notifications, submissions, or communications are required by this Consent Decree, they shall be made in writing and addressed as set forth in Appendix D.

94. Any Party may, by written notice to the other Parties, change its designated notice recipient(s) or notice address(es) provided in Appendix D. Notices submitted pursuant to this Section shall be deemed submitted upon mailing, unless otherwise provided in this Consent Decree or by mutual agreement of the Parties in writing.

XV. EFFECTIVE DATE

95. The Effective Date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, or a motion to enter is granted, whichever occurs first, as recorded on the Court's docket.

XVI. RETENTION OF JURISDICTION

96. The Court shall retain jurisdiction over this case until termination of this Consent Decree, for the purpose of resolving disputes arising under this Decree, entering orders modifying this Decree, pursuant to Sections X (Dispute Resolution) or Section XVII (Modification), or effectuating or enforcing compliance with the terms of this Decree.

XVII. MODIFICATION

97. The terms of this Consent Decree, including any attached appendices, may be modified only by a subsequent written agreement signed by the United States, the State and Defendant. Where the modification constitutes a material change to this Consent Decree, it shall be effective only upon approval by the Court.

98. Any disputes concerning modification of this Decree, including any attached appendices, shall be resolved pursuant to Section X (Dispute Resolution), provided, however, that, instead of the burden of proof provided by Paragraph 77, the Party seeking the modification bears the burden of demonstrating that it is entitled to the requested modification in accordance with Federal Rule of Civil Procedure 60(b).

XVIII. TERMINATION

99. After (a) Defendant has completed the requirements of Section IV (Compliance Requirements) and obtained all permit modifications contemplated by this Consent Decree; has thereafter maintained continuous satisfactory compliance with this Consent Decree and those provisions of Defendant's modified permit covered by this Consent Decree for a period of 24 months (including demonstrating 24 months of compliance with the emission limits, as modified, through MPCA approved performance test results or MPCA approved emissions monitoring results); has complied with all other requirements of this Consent Decree; and has paid the civil penalty and any accrued stipulated penalties as required by this Consent Decree; or (b) Defendant permanently shuts down the Facility, has its Permit terminated, and has paid the civil penalty and any accrued stipulated penalties as required by this Consent Decree, then Defendant may serve upon the United States and the State a Request for Termination, together with all necessary supporting documentation.

100. Following receipt by the United States and the State of Defendant's Request for Termination, the Parties shall confer informally concerning the Request and any disagreement that the Parties may have as to whether Defendant has satisfactorily complied with the requirements for termination of this Consent Decree. If the United States, after consultation with

the State, agrees that the Decree may be terminated, the Parties shall submit, for the Court's approval, a joint stipulation terminating the Decree.

101. If the United States, after consultation with the State, does not agree that the Decree may be terminated, Defendant may invoke Dispute Resolution under Section X. However, Defendant shall not seek Dispute Resolution of any dispute regarding termination until at least 90 days after service of its Request for Termination.

XIX. PUBLIC PARTICIPATION

102. This Consent Decree shall be lodged with the Court for a period of not less than 30 Days for public notice and comment in accordance with 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the Consent Decree disclose facts or considerations indicating that the Consent Decree is inappropriate, improper, or inadequate. Defendant consents to entry of this Consent Decree without further notice and agrees not to withdraw from or oppose entry of this Consent Decree by the Court or to challenge any provision of the Decree, unless the United States has notified Defendant in writing that it no longer supports entry of the Decree.

XX. SIGNATORIES/SERVICE

103. Each undersigned representative of Defendant, the State, EPA, and the Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind the Party he or she represents to this document.

104. This Consent Decree may be signed in counterparts, and its validity shall not be challenged on that basis. Defendant agrees to accept service of process by mail with respect to all matters arising under or relating to this Consent Decree and to waive the formal service

requirements set forth in Rules 4 and 5 of the Federal Rules of Civil Procedure and any applicable Local Rules of this Court including, but not limited to, service of a summons.

XXI. INTEGRATION

105. This Consent Decree constitutes the final, complete, and exclusive agreement and understanding among the Parties with respect to the settlement embodied in the Decree and supersedes all prior agreements and understandings, whether oral or written, concerning the settlement embodied herein. Other than deliverables that are subsequently submitted and approved pursuant to this Decree, the Parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained in this Consent Decree.

XXII. FINAL JUDGMENT

106. Upon approval and entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment of the Court as to the United States, the State, and Defendant. The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

XXIII. APPENDICES

107. The following appendices are attached to and part of the Consent Decree:

Appendix A	RHF Mercury Permit Requirements -- Case-by-Case MACT Permit Requirements
Appendix B	Mercury Monitoring Provisions
Appendix C	Bag Leak Detection System Requirements for O&M
Appendix D	Party Contact Information

DATED and ENTERED this 26th day of June, 2017.

s/Richard H. Kyle
UNITED STATES DISTRICT JUDGE
DISTRICT OF MINNESOTA

FOR THE UNITED STATES OF AMERICA:

5/12/17
Date

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Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice

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FOR THE UNITED STATES OF AMERICA:

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Date

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FOR THE STATE OF MINNESOTA

Date: 3/16/17

Michelle Beeman for
JOHN LINC STINE
Commissioner
Minnesota Pollution Control Agency

Approved as to form and legality:

Attorney General of Minnesota

Date: 3/30/17

By: ANN E. COHEN
Assistant Attorney General
State of Minnesota
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FOR MESABI NUGGET DELAWARE, LLC:

