# Revised MPCA Response to Comments Received during the Public Comment Period on the Dual Notice of Intent to Adopt Rules Governing Mercury Air Emissions Reporting and Reduction, Minnesota Rules, Chapters 7005, 7007, 7011, and 7019

The Minnesota Pollution Control Agency (MPCA) placed the Dual Notice of Intent to Adopt Rules on public notice in the *State Register* from December 2, 2013, through January 17, 2014. The MPCA received thirteen comment letters and one e-mail on the proposed rules during the public comment period. Comments fell into two areas: general comments about the overall rule, and comments about specific rule parts and rule language. The MPCA's rationale for changes it will make to the proposed rules as a result of the comments received on specific rule parts is provided in the Order Adopting Rules. The MPCA's response to the general comments and its response to comments on specific rule parts where no change is proposed are provided in this Response to Comments document.

## A. List of interested parties

The following is a list of interested parties who submitted written comments to the MPCA during the public notice comment period from December 2, 2013, through January 17, 2014.

1. Letter from Mark Thoma, Otter Tail Power Company, received via e-mail on January 7, 2014;
2. Letter from Margaret Sieffert, US Environmental Protection Agency, Region 5, received via e-mail on January 15, 2014;
3. Letter from Louis Knieper, Southern Minnesota Beet Sugar Cooperative, received via e-mail on January 16, 2014;
4. Letter from Joy Wiecks, Fond du Lac Band, received via e-mail on January 16, 2014;
5. Letter from Greg French, Virginia Department of Public Utilities, received via e-mail on January 17, 2014;
6. Letter from Richard Rosvold, Xcel Energy, received via e-mail on January 17, 2014;
7. Letter from Jeff Hansen, Mesabi Nugget, received via e-mail on January 17, 2014;
8. Letter from Scott Knudson, Fibrominn LLC, received via e-mail on January 17, 2014;
9. Letter from Chrissy Bartovich, United States Steel Corporation (US Steel), received via e-mail on January 17, 2014;
10. Letter from Lloyd Grooms and Tony Kwilas, Minnesota Chamber of Commerce, received on January 17, 2014;
11. Letter with Exhibits 1-7, from Jaime Johnson, ArcelorMittal Minorca Mine Inc.; Scott Gischia, Cliffs Natural Resources; and Chrissy Bartovich, United States Steel Corporation, (referenced in this document as the "Taconite Companies") received via e-mail on January 17, 2014;
12. E-mail from Melissa Weglarz, Minnesota Power, received on January 17, 2014;
13. Letter from Scott Gischia, Cliffs Natural Resources, received on January 17, 2014;
14. Letter from Douglas Stolowski, Gerdau St. Paul Steel Mill, received on January 17, 2014

## B. General comments

### 1. MPCA's proposed rule is premature and would undermine years of collaborative voluntary efforts.

**Comment 1:** ArcelorMittal Minorca Mine, Cliffs Natural Resources, and US Steel (Taconite Companies) submitted a joint comment letter containing extensive comments on the need for this rule. One of several concerns is that the rule is premature. The Taconite Companies commented that MPCA should not promulgate a rule until a taconite furnace technology that can meet the goal of a 75% reduction in mercury emissions by 2025 is identified and tested. The Implementation Plan recognized that this technology did not yet exist. Therefore, the commenters believe the MPCA should not mandate a reduction and should instead allow the facilities to continue testing mercury reduction technology (*letter comment #IA*).

The Taconite Companies also offered a series of comments on the infeasibility of achieving the proposed mercury reduction of 72%. The Taconite Companies commented that "Issuing any rule mandating reductions before a viable technology is identified and tested is inconsistent with the Strategy Framework and Implementation Plan, which set a goal of a 75% reduction in mercury emissions by 2025. The technology vetted to date has demonstrated only a 25%-61% reduction, which falls far short of the 72% reduction proposed by MPCA." (*letter comment #IB, page 8*).

**Response:** The purpose of the Statewide Mercury Total Maximum Daily Load (TMDL) study and its Implementation Plan is to address impairments in Minnesota's waters. To achieve the water quality standard, which is expressed as the concentration of mercury in fish, reductions in atmospheric deposition is needed. Achieving the reduction goal will contribute to protecting Minnesota citizens who eat locally caught fish.

Minnesota cannot achieve the water quality standards without action. The TMDL Implementation Plan lays out the actions the stakeholders will take. The schedule for reductions from emitters in Minnesota, including taconite facilities, cannot be accomplished without steady progress. The Statement of Need and Reasonableness (SONAR) contains a recital of the history of many voluntary programs and initiatives used to secure permanent air emission reductions (pages 70-72). That recital demonstrates that little action occurred with voluntary measures. Given that history, the MPCA is acting on stakeholder commitments to address the mercury contamination problem by putting the processes agreed to into a rule. To ensure that progress is made, reduction plans are being required.

The ferrous processing industry is one of the last major mercury-emitting industry sectors in Minnesota to undertake efforts to reduce mercury emissions. The Implementation Plan and this rule recognize that research is underway to identify control solutions, but is not yet complete. As a result, the rule provides until 2018, a very long time horizon, to submit a mercury emission reduction plan. Mercury reduction technology trials at taconite facilities are underway and show great promise. Technical issues remain, but appear resolvable within the time frames agreed to and provided in the rule.