3.15.17
Date

DAVID P. SKONALZE
VP IRON RESOURCES

APPENDIX A

RHF Mercury Permit Requirements – Case-by-Case MACT Permit Requirements

Req. No.	Req. Type	Req. Text	Citation
1	LIMIT	Mercury: less than or equal to 0.0086 lbs/hour using 30-day Block Average based on the hours of operation in a 30-day period. The Permittee shall determine compliance with this limit by continuously measuring mercury emissions using a mercury sorbent trap monitoring system as required by this Consent Decree and recording the number of hours of operation in each 30-day operating period. Compliance calculation: Mercury Emission rate = pounds of mercury emitted during 30-day block period/hours of operation during the 30-day block period "Hours of operation," for the purposes of calculating a 30-day block average, is the sum of all time periods within the 30-day period when dry balls are being fed to the rotary hearth furnace (RHF). "30-day block period," consists of 720-hour periods of time from 7:00 a.m. of day 1 to 6:59 a.m. on day 30. Three significant figures are required for all mercury measurements. All hours of operation measurements shall be to the 1/10th hour.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. State. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
2	CD	The Permittee shall demonstrate initial and continuous compliance with the mercury limit through use of a mercury sorbent trap monitoring system, in accordance with Appendix B of this Consent Decree. Compliance is demonstrated by using all quality-assured sorbent trap monitoring system data and the other required monitoring systems (e.g., flow rate and moisture monitoring systems) to calculate the arithmetic average emissions rate, expressed in units of pounds/hour, over a 30-day block period, and the average emissions rate is less than or equal to the mercury limit in this Consent Decree (less than or equal to 0.0086 lb Hg/hour using a 30-day block average). Initial compliance is demonstrated if the results of the first 30-day block period average emission rate calculated meets the mercury emissions limit.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn, Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800; Minn. R. 7007.3010
3	CD	Except during breakdowns, repairs, maintenance, or sorbent trap removal and replacement, the Permittee shall operate the mercury sorbent trap monitoring system at all times that dry balls are being fed to the RHF. The Permittee shall take all steps reasonably necessary to avoid breakdowns and minimize downtime of the sorbent trap monitoring system. These steps	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R.

		shall include, but are not limited to, operating and maintaining the sorbent trap monitoring system in accordance with best practices, and maintaining an adequate on-site inventory of spare parts or other supplies necessary to make rapid repairs to the equipment.	7007.0800, subps. 1-2; Minn. R. 7007.3010
4	CD	The Permittee shall develop and maintain a site-specific monitoring plan for the Hg sorbent trap monitoring system and any other monitoring system (i.e., flow rate and moisture systems) needed for routine operation of the sorbent trap monitoring system or to convert Hg concentrations to units of pounds per hour. The monitoring plan shall contain essential information on the continuous monitoring systems as specified in Appendix B of this Consent Decree. The monitoring plan shall also address conditions that define a sorbent trap monitoring system that is out of control consistent with 40 CFR Section 63.8(c)(7)(i) and for responding to out of control periods consistent with 40 CFR Sections 63.8(c)(7)(ii) and (c)(8). The monitoring plan shall be kept in electronic and hard copy format as required by Appendix B of this Consent Decree. The monitoring plan shall also contain the information specified in section 7.1.1.2 of Appendix B of this Consent Decree. Updates to the monitoring plan shall be made according to section 7.1.1.1 of Appendix B of this Consent Decree.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
5	CD	Until the Hg sorbent trap monitoring system is installed, certified under Appendix B, and operating, the Permittee shall conduct Hg emissions testing quarterly using EPA reference method 30B or other method approved by MPCA in the performance test plan approval.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
6	CD	The Permittee shall collect quality-assured Hg sorbent trap monitoring system data for all unit operating conditions, except startup and shutdown periods as defined in Appendix B of this Consent Decree. Emission rates determined during startup periods and shutdown periods are not to be included in the compliance determinations.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
7	CD	The Permittee shall calculate the pollutant mass emission rate in units of lb/hour using Equation 2 and Equation 3 in Appendix B of this Consent Decree as an interim step. The Permittee shall calculate the average mercury emission rate over the 30-day block averaging period using Equation 4 in Appendix B of this Consent Decree.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
8	CD	Install the sorbent trap monitoring system in the stack or at a location in the ductwork downstream of all emissions control devices, where the pollutant and diluents concentrations are representative of the emissions that exit to the atmosphere.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R.

			7007.0800, subps. 1-2; Minn. R. 7007.3010
9	CD	The Permittee shall quality-assure the data from the monitoring system in accordance with Appendix B of this Consent Decree. The Permittee shall calculate and record a 30-day block average Hg emission rate in lb/hour, updated within 30 days after the end of the 30-day block period. Each 30-day block average Hg emission rate shall be calculated using Equation 4 according to Section 6.2 of Appendix B to this Consent Decree. Section 7.1.3.3 of Appendix B of this Consent Decree explains how to reduce sorbent trap monitoring system data to an hourly basis (as an interim step, using Equations 2 and 3 in Sections 6.1 and 6.2 of Appendix B of this Consent Decree).	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
10	CD	The Permittee shall install, certify, operate and maintain the sorbent trap monitoring system according to Appendix B of this Consent Decree.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
11	CD	The Permittee shall install, operate, and maintain the flow rate and moisture monitoring systems at a location in the ductwork downstream of all emissions control devices, where the pollutant concentrations are representative of the emissions that exit to the atmosphere.	CAAA of 1990; Title I Condition: 40 CFR 63.43; Minn. Stat. Section 116.07, subds. 4a & 9; Minn. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010
12	CD	Submit the following notifications as applicable: • 40 CFR Section 63.8(e)(2) – Notification of performance evaluation • 40 CFR Section 63.8(f)(4) – Request to use alternative monitoring procedure • 40 CFR Section 63.9(c) – Request for extension of compliance • 40 CFR Section 63.9(h) – Notification of Compliance Status	CAAA of 1990; Title I Condition: 40 CFR 63.43; 40 CFR 63.8; 40 CFR 63.9; Minn. Stat. Section 116.07, subds. 4a & 9; Min. R. 7007.0100, subp. 7; Minn. R. 7007.0800, subps. 1-2; Minn. R. 7007.3010; Minn. R. 7017.2015; Minn. R. 7019.0100; and Minn. R. 7017.1010

APPENDIX B

Mercury Monitoring Provisions

1. General Provisions

1.1 *Applicability.* These monitoring provisions apply to the measurement of total vapor phase mercury (Hg) in emissions from the rotary hearth furnace (RHF) using a mercury sorbent trap monitoring system. The Hg sorbent trap monitoring system shall be capable of measuring the total vapor phase mercury in units of mass per time period, regardless of speciation.

1.2 *Initial Certification and Recertification Procedures.* The Permittee shall comply with the initial certification and recertification procedures in section 4 of this appendix.

1.3 *Quality Assurance and Quality Control Requirements.* The Permittee shall meet the applicable quality assurance requirements in section 5 of this appendix.

1.4 *Missing Data Procedures.* The Permittee is not required to substitute for missing data from Hg sorbent trap monitoring systems. Any process operating hour for which quality-assured Hg concentration data are not obtained is counted as an hour of monitoring system downtime.

2. Monitoring of Hg Emissions

2.1 Monitoring System Installation Requirements. Install the Hg sorbent trap monitoring system in the stack or at a location in the ductwork downstream of all emissions control devices, where the mercury concentrations are representative of the emissions that exit to the atmosphere.

2.2 Primary and Backup Monitoring Systems. The electronic monitoring plan described in section 7.1.1.2.1 of this appendix requires the Permittee to install, operate, maintain, and calibrate a Hg sorbent trap monitoring system. The primary system shall be used to monitor Hg emissions when the system is able to provide quality-assured data, i.e., when the system is "in control". The Permittee is also allowed, but not required, to install, operate, maintain, and calibrate a backup monitoring system, as follows:

2.2.1 *Redundant Backup Systems.* A redundant backup monitoring system may be a separate Hg sorbent trap monitoring system. A redundant backup system is one that is permanently installed at the unit or stack location in the ductwork downstream of all emission control devices, and is kept on "hot standby" in case the primary monitoring system is unable to provide quality-assured data. A redundant backup system shall be represented as a unique monitoring system in the electronic monitoring plan. Each redundant backup monitoring system shall be certified according to the applicable provisions in section 4 of this appendix and shall meet the applicable on-going QA requirements in section 5 of this appendix.

2.2.2 *Non-redundant Backup Monitoring Systems*. A non-redundant backup monitoring system is a separate Hg sorbent trap system that has been certified at a particular unit or stack location, but is not permanently installed at that location. Rather, the system is kept on "cold standby" and may be reinstalled in the ductwork downstream of all emission control devices in the event of a primary monitoring system outage. Except as otherwise provided in section 2.2.4.5

of this appendix, a non-redundant backup monitoring system may only be used for 720 hours per year at a particular stack or unit location.

2.2.3 *Quality Assurance Requirements for Non-redundant Backup Monitoring Systems and Temporary Like-kind Replacement Analyzers.* To quality-assure the data from non-redundant backup Hg monitoring systems and temporary like-kind replacement Hg analyzers, the following provisions apply:

2.2.3.1 When a certified non-redundant backup Hg sorbent trap monitoring system is brought into service, the Permittee shall follow the procedures for routine day-to-day operation of the system, in accordance with Performance Specification 12B in 40 CFR pt. 60, appendix B.

2.2.3.2 When a certified non-redundant backup Hg sorbent trap monitoring system or a temporary like-kind replacement Hg analyzer is brought into service, a calibration error test and linearity check shall be performed and passed. A single point system integrity check is also required, unless a NIST-traceable source of oxidized Hg was used for the calibration error test.

2.2.3.3 Each non-redundant backup Hg sorbent trap monitoring system or temporary like-kind replacement Hg analyzer shall comply with all required daily, weekly, and quarterly quality-assurance test requirements in section 5 of this appendix, for as long as the system or analyzer remains in service.

2.2.3.4 For the routine, on-going quality-assurance of non-redundant backup Hg monitoring system, a relative accuracy test audit (RATA) shall be performed and passed at least once every 8 calendar quarters.

2.2.3.5 To use a non-redundant backup Hg monitoring system or a temporary like-kind replacement analyzer for more than 720 hours per year, a RATA shall first be performed and passed.

2.3 Except during breakdowns, repairs, or sorbent trap removal and replacement, the Hg sorbent trap monitoring system shall be initiated when the input material feeder readings register the initiation of dry balls being fed to the RHF. Sampling shall continue at a proportional rate as defined in Performance Specification 12B Section 8.2.2 in 40 CFR pt. 60, appendix B, until the feeder readings register that dry balls are no longer being fed to the RHF or until the Hg sorbent trap monitoring system is manually disabled for periodic trap replacement or maintenance.

3. Mercury Emissions Measurement Methods

The following definitions, equipment specifications, procedures, and performance criteria are applicable to the measurement of vapor-phase Hg emissions, under relatively low-dust conditions (i.e., sampling in the stack or duct after all pollution control devices). The analyte measured by these procedures and specifications is total vapor-phase Hg in the flue gas, which represents the sum of elemental Hg and oxidized forms of Hg. The Hg monitoring system must be capable of measuring the total concentration of vapor phase Hg (regardless of speciation), in units of micrograms per dry standard cubic meter (µg/dscm).

3.1 *Definitions*.

3.1.1 *Sorbent Trap Monitoring System* means the equipment required to monitor Hg emissions continuously by using paired sorbent traps containing iodated charcoal (IC) or other suitable sorbent medium. The monitoring system consists of a probe, paired sorbent traps, an umbilical line, moisture removal components, an airtight sample pump, a gas flow meter, and an automated data acquisition and handling system. The system samples the stack gas at a constant proportional rate relative to the stack gas volumetric flow rate. The sampling is a batch process. The average Hg concentration in the stack gas for the sampling period is determined, in units of µg/dscm, based on the sample volume measured by the gas flow meter and the mass of Hg collected in the sorbent traps.

3.1.2 *Startup of the RHF* means periods when only natural gas is being fired in the furnace and no dry balls are being fed to the furnace.

3.1.3 *Shutdown of the RHF* means periods when only natural gas is being fired in the furnace and dry balls are no longer being fed to the furnace.

3.1.4 *Relative Accuracy Test Audit or RATA* means a series of nine or more test runs, directly comparing readings from the Hg sorbent trap monitoring system to measurements made with a reference stack test method. The relative accuracy (RA) of the monitoring system is expressed as the absolute mean difference between the monitoring system and reference method measurements plus the absolute value of the 2.5 percent error confidence coefficient, divided by the mean value of the reference method measurements.

3.1.5 *Hour of operation* or *operating hour* means any time when dry balls are being fed to the rotary hearth furnace (RHF). All hours of operation shall be measured to the 1/10th hour. Periods of startup and shutdown are not counted as hours of operation.

3.1.6 *Quality Assurance (QA) Operating Quarter* means a calendar quarter in which there are at least 168 hours of operation (as defined in this section).

3.1.7 *Grace Period* means a specified number of hours of operation after the deadline for a required quality-assurance test of a continuous monitor has passed, in which the test may be performed and passed without loss of data.

3.1.8 *Data Collection Period* means the time period in which a single set of paired sorbent traps are in use in the Hg monitoring system.

3.2 *Sorbent Trap Monitoring System.* A sorbent trap monitoring system (as defined in paragraph 3.1.1 of this appendix) shall be installed, maintained, and operated in accordance with Performance Specification 12B in 40 CFR pt. 60, appendix B. The system shall be certified in accordance with the provisions of section 4.1 of this appendix.