The MPCA believes this rule is well-timed. The Taconite Companies face ambient air issues for other pollutants that may require investments in air pollution controls within the next five to seven years, coinciding with the requirements to address mercury reductions. These issues include sulfur dioxide emission reductions to comply with federal National Ambient Air Quality Standards (NAAQS) for sulfur dioxide to either avoid or address non-attainment designation. The MPCA believes it is most efficient for the companies, and the MPCA staff, to address these issues with multi-pollutant control strategies that include mercury.

***Technical Feasibility of Mercury Controls***

At taconite facilities, most of the mercury emitted is elemental (referred to as "gas" and/or "vapor phase" mercury) and easily escapes control in the wet scrubbers used for particulate matter (PM) capture[1]. Adding an oxidant like halogenated carbon will convert the mercury to an oxidized species which is readily captured on carbon, a particulate. The Minnesota Taconite Mercury Control Advisory Committee (MTMCAC), a group of industry, state, and academic technical experts, was formed in 2009 to help the taconite industry achieve a 75% reduction in industry-wide stack gas mercury emissions by 2025. Research conducted by this group from 2010-2012 (referred to by industry in its correspondence as "Phase 1") focused on testing activated and brominated carbon sorbents to improve mercury capture in existing taconite processing plants. Six projects were selected and conducted using combined funds from the Minnesota Department of Natural Resources (MDNR) Environmental Cooperative Research Program, six Minnesota participating taconite companies, and a $1.5 million grant from the United States Environmental Protection Agency (USEPA), Great Lakes Restoration Initiative. The MDNR administered the grant and managed the overall project.

Researchers noted during testing in Phase I that "while the [existing, wet] particulate scrubber is effective for capturing the taconite dust entrained in the flue gas, it is less effective in capturing the powdered carbon additive. Increases in

[1] Stack testing has been conducted by the facilities and the Minnesota Department of Natural Resources (MDNR). The MDNR has made their studies available at http://www.dnr.state.mn.us/lands_minerals/dnr_hg_research.html. The first study report was released in 2002.

particulate mercury emissions suggest that the tested technology requires higher particulate capture efficiencies to achieve 75% mercury reduction" [2]. (*Emphasis added*).

Further, "of the methods considered, direct carbon injection, fixed bed reactors, and post-scrubber bag houses were all found to have the potential to control mercury at levels needed for the industry to achieve its 75% 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."[3] (*Emphasis added*).

Commenters provide a summary from Phase 1 of expected mercury control performance in their Exhibit 1, page 9:

Table 3 Kepner-Tregoe Analysis - Summary of Results

| Technology | Positive Attributes | Negative Attributes |
|---|---|---|
| Monolithic Polymer Resin Adsorber | Performance and many co-benefits at reasonable costs. | Very early in development, commercial risk. Not commercially available, therefore not fully evaluated. |
| ACI Injection | Reasonable performance at very low cost. | Limited specific experience. |
| Oxidant Chemical Addition | Reasonable performance at very low cost. Has been trialed on actual waste gas. | Mixed results with many different oxidants. |
| ACI+ Fabric Filter | Good performance. Good co-benefits. | Large footprint, high pressure drop. |
| Fixed Bed Adsorber | Good performance. | Very large footprint, high pressure drop. Very high capital cost. |
| Fixed Bed Adsorber + Fabric Filter | Good performance. Good co-benefits. | Largest footprint, highest pressure drop. Very high capital cost. |
| Monolithic Honeycomb Adsorption | | Not commercially available, therefore, not fully evaluated. |

In the commenters' Exhibit 1, Table 3 above, activated carbon injection (ACI) is described as providing reasonable performance at a very low cost, while ACI with a fabric filter is described as providing good performance with good co-benefits, conclusions reached during Phase I based on the pilot testing results. The facilities conducted further testing of ACI Injection-only during Phase II testing with the full understanding that it is the least expensive option, but its ability to control mercury is expected to be *less* than when ACI is used with a fabric filter. Taconite companies have thus undertaken trials in Phase II of a technology that appears to be the least costly, not necessarily the most effective.

The commenters report that the data from Phase II testing are available but only made them available to the MPCA for review on May 28, 2014, 131 days after the comment period closed. The commenters did not include the technical data with their comments submitted January 17, the close of the comment period. In addition, the commenters discussed results at only two facilities in the written comments.

- "…the Phase II testing at Hibbing Taconite achieved an 81% reduction in gaseous phase mercury, but only a 41% reduction in total mercury." (*Exhibit 2 page 8*).
- "The screening tests showed that an ACI rate of 3 lb/mmacf was sufficient to achieve the goal of 75% gas phase mercury (HgG) reductions….M30B results, using the modified M30B procedure, show that total Hg reduction at 3 pounds/mmacf of ACI was 57%. Therefore, the goal of 75% total Hg reduction is not attainable at Minorca. The Hg-CEMS showed the gas phase Hg removal was 79% at 3 pounds/mmacf. Particulate phase Hg in the stack gas significantly increased with ACI in Stacks C and D. The gas-phase mercury Hg-CEMS values agreed well with the modified gas-phase mercury M30B data, but not with the total (gas-phase and particulate phase) M30B Hg values." *(Exhibit 2, pages 10-11)*.

[2] Berndt, 2012. http://files.dnr.state.mn.us/lands_minerals/reclamation/berndt_2012_final.pdf p. 6.
[3] Berndt, 2012. P. 2.

Due to the taconite companies' failure to submit the Phase II reports during the comment period, the MPCA has not been able to conduct its standard review of stack test reports to verify and confirm results. The MPCA believes that proper review of the six performance tests by technical staff and scientists at the MPCA and the MDNR will require several months. Current workloads at the two agencies will not allow for the initiation of reviews for several months. Therefore, the MPCA at this time cannot determine if the comments describing the performance test results can be broadly applied to all six taconite facilities and their multiple furnaces, or just the two furnaces for which results are discussed.

However, if we assume the claims for the two facilities discussed are accurate, the statements reinforce the MPCA's position taken in its technical analysis of mercury controls: the facilities are demonstrating that ACI will achieve mercury reductions of 72%. Greater mercury removal efficiencies are potentially possible, *provided* PM capture is improved. The testing described above is demonstrating that ACI injection is converting gaseous mercury to particulate form. Because the wet scrubbers are not controlling the additional PM as carbon very well, the carbon with mercury now in it is escaping the wet scrubbers and is depressing the overall mercury reductions.

The Taconite Companies' conclusion that a 75% reduction at Minorca Mine is not attainable might be accurate for ACI injection alone, but it is not a conclusion about whether a 75% reduction is technically achievable, ever. To use ACI, Minorca Mine and Hibbing Taconite will likely have to evaluate improved PM capture. As discussed in Phase I, small sized particulate is difficult to capture with a wet scrubber. Other options are possible, including those identified by the commenters: Minorca Plant modifications in Exhibit 1 described installing a fabric filter or electrostatic precipitator to handle additional PM loading. Facilities could also evaluate completely changing the air pollution control train to multi-pollutant controls so that an indurating unit does not rely on wet scrubbers for PM control. That possibility is described in options for United Taconite in Exhibit 5 and commenters provided their estimates of costs for installing dry acid gas scrubbing with fabric filters. These options are multi-pollutant — they are designed to control sulfur dioxide, mercury and particulate matter, potentially resolving many ambient air impact issues facing the taconite companies. Several furnaces are already scheduled to install dry controls by 2025, thus these companies can plan for additional PM capture. Regardless, the MPCA appropriately identified the requirement for additional PM capture in its review of mercury control technology feasibility and associated costs in its estimate of costs related to this rule in Attachment 7 to the SONAR.

The proposed rule also offers flexibility in meeting the reductions, and the commenters did not remark on it. Reductions can be accomplished between multiple units, or facilities, as discussed in the SONAR (page 22). In this way, an owner might seek to "over-control" at one unit or facility to avoid investments in all units or facilities.

Alternatively, facilities could investigate options that do not rely on injecting a carbon sorbent into the flue gases, thereby avoid making investments in PM capture. The commenters describe in Exhibit 1 their interest in advancing the development of mercury control using the sorbent polymer composite manufactured by GORE which claims to remove mercury in wet scrubbers without additional sorbent injection, thereby eliminating the increased PM capture requirements. This technology holds considerable promise. The GORE technology is installed at full-scale at Xcel Energy's coal-fired electric generating station Sherco in Becker, Minnesota. This is a significant installation because this facility is the largest electric generating station in Minnesota as well as the largest air pollution emitter. Xcel is relying on the GORE technology, coupled with activated carbon injection, at Units 1 and 2 to meet the 90% mercury emissions reduction requirements by December 2014 established in Minnesota statute as well as the upcoming federal mercury control requirements. The MPCA has not yet been provided compliance data for this installation.

It is the potential that this technology offers in addressing the shortcomings of ACI injection that leads the MPCA to agree to the Taconite Companies' request to defer the submittal date for a reduction plan for the ferrous processing industry. The MPCA will modify the rule to provide the ferrous processing industry more time to complete its research and prepare a reduction plan (part 7007.0502, subpart 4.B). The modified rule now proposes that the industry submit a plan by December 2018, a date extension of two years. Reductions must be achieved by 2025, which is unchanged. The MPCA is providing the extension to allow the facilities sufficient time to conduct long-term testing of the technology, as well as make decisions related to other concurrent air pollutant control issues (see response to comment 5a).

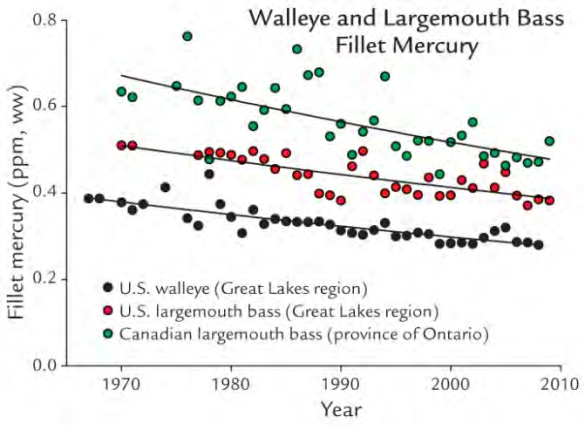
The mercury percent reduction proposed by the rule, 72%, is technically achievable and remains a reasonable mercury reduction for the ferrous processing industry. The timing of this rule provides for sufficient time to further investigate PM control options, or different mercury control technologies, like the GORE technology. Mercury control options may also include multi-pollutant controls, allowing a facility to address multiple ambient air program issues.

## 2. The rule does not have a legal and factual basis because there is no analysis of whether there is a causal link between taconite plant mercury emissions and elevated mercury levels in fish in Minnesota water bodies.