3.2.1 *Installation and Measurement Location.* For any additional monitoring systems needed to convert Hg concentrations to the desired units of measure (i.e., a flow monitoring system and a moisture monitor), install each monitoring system at a location that represents the emissions exiting to the atmosphere.

3.3 *Other Necessary Data Collection.* To convert the collected mercury mass to the units of the emissions standard (i.e., lbs/hour over a 30-day block average), additional data shall be collected, as described in paragraphs 3.3.1 - 3.3.3 of this section.

3.3.1 *Stack Gas Moisture Determination.* The stack gas moisture content shall be determined using a continuous moisture monitoring system or other means acceptable to the Administrator certified in accordance with the applicable provisions of 40 CFR pt. 75, appendix A. The following continuous moisture monitoring systems are acceptable: a continuous moisture sensor; or an oxygen analyzer (or analyzers) capable of measuring O_2 both on a wet basis and on a dry basis. The moisture monitoring system shall include as a component the automated data acquisition and handling system for recording and reporting both the raw data (e.g., hourly average wet-and dry-basis O_2 values) and the hourly average values of the stack gas moisture content derived from those data.

3.3.2 *Stack Gas Flow Rate Determination.* The stack gas flow rate shall be determined using a continuous gas flow rate monitoring system or other means acceptable to the Administrator certified in accordance with the applicable provisions of 40 CFR pt. 75, appendix A. The stack gas flow rate data shall be reduced to hourly data.

3.3.3 *Operating Hours Determination.* The hours of operation shall be determined using a device to indicate when raw materials are being fed to the rotary hearth furnace.

3.4 *Sorbent Trap Monitoring System Operation.* Routine operation of a sorbent trap monitoring system requires the use of a certified stack gas flow rate monitor, to maintain an established ratio of stack gas flow rate to sample flow rate, in accordance with section 8.2.2 Performance Specification 12B in 40 CFR pt. 60, appendix B.

4. CERTIFICATION AND RECERTIFICATION REQUIREMENTS

4.1 *Certification Requirements.* All Hg sorbent trap monitoring systems and the additional monitoring systems used to continuously measure Hg emissions in accordance with this appendix shall be certified in a timely manner, such that the initial compliance demonstration is completed in accordance with the schedule outlined in Consent Decree.

4.1.1 *Sorbent Trap Monitoring Systems*. For the initial certification of a sorbent trap monitoring system, only a RATA is required.

4.1.1.1 *Relative Accuracy Test Audit (RATA).* Perform the RATA of the Hg sorbent trap monitoring system at normal load. Acceptable Hg reference methods for the RATA include ASTM D6784-02 (Reapproved 2008), “Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)” (incorporated by reference, see 40 CFR §63.14) and Methods 29, 30A, and 30B in appendix A-8 to 40 CFR pt. 60. When Method 29 or ASTM D6784-02 is used, paired sampling trains are required. To validate a Method 29 or ASTM D6784-02 test run, calculate the relative deviation (RD) using equation 1 of this appendix, and assess the results as follows to validate the run. The RD shall not exceed 10 percent, when the average Hg concentration is greater than 1.0 µg/dscm. If the average concentration is ≤ 1.0 µg/dscm, the RD shall not exceed 20 percent. The RD results are also acceptable if the absolute difference between the two Hg concentrations does not exceed 0.2 µg/dscm. If the RD specification is met, the results of the two samples shall be averaged arithmetically.

$$RD = \frac{|C_a - C_b|}{C_a + C_b} * 100 \qquad \text{(Equation 1)}$$

Where:

$RD = Relative\ deviation\ between\ the\ Hg\ concentrations\ of\ samples$ a and b $(percent)$

$C_a = Hg\ concentration\ of\ Hg\ sample$ "a" $(\mu g/dscm)$

$C_b = Hg\ concentration\ of\ Hg\ sample$ "b" $(\mu g/dscm)$

4.1.1.1.1 *Special Considerations.* A minimum of nine valid test runs shall be performed, directly comparing the sorbent trap monitoring system measurements to the reference method. More than nine test runs may be performed. If more than nine test runs are performed, the results from a maximum of three test runs may be rejected so long as the total number of test results used to determine the relative accuracy is greater than or equal to nine; however, all data shall be reported including the rejected data. The minimum time per run is 21 minutes if Method 30A is used. If Method 29, Method 30B or ASTM D6784-02 (Reapproved 2008), "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)" (incorporated by reference, see 40 CFR §63.14) is used, the time per run shall be long enough to collect a sufficient mass of Hg to analyze. Complete the RATA within 168 unit operating hours, except when Method 29 or ASTM D6784-02 is used, in which case up to 336 operating hours may be taken to finish the test.

4.1.1.1.2 During the RATA, the monitoring system must be operated and quality-assured in accordance with Performance Specification 12B in 40 CFR pt. 60, appendix B, with the following exceptions for sorbent trap section 2 breakthrough:

4.1.1.1.2.1 For stack Hg concentrations >1 µg/dscm, ≤ 10% of section 1 Hg mass;

4.1.1.1.2.2 For stack Hg concentrations ≤1 µg/dscm and >0.5 µg/dscm, ≤20% of section 1 Hg mass;

4.1.1.1.2.3 For stack Hg concentrations ≤0.5 µg/dscm and >0.1 µg/dscm, ≤50% of section 1 Hg mass; and

4.1.1.1.2.4 For stack Hg concentrations ≤0.1 µg/dscm, no breakthrough criterion assuming all other QA/QC specifications are met.

4.1.1.1.3 The type of sorbent material used by the traps during the RATA shall be the same as for daily operation of the monitoring system; however, the size of the traps used for the RATA may be smaller than the traps used for daily operation of the system.

4.1.1.1.4 *Calculation of RATA Results*. Calculate the relative accuracy (RA) of the sorbent trap monitoring system, on a µg/scm basis, as described in section 12 of Performance Specification 2 in appendix B to 40 CFR pt. 60 (see equations 2-3 through 2-6 of

PS2). For purposes of calculating the relative accuracy, ensure that the reference method and monitoring system data are on a consistent moisture basis, either wet or dry. The main and alternative RATA performance specifications in Table A-1 apply to the sorbent trap monitoring system.

Table A-1 – Required Certification Tests and Performance Specifications for Hg Sorbent Trap Monitoring Systems

For this required certification test…	The main performance specification is…	The alternate performance specification is…	And the conditions of the alternate specification are…
RATA	20.0% RA	$\|RM_{avg} - C_{avg}\| + \|CC\| \leq$ 0.5 µg/scm	$RM_{avg} <$ 2.5 µg/scm

4.1.1.1.5 *Bias Adjustment*. Measurement or adjustment of Hg sorbent trap monitoring system data for bias is not required.