**Comment 2:** The Taconite Companies commented that the proposed rule lacks analysis of whether there is a causal link between the taconite industries' mercury emissions and the elevated mercury in fish at any Minnesota water body. "Despite the very small fraction of overall mercury emissions attributable to the taconite industry and the fact that the composition of those emissions makes them less likely to cause fish consumption problems, MPCA did nothing to assess the causal relationship between mercury emissions from the taconite industry and the impairment of any lake or stream segment. Instead, the MPCA relied exclusively on "the proportionality principle" which essentially assumes that all mercury is created equal and will have the same effect everywhere" (*letter comment # II, page 10*). Comments in Exhibit 3 on studies evaluating fish concentration trends review selected studies of fish mercury concentrations. The commenters suggested in Exhibit 3 that the MPCA could follow a "conceptual methodology" to estimate the relationship between taconite facilities and impaired waters.

**Response:** Mercury emissions have dropped regionally and locally even while global emissions have increased. As shown in Figure 1, in spite of the global increase in mercury emissions, mercury contamination of fish in the inland lakes of the Great Lakes region has decreased. Although there may be other contributing factors, the trend suggests that local and regional reductions in mercury releases are important to achieving water quality standards and removing mercury impairments. These were the findings of a scientific synthesis of information on mercury in air, water, fish and wildlife through the USEPA-funded Great Lakes Air Deposition program[4]. As mercury inputs into the water bodies' ecosystems decrease, mercury in fish is also predicted to decline. Minnesota's 2014 Clean Water Fund Performance Report[5] includes mercury trends in fish and air emissions as an outcome measure; the latest results show a downward trend in both.

**Figure 1. Fish fillet mercury concentrations averaged by year across multiple sites in the Great Lakes and inland water bodies in the US Great Lake states and the province of Ontario.**




The MPCA has the authority to adopt rules and standards for the prevention, abatement or control of air or water pollution (Minn. Stat. 116.07, Subd. 4 (a)). In order to adopt rules, it is not necessary for the MPCA to create a causal relationship between a specific facility and the environmental harm being addressed. In this instance, the scientific

[4] Evers. D. et.al. 2011. Great Lakes Mercury Connections: The Extent and Effects of Mercury Pollution in the Great Lakes Region. Biodiversitu Research Institute. Gorham, Maine. Report BRI 2011-18. http://www.Briloon.org/mercuryconnections/Greatlakes
[5] http://www.legacy.leg.mn/funds/clean-water-fund/clean-water-fund-performance-reports

community has concluded that mercury releases to the atmosphere must be reduced to reduce mercury contamination in the environment.

***The Proportionality Principle***

In support of the claim that causality must be demonstrated, the Taconite Companies criticized the scientific assumptions and analysis that were used in establishing Minnesota's Statewide Mercury TMDL. In particular, they disagreed with the assumption of the conceptual model, referred to as "the proportionality principle". This complaint is not relevant to this rulemaking proceeding. Comments regarding the Mercury TMDL should have been offered during the development of the TMDL itself, which included a public notice and comment process in 2006 that followed the requirements of the Clean Water Act. Concerns about the process, science and analysis related to the Mercury TMDL were addressed at that time. The scope of this rulemaking does not extend back to the TMDL process which concluded several years ago.

With that in mind, the MPCA nonetheless stands by its decision to use the proportionality principle to support some of its choices in the mercury rule. The MPCA's proportionality principle relies on USEPA's Mercury Maps model of the relationship between mercury deposition and mercury concentrations in fish tissue, which in turn followed the recommendations of the National Research Council. Later research demonstrates continued support for the proportionality principle. In addition, the MPCA has been unable to identify any other approach that is sufficiently reliable or developed to justify relying on it.

The MPCA's most extensive explanation for the proportionality principle is in Section 5.2 of the Mercury TMDL, attached to the SONAR as Attachment 2 http://www.pca.state.mn.us/index.php/view-document.html?gid=8507. The MPCA relied on USEPA's Mercury Maps approach to establish the relationship between mercury inputs to water bodies and fish concentrations[6]. USEPA reviewed and commented on the draft and final Mercury TMDL and had no objections to the use of the proportionality principle in Minnesota's Statewide Mercury TMDL. USEPA went on to approve the TMDL in March 2007.

The Mercury Maps model states that for long-term steady state conditions, reductions in fish tissue concentrations are expected to track linearly with reductions in air deposition watershed loads. The model used by USEPA is a reduced form of the IEM-2M and MCM models used in the Mercury Study Report to Congress (MSRC) (USEPA, 1997b), where the equations of these models are reduced to steady state and consolidated into a single equation relating the ratio of current/future air deposition rates to current/future fish tissue concentrations (the "proportionality principle").

The Taconite Companies conclude the proportionality principle is overly simplistic, and it is not supported by monitoring data. They included a memorandum from Dr. David Grigal in support of this position (Taconite Companies, Exhibit 3, Attachment A). Dr. Grigal points out many of the uncertainties in the scientific understanding of mercury cycling, which he concludes invalidates the assumption of proportionality. Many of these uncertainties were discussed in the Statewide Mercury TMDL. The USEPA and MPCA followed the recommendation of the National Research Council (NRC) in its assessment of the scientific basis for TMDLs.[7] The NRC recommended using conceptual models to describe the link between environmental stressors and responses, recognizing the limits of our understanding of complex natural systems. The following statements by USEPA published in 2011 underscore their continued support for the Mercury Maps model (MMap) as the best tool for estimating the degree of improvements when reducing mercury deposition to water bodies, while acknowledging the uncertainties:

> "MMap implements a simplified form of the IEM-2M model applied in USEPA's Mercury Study Report to Congress (USEPA, 1997). By simplifying the assumptions inherent in the freshwater ecosystem models that were described in the Report to Congress, the MMaps model showed that these models converge at a steady-state solution for MeHg [methylmercury] concentrations in fish that are proportional to changes in Hg inputs from

[6] http://water.epa.gov/scitech/datait/models/maps/index.cfm The peer review of the tool for linking changes in mercury deposition with fish contamination: http://water.epa.gov/scitech/datait/models/maps/upload/2006_12_27_models_maps_report.pdf

[7] National Research Council (NRC), 2001. Assessing the TMDL approach to water quality management. Report to the Committee to Assess the Scientific Basis of the Total Maximum Daily Load Approach to Water Pollution Reduction. National Research Council. National Academy Press. Washington, D.C.

atmospheric deposition (i.e., over the long term, fish concentrations are expected to decline proportionally to declines in atmospheric loading to a waterbody)."[8]

"This methodology therefore applies only to situations where air deposition is the sole significant source of Hg to a water body, and where the physical, chemical, and biological characteristics of the ecosystem remain constant over time. EPA recognizes that concentrations of MeHg in fish across all ecosystems may not reach steady state and that ecosystem conditions affecting mercury dynamics are unlikely to remain constant over time. EPA further recognizes that many water bodies, particularly in areas of historic gold and Hg mining in western states, contain significant non-air sources of Hg. Finally, EPA recognizes that MMaps does not account for the time lag between a reduction in Hg deposition and a reduction in the MeHg concentrations in fish. While acknowledging these limitations, EPA is unaware of any other tool for performing a national-scale assessment of the change in fish MeHg concentrations resulting from reductions in atmospheric deposition of Hg." (RIA, page 4-18)

Studies published after the MPCA drafted the Statewide Mercury TMDL also support the continued use of the proportionality principle. Hammerschmidt and Fitzgerald (2006) showed the proportional response between fish-Hg and wet deposition based on real data throughout the U.S[9]. Munthe et al. (2007) reviewed the scientific literature and concluded that the proportionality concept was appropriate.[10]

The Barr memo in Exhibit 3 also states that existing scientific knowledge has advanced sufficiently to allow a viable methodology for assessing the causal link between mercury emissions from taconite facilities and impairment at specific waters. The commenter points to Minnesota Mercury Risk Estimation Method (MMREM) as a screening level assessment of such a process, although MMREM relies on the proportionality principle. The memo goes on to suggest that there is a conceptual methodology for an assessment. The memo lays out a conceptual framework for such an assessment.

As the commenters point out, the MPCA developed the MMREM as a screening level assessment tool. No other more detailed assessment tool exists. However, the MPCA believes its current tools and understanding of the behavior of mercury in the environment is a reasonable basis to address current water quality impairments. Adopting this rule will aid in addressing those impairments by reducing mercury releases to the environment.

### 3. There is a lack of connection between these emission reductions and Minnesota water quality.

**Comment 3:** Mesabi Nugget comments that "the proposed rule will likely not result in meeting the water quality standards, particularly the fish consumption standards for mercury" and "Because the rule will do nothing to control mercury sources outside of Minnesota and because those outside sources account for the vast majority of mercury in Minnesota waters, the proposed reductions by Minnesota sources will result in little or no change to Minnesota water quality" (*comment letter page 3*).

**Response:** Minnesota's Mercury TMDL study identified the degree of water quality impairments and sources contributing to the impairments, including the contributions from global, regional and local mercury air emission sources. The TMDL development process and result was explained in the SONAR (pages 5-7). Minnesota has been appropriately allocated a portion of mercury deposition in the Mercury TMDL, as required under the Clean Water Act. The USEPA approved Minnesota's Statewide Mercury TMDL study in 2007. The Mercury TMDL went through public notice and comment at the time of its adoption and approval and is not open for commenting on in this rulemaking.

Minnesota is not acting alone to reduce mercury emissions and, consequently, mercury deposition. In addition to the mercury reductions being secured through the adoption and implementation of this rule at sources like Mesabi Nugget,

[8] US EPA, 2011. Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, December 2011. EPA-452/R-11-011 http://www.epa.gov/ttn/ecas/regdata/RIAs/matsriafinal.pdf

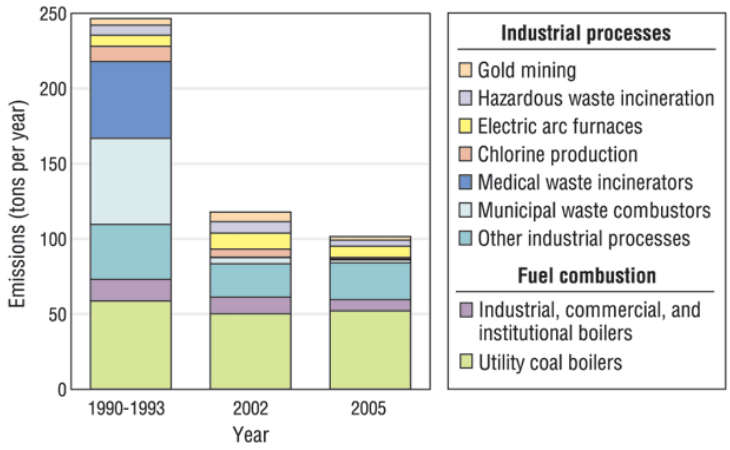
[9] Hammerschmidt, C. R.; Fitzgerald, W. F., Methylmercury in freshwater fish linked to atmospheric mercury deposition. *Environmental Science & Technology* **2006,** *40* (24), 7764-7770.