4.2 *Recertification.* Whenever the Permittee makes a replacement, modification, or change to a certified Hg sorbent trap monitoring system that may significantly affect the ability of the system to accurately measure or record pollutant concentrations, stack gas flow rates, or stack gas moisture content, the Permittee shall recertify the monitoring system. Furthermore, whenever the Permittee makes a replacement, modification, or change to the flue gas handling system or the unit operation that may significantly change the concentration or flow profile, the Permittee shall recertify the monitoring system. The same test performed for the initial certification of the monitoring system shall be repeated for recertification, unless otherwise specified by the Administrator. Examples of changes that require recertification include: replacement of a gas analyzer; complete monitoring system replacement, and changing the location or orientation of the sampling probe.

5. Ongoing Quality Assurance (QA) and Data Validation

5.1 Sorbent Trap Monitoring Systems.

5.1.1 Each sorbent trap monitoring system shall be continuously operated and maintained in accordance with Performance Specification (PS) 12B in 40 CFR pt. 60, appendix B. The QA/QC criteria for routine operation of the system are summarized in Table 12B-1 of PS 12B. Each pair of sorbent traps may be used to sample the stack gas for up to 360 operating hours.

5.1.2 For ongoing QA, periodic RATAs of the system are required.

5.1.2.1 The RATA frequency shall be annual, i.e., once every four QA operating quarters. The Permittee may use the provisions in section 5.1.2.4 of this appendix for RATA deadline extensions.

5.1.2.2 The RATA performance criteria specified in Table A-2 apply to the annual RATAS of the sorbent trap monitoring system.

Table A-2 – On-Going QA Test Requirements for Hg Sorbent Trap Monitoring Systems

Perform this type of QA test…	At this frequency…	With these qualifications and exceptions…	Acceptance criteria…
RATA	Once every four QA operating quarters	Test deadline may be extended for "non-QA operating quarters" up to a maximum of 8 quarters from the quarter of the previous test	≤ 20.0% RA when C_{avg} ≥ 2.5 µg/scm Or $\lvert RM_{avg} - C_{avg}\rvert + \lvert CC\rvert$ ≤ 0.5 µg/scm, if RM_{avg} < 2.5 µg/scm.
		720 operating hour grace period available	

5.1.2.3 A 720 unit or stack operating hour grace period is available for RATAs of the monitoring system.

5.1.2.4 The test frequency for the RATAs of the Hg sorbent trap monitoring system shall be annual, i.e., once every four QA operating quarters. For units that operate infrequently, extensions of RATA deadlines are allowed for non-QA operating quarters. Following a RATA, if there is a subsequent non-QA quarter, it extends the deadline for the next test by one calendar quarter. However, there is a limit to these extensions; the deadline may not be extended beyond the end of the eighth calendar quarter or in a 720 hours of operation grace period following that quarter. When a required annual RATA is done within a grace period, the deadline for the next RATA is three QA operating quarters after the quarter in which the grace period test is performed.

5.1.3 Data validation for sorbent trap monitoring systems shall be done in accordance with Table 12B-1 in Performance Specification 12B in 40 CFR pt. 60, appendix B. All periods of invalid data shall be counted as hours of monitoring system downtime.

5.2 *Flow Rate, and Moisture Monitoring Systems.* The on-going QA test requirements for these monitoring systems are specified in 40 CFR pt. 75, appendix B.

5.3 *QA/QC Program Requirements.* The Permittee shall develop and implement a quality assurance/quality control (QA/QC) program for the sorbent trap monitoring system that is used to provide data as required by this Consent Decree. At a minimum, the program shall include a written plan that describes in detail (or that refers to separate documents containing) complete, step-by-step procedures and operations for the most important QA/QC activities. Electronic storage of the QA/QC plan is permissible, provided that the information can be made available in hard copy to auditors and inspectors. The QA/QC program requirements for the flow rate and moisture monitoring systems described in section 3.3 of this appendix are specified in 40 CFR pt. 75, appendix B, section 1.

5.3.1 *General Requirements.*

5.3.1.1 *Preventive Maintenance.* Keep a written record of procedures needed to maintain the Hg sorbent trap monitoring system in proper operating condition and a schedule for those procedures. Include, at a minimum, all procedures specified by the manufacturers of the equipment and, if applicable, additional or alternate procedures developed for the equipment.

5.3.1.2 *Recordkeeping and Reporting.* Keep a written record describing procedures that will be used to implement the recordkeeping and reporting requirements of this appendix.

5.3.1.3 *Maintenance Records.* Keep a record of all testing, maintenance, or repair activities performed on any Hg sorbent trap monitoring system in a location and format suitable for inspection. A maintenance log may be used for this purpose. The following records shall be maintained: date, time, and description of any testing, adjustment, repair, replacement, or preventive maintenance action performed on any monitoring system and records of any corrective actions associated with a monitor outage period. Additionally, any adjustment that may significantly affect a system's ability to accurately measure emissions data shall be recorded and a written explanation of the procedures used to make the adjustment(s) shall be kept.

5.3.2 *Specific Requirements for Sorbent Trap Monitoring Systems.*

5.3.2.1 *Sorbent Trap Identification and Tracking*. Include procedures for inscribing or otherwise permanently marking a unique identification number on each sorbent trap, for chain of custody purposes. Keep records of the ID of the monitoring system in which each sorbent trap is used, and the dates and hours of each Hg collection period.

5.3.2.2 *Monitoring System Integrity and Data Quality*. Document the procedures used to perform the leak checks when a sorbent trap is placed in service and removed from service. Also document the other QA procedures used to ensure system integrity and data quality, including, but not limited to, gas flow meter calibrations, verification of moisture removal, and ensuring air-tight pump operation. In addition, the QA plan shall include the data acceptance and quality control criteria in Table 12B-1 in section 9.0 of Performance Specification 12B in 40 CFR pt. 60, appendix B. All reference meters used to calibrate the gas flow meters (e.g., wet test meters) shall be periodically recalibrated. Annual, or more frequent, recalibration is recommended. If a NIST-traceable calibration device is used as a reference flow meter, the QA plan shall include a protocol for ongoing maintenance and periodic recalibration to maintain the accuracy and NIST –traceability of the calibrator.

5.3.2.3 *Hg Analysis*. Explain the chain of custody employed in packing, transporting, and analyzing the sorbent traps. Keep records of all Hg analyses. The analyses shall be performed in accordance with the procedures described in section 11.0 of Performance Specification 12 B in 40 CFR pt. 60, appendix B.

5.3.2.4 *Data Collection Period*. State, and provide the rationale for, the minimum acceptable data collection period (e.g., one day, one week, etc.) for the size of sorbent trap selected for the monitoring. Address such factors as the Hg concentration in the stack gas, the capacity of the sorbent trap, and the minimum mass of Hg required for the analysis. Each pair of sorbent traps may be used to sample the stack gas for up to 360 hours of operation.

5.3.2.5 *Relative Accuracy Test Audit Procedures*. Keep records of the procedures and details peculiar to the sorbent trap monitoring systems that are to be followed for relative accuracy test audits, such as sampling and analysis methods.

6. Data Reduction and Calculations

6.1 *Data Reduction.*

6.1.1 For sorbent trap monitoring systems, determine the Hg concentration for each of the two sorbent traps for each data collection period using Equation 2, below:

$$C_{Hg} = \frac{M^*}{V_t} \quad \text{(Equation 2)}$$

Where:
C_{Hg} = Concentration of Hg for the collection period (ug/dscm)
M* = Total mass of Hg recovered from sections 1 and 2 of the sorbent trap (ug)
V_t = Total volume of dry gas metered during the collection period (dscm). For the purposes of this calculation, standard temperature and pressure are defined as 20 °C and 760 mm Hg, respectively.

When both sorbent traps meet the QC specifications of Performance Specification 12B in 40 CFR pt. 60, appendix B, the two measured Hg concentrations must be averaged arithmetically and the average value (defined as C_{Hg} and used in Equation 3) must be applied to each hour of the data collection period. Should one of the two sorbent trap samples or sampling systems either: (a) fail the post-monitoring leak check; or (b) have excessive section 2 breakthrough; or (c) fail to maintain the proper stack flow-to-sample flow ratio; or (d) fail to achieve the required section 3 spike recovery; or (e) is lost, broken, or damaged, provided that the other trap meets the acceptance criteria for all four of these QC specifications, the Hg concentration measured by the valid trap may be multiplied by a factor of 1.111 and then used as C_{Hg}. Further, if both traps meet the acceptance criteria for all four of these QC specifications, but the acceptance criterion for paired trap agreement is not met, the higher of the two Hg concentrations measured by the traps may be used as C_{Hg}, in lieu of invalidating the data from the paired traps.

6.1.2 For any operating hour in which valid data are not obtained for Hg concentration do not calculate the Hg emission rate for that hour. For the purposes of this appendix, 40 CFR pt. 75, appendix C substitute data values are not considered to be valid data.

6.1.3 For any operating hour in which valid data are not obtained for a parameter, other than Hg concentration, used in the emissions calculations (i.e., flow rate, moisture content), the last valid data value measured shall be substituted for that hour. Substitute data values shall only be used for no more than 10 consecutive operating hours.

6.1.4 Operating hours in which valid data are not obtained for Hg concentration are considered to be hours of monitor downtime.

6.2 *Calculation of Hg Emission Rates.* Use the calculation methods in this section to convert Hg concentration values to the units of the emission standard.

6.2.1 Calculate the Hg concentration for each operating hour in which valid data are obtained for all parameters, using Equation 3 of this section.

6.2.2 Use Equation 4 of this section to calculate the average Hg emission rate over the 30-day block period. The pound per hour Hg emission rate limit in this Consent Decree shall be met on a 30-day block average basis.

$$M_{Hg} = K * C_{Hg} * Q_s * (1 - B_w) \qquad \text{(Equation 3)}$$

Where:

M_{Hg} = Hg mass emission rate for the hour (lb/hr).

K = Units conversion constant: $6.24*10^{-11}$ lb-scm/µg-scf.

C_{Hg} = Hg concentration for the collection period, dry basis (µg/dscm), determined according to section 6.1.1 of this appendix.

Q_s = Stack gas volumetric flow rate for the hour (scf/hr), measured according to section 7.1.4 of this appendix

(NOTE: Use unadjusted flow rate values; bias adjustment is not required).

B_w = Moisture fraction of the stack gas, expressed as a decimal (equal to % H_2O/100), measured according to section 7.1.5 of this appendix.

$$E_{Hg} = \frac{\sum_{h=1}^{n} M_{Hg}}{n} \qquad \text{(Equation 4)}$$

Where:

E_{Hg} = Average Hg emission rate over the 30-day block averaging period

M_{Hg} = Hourly Hg emission rate for unit or stack operating hour “h” in the averaging period, from Equation 2 or Equation 3 of this section.

n = Number of operating hours for the RHF in the 30-day block averaging period

(NOTE: Do not include in the average non-operating hours with zero emission rates or hours where there was invalid data for Hg or a necessary parameter (as per Sections 6.1.2 and 6.1.3)).

7. Recordkeeping and Reporting

7.1 *Recordkeeping Provisions.* For the Hg sorbent trap monitoring systems and any related monitoring systems (i.e., flow rate and moisture systems)installed at the RHF, the Permittee shall maintain a file of all measurements, data, reports, and other information required by this appendix in a form suitable for inspection, for 5 years from the date of each record. The file shall contain the information in paragraphs 7.1.1 through 7.1.7 of this section.

7.1.1 *Monitoring Plan Records.* For the RHF, the Permittee shall prepare and maintain a monitoring plan for the Hg sorbent trap monitoring system and any related monitoring system (i.e., flow rate and moisture systems) needed for routine operation of a sorbent trap monitoring system or to convert Hg concentrations to units of pounds per hour as required by this Consent Decree.

7.1.1.1 *Updates.* Whenever the Permittee makes a replacement, modification, or change in a certified continuous monitoring system that is used to provide data as required by this Consent Decree (including a change in the automated data acquisition and handling system or the flue gas handling system) which affects information reported in the monitoring plan (e.g., a change to a serial number for a component of a monitoring system), the Permittee shall update the monitoring plan.

7.1.1.2 *Contents of the Monitoring Plan.* For the Hg sorbent trap monitoring system, the monitoring plan shall contain the information in sections 7.1.1.2.1 and 7.1.1.2.2, as applicable. For stack gas flow rate and moisture monitoring systems, the monitoring plan shall include the information in section 7.1.1.2.3, as applicable.