[10] Munthe, J.; Bodaly, R. A.; Branfireun, B. A.; Driscoll, C. T.; Gilmour, C. C.; Harris, R.; Horvat, M.; Lucotte, M.; Malm, O., Recovery of mercury-contaminated fisheries. *Ambio* **2007,** *36* (1), 33-4

this rulemaking is also incorporating *federal* rules that impose mercury control requirements at all sources nationally. USEPA has recently promulgated mercury control standards for power plants, currently the largest source of mercury emissions in the United States, as well as industrial boilers, sewage sludge incinerators and commercial/industrial solid waste incinerators, and the MPCA is incorporating those standards by reference in this rulemaking. Federal rules were adopted almost 20 years ago controlling mercury from municipal and medical waste incinerators, and recently gold mines and Portland cement kilns, two source types that are not likely to ever be located in Minnesota and thus not included in this rulemaking. Below is a graphic (Figure 2) from USEPA's 2008 Report on the Environment showing United States mercury emissions, by source category. [11] Emissions from sources like Mesabi Nugget would be categorized within the general category "other industrial processes". Mesabi Nugget began operations in 2010, and so its emissions are not yet reflected in the national inventory.

**Figure 1.**

**Exhibit 2-39.** Mercury emissions in the U.S. by source category, 1990-1993, 2002, and 2005[a,b]




[a]1990-1993 is considered the baseline period for mercury emissions. The baseline period spans multiple years due to the availability of emissions data for various source categories. The data presented for the baseline period are annual emissions (tons per year) and are therefore comparable to the 2002 and 2005 data.

[b]Mercury emissions from mobile sources are not depicted because they have been estimated only for inventory years 2002 (0.8 tons) and 2005 (1.1 tons), not for the baseline period.

***Data source:*** *U.S. EPA, 2009*

## 4. The proposed standards for iron and steel melters are arbitrary and unnecessary.

**Comment 4:** Gerdau Steel questions the need for the rule and urges the MPCA to forego rulemaking as far as electric arc furnace (EAF) steel manufacturing is concerned (*letter comment #1*). The comment states that the proposed standard is based on an arbitrary standard from another state, would be difficult to meet on a consistent basis, and would place Gerdau at a competitive disadvantage. The comment further notes that the USEPA has a federal standard that addresses mercury emissions from the industry and that USEPA is currently revising the rule. USEPA's revised rule will expect compliance within about the same timeframe as the MPCA's rule, based on actual mercury data from EAF steel manufacturing. Gerdau suggests that the MPCA should withdraw this rule and wait for USEPA.

**Response:** Gerdau states that the standard is arbitrary and without technical basis. The MPCA disagrees. The MPCA is proposing in this rule an EAF mercury emissions rate of 35 mg/ton of steel produced. The MPCA based the standard on reliable data and precedent. First, before proposing this rule, the MPCA reviewed the stack testing at the Gerdau facility

[11] US EPA, Mercury Emissions, prepared December 2009
http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewInd&lv=list.listByAlpha&r=216615&subtop=341

in Sayerville, New Jersey. The facility in Sayerville uses ACI and source separation (purchasing "mercury free" scrap) and is demonstrating that the emission limit is being met. Stack tests that were conducted starting in 2008 show mercury emissions to average 31 mg/ton of steel produced[12]. In addition, the State of New Jersey adopted the same emissions limit in 2004.

In its comments, Gerdau described the mercury emissions test data collected by USEPA's information collection request. In 2012, USEPA provided the MPCA a summary of the data, which is appended at the end of this response document (Attachment 1). The table shows the Gerdau-St Paul facility emitted 0.00023 pounds of mercury per ton of steel produced (104 mg/ton of steel produced) over the 30 days that the mercury emissions were sampled.

The proposed mercury emission limit of 0.000077 lb/ton (35 mg/ton) represents a reduction in mercury emissions of about 66% at the Gerdau St. Paul Steel Mill. Given that ACI pilot tests as discussed further below, show mercury removal rates greater than 75%, the MPCA believes the standard is technically achievable.

The MPCA believes the proposed rule is well-structured to address Gerdau's concern about its capability of meeting the standard on a consistent basis. First, the proposed rule establishes a compliance deadline of June 30, 2018, or about four years from now. Gerdau is being provided four years to plan, design, install, and operate mercury control and/or scrap purchasing systems so that by June 30, 2018, it can be confident that it is capable of meeting the emission limit. Second, the proposed rules describing the content of a reduction plan direct the facility owner or operator to submit monitoring requirements, which allows Gerdau to propose a testing frequency that allows Gerdau to incorporate emissions variability into its permit. Third, the proposed rule describing the required contents of the reduction plan (part 7007.0506, subp. 5(2)), allows an owner or operator to submit an alternative plan, along with a technical demonstration and an alternative reduction proposal, if the owner or operator determines that that the reduction requirement is not achievable. Should USEPA propose a rule that achieves similar reductions within the same timeframe as scheduled in this proposed rule, the proposed rule would also allow Gerdau to propose relying on the federal standard to accomplish the reductions that this rule intends to achieve.