7.1.1.2.1 *Electronic.* The electronic monitoring plan records shall include the following: unit and stack ID numbers; monitoring location; the Hg monitoring methodologies used, Hg monitoring system information, including, but not limited to: Unique system and component ID numbers; the make, model and serial number of the monitoring equipment; the sample acquisition method; formulas used to calculate Hg emissions. The electronic monitoring plan shall be evaluated and submitted to the Administrator at R5enforcement@epa.gov and the Commissioner at AQRoutineReport.PCA@state.mn.us.

7.1.1.2.2 *Hard Copy.* Keep records of the following: schematics and/or blueprints showing the location of the Hg monitoring system and test ports; data flow diagrams; test protocols; monitor span and range calculations; miscellaneous technical justifications.

7.1.1.2.3 *Stack gas flow rate and moisture monitoring systems*. The monitoring plan records shall include electronic copies of the following: unit and stack ID numbers; monitoring location; the monitoring methodologies used, monitoring system information, including, but not limited to: Unique system and component ID numbers; the make, model and serial number of the monitoring equipment; the sample acquisition method; and formulas used to calculate flow rate and/or moisture content as applicable. Keep hard copy records of the following: schematics and/or blueprints showing the location of these monitoring systems and test ports; data flow diagrams; test protocols; and miscellaneous technical justifications.

7.1.2 *Operating Parameter Records.* The Permittee shall record the following information on operation of the RHF for each 30-day block period:

7.1.2.1 The RHF operating time rounded up to the nearest tenth of an hour.

7.1.3 *Hg Emissions Records.* The Permittee shall record the following information for the RHF in each 30-day block period:

7.1.3.1 The dates for each collection period;

7.1.3.2 Monitoring system and component identification codes, as provided in the monitoring plan;

7.1.3.3 The hourly Hg concentration (calculated according to Equation 3 in section 6.2 of this appendix), if quality-assured hourly values are obtained for moisture and stack flow (μg/scm, rounded to three significant figures). Note that when a quality-assured Hg concentration value is obtained for a particular data collection period, that single concentration value is applied to each operating hour of the data collection period.

7.1.3.4 A special code, indicating whether or not a quality-assured Hg concentration is obtained for the hour;

7.1.3.5 A special code, indicating that the Hg emission rate was not calculated for the hour or any of the other necessary parameters are not obtained for the hour. For the purposes of this appendix, substitute data values for stack gas flow rate and moisture content are not considered to be valid data.

7.1.3.6 The average flow rate of stack gas through each sorbent trap (in appropriate units, e.g. liters/min, cc/min, dscm/min);

7.1.3.7 The gas flow meter reading (in dscm, rounded to the nearest hundredth), at the beginning and end of the collection period;

7.1.3.8 The ratio of the stack gas flow rate to the sample flow rate, as described in section 12.2 of Performance Specification 12B in 40 CFR pt. 60, appendix B; and

7.1.3.9 The measured Hg emissions rate in lbs/hr using a 30-day block average period (calculated according to Equation 4 in Section 6.2 of this appendix, rounded to three significant figures), if valid values of Hg concentration and all other required parameters (stack gas volumetric flow rate and moisture data) are obtained for the data collection periods.

7.1.4 *Stack Gas Volumetric Flow Rate Records.*

7.1.4.1 The Permittee shall keep hourly flow rate records as follows:

7.1.4.1.1 Component system identification code;

7.1.4.1.2 Dates for each collection period;

7.1.4.1.3 Hourly volumetric flow for the data collection period (in scf, rounded to the nearest thousand).

7.1.5 *Records of Stack Gas Moisture Content.*

7.1.5.1 Correction of hourly Hg concentration data for moisture is required when converting Hg concentrations to the units of the Hg emissions limit.

7.1.5.2 The Permittee shall keep hourly records of the stack gas moisture content, as follows:

7.1.5.2.1 Component system identification code;

7.1.5.2.2 Dates for each collection period;

7.1.5.2.3 Moisture content of flue gas (percent, rounded to the nearest tenth).

7.1.6 *Certification and Quality Assurance Test Records.* For any Hg sorbent trap monitoring systems used to provide data as required by this Consent Decree, record the following certification and quality-assurance information:

7.1.6.1 The reference method readings for each test run and the calculated relative accuracy results for all RATAs of the Hg sorbent trap monitoring system;

7.1.6.2 Supporting information for all required RATAs of the Hg monitoring system, including records of the test dates, the raw reference method and monitoring system data, the results of sample analyses to substantiate the reported test results, and records of sampling equipment calibrations;

7.1.6.3 Records of the results of all analyses of the sorbent traps used for routine daily operation of the system, and information documenting the results of all leak checks and the other applicable quality control procedures described in Table 12B-1 of Performance Specification (PS) 12B in 40 CFR pt. 60, appendix B.

7.1.6.4 For stack gas flow rate and moisture monitoring systems, the Permittee shall keep records of all certification, recertification, diagnostic, and on-going quality-assurance tests of these systems.

7.2 Reporting Requirements.

7.2.1 *General Reporting Provisions.* The Permittee shall comply with the following requirements for reporting Hg emissions from the RHF:

7.2.1.1 Notifications, in accordance with paragraph 7.2.2 of this section;

7.2.1.2 Monitoring plan reporting, in accordance with paragraph 7.2.3 of this section;

7.2.1.3 Certification, recertification, and QA test submittals, in accordance with paragraph 7.2.4 of this section; and

7.2.1.4 Electronic quarterly report submittals, in accordance with paragraph 7.2.5 of this section.

7.2.2 *Notifications.* The Permittee shall provide the Administrator and Commissioner the following notifications:

7.2.2.1 Notification of the actual date of initial startup of the monitor: the Permittee shall notify the Administrator and the Commissioner of the actual date of initial startup of the Hg monitoring system no later than 15 days after initial startup of the Hg monitoring system.

7.2.3 *Monitoring Plan Reporting.* The Permittee shall make electronic and hard copy monitoring plan submittals as follows:

7.2.3.1 Submit the electronic and hard copy information in section 7.1.1.2 of this appendix pertaining to the Hg, flow rate, and moisture monitoring systems at least 21 days prior to initial startup of the Hg sorbent trap monitoring system.

7.2.3.2 Whenever an update of the monitoring plan is required, as provided in section 7.1.1.1 of this appendix, an electronic monitoring plan information update shall be submitted either prior to or concurrent with the quarterly report for the calendar quarter in which the update is required.