The MPCA believes the emission limit in the rule is achievable because it is a technology-based standard. That is, the limit is based on the mercury emissions that are achieved with the use of ACI technology. Gerdau's Sayerville facility in New Jersey has successfully met the emissions limit since 2010, using ACI. ACI has widespread application at many types of air emission sources for controlling mercury. Applications of ACI at taconite furnaces, this EAF, and industrial boilers were evaluated in the SONAR Attachment 7, "Estimated Costs Related to the Implementation of the Mercury Reduction Rule". Reductions at coal-fired utility boilers with ACI were described in the SONAR (pages 26-27). The technology is in use at six municipal waste combustors, a medical waste and a sewage sludge incinerator in Minnesota. And although neither type of facility exists in Minnesota; cement kilns and gold refining retorts will likely use ACI or carbon bed absorbers to meet recently promulgated federal mercury control requirements[13].

In addition and as described in Attachment 7 to the SONAR, Minnesota taconite furnaces are researching carbon removal technologies to control mercury emissions from taconite furnaces. The MPCA believes that this testing is relevant to EAFs because the mercury species profile of the taconite furnace stack gas is similar to that of EAFs. Most mercury emitted from taconite furnaces is emitted in elemental form. An initial result of research that is pilot testing halogen-treated ACI is showing mercury removal rates of 70% to 90% at a taconite furnace. [14]

These applications demonstrate the capability and widespread availability of technology for controlling mercury emissions. Technology is commercially available, is being used as a basis for federal and state rules controlling mercury, and most importantly, is capable of achieving very high removal efficiencies. The MPCA acknowledged (Attachment 7, section III) that the EAF Gerdau operates functions as a batch process, which is different from the continuous melting

[12] Nashif, H. Memorandum "Gerdau Ameristeel—Sayreville" New Jersey DEP August 18, 2011.
[13] 40 CFR Part 63 Subpart EEEEEEE Gold Mine Ore Processing and Production; 40 CFR Part 63 Subpart LLL Portland Cement Manufacturing Industry
[14] Taconite research webpage: http://www.dnr.state.mn.us/lands_minerals/dnr_hg_research.html
Albemarle trial at Hibtac: http://files.dnr.state.mn.us/lands_minerals/reclamation/miller_zerangue_2012.pdf

process at Sayreville. This results in a potential difference in engineering the application of carbon for mercury removal. This difference does not negate the control technology, but rather means additional site-specific evaluation and engineering are needed to address site-specific design requirements.

Iron and steel melters release mercury when melting scrap metal that contains mercury. Mercury is present in scrap from shredded vehicles, discarded appliances and industrial equipment, or in waste metals from demolished building structures. Mercury can also be present in additives used in the EAF if the materials were not subject to heat treatment.

As Gerdau pointed out in its comments, in 2007 USEPA adopted the EAF National Emission Standard for Hazardous Air Pollutants (NESHAP) controlling particulate matter and mercury. The standard includes provisions to implement a national goal of removing 80% of mercury-containing vehicle switches prior to shredding. Source separation, that is, the removal of mercury prior to the melting of the metal, has potential to reduce mercury emissions. The federal requirements related to switch separation and handling are in Gerdau's air emissions permit, and Gerdau has demonstrated to the MPCA that is it complying with the state and federal switch removal program requirements. The MPCA expects that Gerdau will continue to require suppliers to remove mercury in the scrap Gerdau receives.

Collected vehicle switches are returned to the National Vehicle Mercury Switch Recovery Program (NVMSRP)[15]. This voluntary collection program "counts" the number of switches removed and returned to the program by state, thereby lowering the expected amount of mercury present in shredded vehicles. Mercury switches or industrial sources must be handled through other waste management programs.

The MPCA has reviewed the data from the NVMSRP to determine whether the switch program can be relied on in place of an emission standard, as Gerdau suggests in its comments (*letter comment #1*). Table 1 below shows that Minnesota achieved a 90% rate of vehicle mercury switch capture in 2008, but has not been able to sustain it. As a result, expected mercury present in scrapped vehicles has risen after 2008.

**Table 1. [16] Mercury Switch Recovery in Minnesota from Scrapped Vehicles**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|
| NMVSRP Est Number of light switches available for recovery in scrapped vehicles | 82,000 | 70,000 | 70,000 | 69,000 | 65,000 | 60,000 | 55,000 |
| Total Pounds of Hg in scrapped MN vehicles | 180 | 150 | 150 | 150 | 140 | 130 | 120 |
| total switches recovered | 55,719 | 64,348 | 37,407 | 34,830 | 43,698 | 29,655 | 21,750 |
| recovery rate of Hg in vehicles | 68% | 92% | 53% | 50% | 67% | 49% | 40% |

Mercury emissions from Gerdau's EAF are compared in Figure 3 below. The purple line represents the total pounds of mercury in scrapped vehicles (from Table 1). If the goal of the switch removal program actually were sustained, mercury emissions at Gerdau might look like the red line. However, because the switch recovery rates have fallen, mercury inputs to Gerdau follow the blue line. Emission measurements at Gerdau in 2010, when switch removal was estimated as being fairly good, is considerably higher than the estimated emissions, suggesting that mercury is coming from additional sources.