7.2.3.3 All electronic monitoring plan submittals and updates shall be made to the Administrator and the Commissioner. Hard copy portions of the monitoring plan shall be kept on record according to section 7.1 of this appendix.

7.2.4 *Certification, Recertification, and Quality-Assurance Test Reporting.* Except for daily QA tests of the required monitoring systems (i.e., calibration error tests and flow monitor interference checks), the results of all required certification, recertification, and quality-assurance test described in section 7.1.7 of this appendix (except for test results previously submitted) shall be submitted electronically, either prior to or concurrent with the relevant quarterly electronic emissions report.

7.2.5 *Quarterly Reports.*

7.2.5.1 Beginning with the report for the calendar quarter in which the initial compliance demonstration is completed, the Permittee shall submit electronic quarterly reports to the Administrator and the Commissioner.

7.2.5.2 The electronic reports shall be submitted within 30 days following the end of each calendar quarter. If the RHF does not operate, the Permittee shall submit the report indicating the RHF did not operate and provide the beginning and end date of the time when the RHF was not operating.

7.2.5.3 Each electronic quarterly report shall include the following information:

7.2.5.3.1 The date of report generation;

7.2.5.3.2 Facility identification information;

7.2.5.3.3 The information in sections 7.1.2 and 7.1.3.9 of this appendix; and

7.2.5.3.4 The results of all daily flow monitor interference checks.

7.2.5.4 *Compliance Certification.* Based on reasonable inquiry of those persons with primary responsibility for ensuring that all Hg emissions from the RHF have been correctly and fully monitored, the Permittee shall submit a compliance certification in support of each electronic quarterly emissions monitoring report. The compliance certification shall include a statement by a responsible official with that official's name, title, and signature, certifying that, to the best of his or her knowledge, the report is true, accurate, and complete.

APPENDIX C

Bag Leak Detection System Requirements for Operation and Maintenance

Defendant must operate and maintain the bag leak detection systems identified in this Consent Decree according to the paragraphs below.

1. Specifications:

   a. The bag leak detection system must be certified by the manufacturer to be capable of detecting PM emissions at concentrations of 1 milligram per dry standard cubic meter (0.00044 grains per actual cubic foot) or less.

   b. The bag leak detection system sensor must provide output of relative PM loadings. The Defendant shall continuously record the output from the bag leak detection system using electronic or other means (e.g., using a strip chart recorder or a data logger).

   c. The bag leak detection system must be equipped with an alarm system that will be activated when the system detects an increase in relative particulate loading over the alarm set point established according to paragraph (d) of this section, and the alarm must be located such that it can be noticed by the appropriate plant personnel.

   d. In the initial adjustment of the bag leak detection system, the Defendant shall establish, at a minimum, the baseline output by adjusting the sensitivity (range) and the averaging period of the device, the alarm set points, and the alarm delay time.

   e. Following initial adjustment, the Defendant shall not adjust the averaging period, alarm set point, or alarm delay time without approval from the EPA and MPCA, except as provided in paragraph (f) of this section.

f. Once per quarter, the Defendant may adjust the sensitivity of the bag leak detection system to account for seasonal effects, including temperature and humidity, according to the procedures identified in the site-specific monitoring plan required by paragraph (2) of this section.

g. The Defendant shall install the bag leak detection sensor downstream of the fabric filter.

h. Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors.

2. The Defendant shall develop and submit to EPA and MPCA in accordance with Section V for approval of a site-specific monitoring plan for each bag leak detection system. The Defendant shall operate and maintain the bag leak detection system according to the site-specific monitoring plan at all times. Each monitoring plan must describe:

a. Installation of the bag leak detection system;

b. Initial and periodic adjustment of the bag leak detection system, including how the alarm set-point will be established;

c. Operation of the bag leak detection system, including quality assurance procedures;

d. How the bag leak detection system will be maintained, including a routine maintenance schedule and spare parts inventory list;

e. How the bag leak detection system output will be recorded and stored; and

f. Corrective action or response step procedures as specified in paragraph (g) of this section.

g. For each bag leak detection system, the Defendant shall initiate procedures to determine the cause of every alarm within 1 hour of the alarm. Except as provided for under paragraph (h) of this section, the cause of the alarm must be alleviated within 3 hours of the time the alarm occurred by taking response steps as necessary. Corrective actions/response steps may include, but are not limited to the following:

i. Inspecting the fabric filter for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in PM emissions;
ii. Sealing off defective bags or filter media;
iii. Replacing defective bags or filter media or otherwise repairing the control device;
iv. Sealing off a defective fabric filter compartment;
v. Cleaning the bag leak detection system probe or otherwise repairing the bag leak detection system; or
vi. Shutting down the process producing the PM emissions.

h. In approving the site-specific monitoring plan required in paragraph (g) of this section, the EPA and MPCA may allow more than 3 hours to alleviate specific conditions that cause an alarm if the Defendant identifies the condition that could lead to an alarm in the monitoring plan, adequately explains why it is not feasible to alleviate the condition within 3 hours of the time the alarm occurred, and demonstrates that the requested additional time will ensure alleviation of the condition as expeditiously as practicable.

APPENDIX D

Contact Information for the Parties to
United States and State of Minnesota v. Mesabi Nugget Delaware, LLC

Notice or submission to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
Box 7611 Ben Franklin Station
Washington, DC 20044-7611
Re: DOJ No. 90-5-2-1-06944/1
eescasemanagement.enrd@usdoj.gov

Notice or submission to EPA:

Air Enforcement Division Director
U.S. Environmental Protection Agency
Office of Civil Enforcement
Air Enforcement Division
U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Mail Code: 2242A
Washington, DC 20460

and

Molly Smith
U.S. Environmental Protection Agency
Region 5
AE-17J
77 West Jackson Blvd.
Chicago, IL 60604

Including an electronic copy to:
Smith.Molly@epa.gov

and

Patrick Miller
U.S. Environmental Protection Agency
Region 5
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77 West Jackson Blvd.
Chicago, IL 60604

Including an electronic copy to:
Miller.Patrick@epa.gov

and

James Morris
U.S. Environmental Protection Agency
Region 5
C-14J
77 West Jackson Blvd.
Chicago, IL 60604

Including an electronic copy to:
Morris.James@epa.gov

Notice or submission to the State:

Steve Palzkill
Air Quality Compliance & Enforcement
Minnesota Pollution Control Agency
525 Lake Avenue South, Suite 400
Duluth, MN 55802

Including an electronic copy to:
Steven.Palzkill@state.mn.us