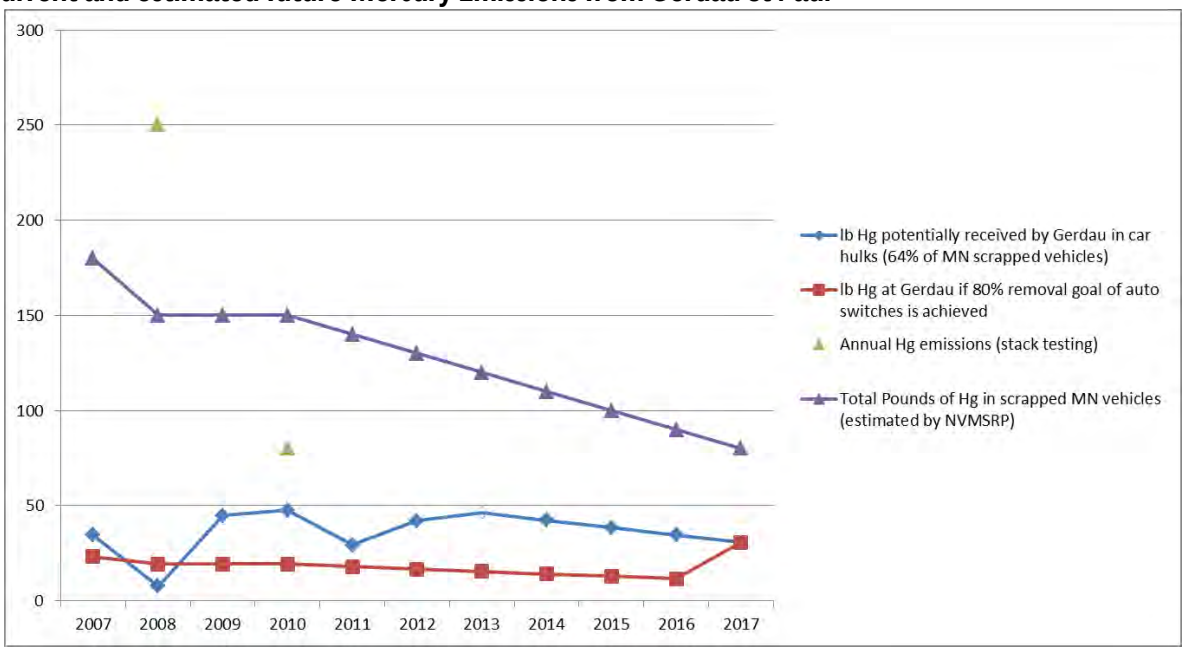
A number of factors likely play into the presence of mercury in Gerdau's scrap. First, Gerdau is part of a regional multistate supply chain of vehicles, and the amount of mercury in the scrap vehicles it accepts could be affected by the far lower switch recovery rates in other states such as Wisconsin (around 46%) and Iowa (21%). Second, vehicles make up only about half of the scrap metal melted in the EAF. The other half will include appliances, industrial equipment and building scrap metal where switches, levels, pressure gauges, thermostats and other mercury-containing devices were

[15] http://elvsolutions.org/?page_id=272

[16] http://www.eqonline.com/services/ELVS-Mercury-Switch-Recovery-Program/annual-report.asp?year=all
The NMVSRP operated a bounty program for switches until 2009, when the funds ran out. Recovery rates nation-wide and in MN have declined since then.

scrapped with the original equipment. So, even as the presence of mercury switches in automobiles declines, a considerable fraction appears to remain in the remaining scrap sources.

**Figure 2. Current and estimated future Mercury Emissions from Gerdau St Paul**




The USEPA emission limit is a technical standard that was not driven by the Statewide Mercury TMDL goal for this mercury emission source. As a result of the evaluation of emission trends above, the MPCA is concluding that the TMDL goal of 10 pounds per year from Gerdau is not technically achievable today. Given current production of 453,000 tons a year, the MPCA estimates that when Gerdau demonstrates compliance with the proposed federal standard, the EAF will be emitting about 35 pounds in 2025.

***Competitive Disadvantage***

The absolute quantity of mercury emitted from this EAF depends on the presence of a mercury switch or other component in the scrap supply. Gerdau notes that one strategy for reducing mercury emissions would include Gerdau ceasing the use of auto scrap or other undifferentiated metal scrap. Based on stack testing in Minnesota, ceasing the use of autohulks would lower emissions by up to 50%, as it appears about half of mercury emissions might be from sources other than vehicles. The MPCA agrees that this is an impractical method to reduce mercury emissions because recycling autohulks and other scrap metal is in important aspect of recycling iron and steel into new products. If Gerdau were to cease using autohulks, it is likely the vehicles would simply be sent to a different melter, increasing other air emissions due to additional transportation fuel use.

It is unknown if USEPA will proceed with rulemaking to revise the existing federal mercury performance standard for EAFs. If USEPA does propose a standard similar to that suggested by Gerdau (letter comment #I), the test data provided by USEPA suggests that half of the operating EAFs in the United States must undertake mercury reduction actions, and that a quarter of them face similar reduction requirements as Gerdau, that is, identifying the means to reduce mercury emissions by 40% to 70%.

The MPCA believes that the proposed reduction requirement for iron and steel melters is reasonable. The rule establishes a technically achievable emissions rate, and provides a mechanism for Gerdau to propose alternative emission reductions if necessary.

## 5. MPCA cost analysis.

**Comment 5a:** Minn. Stat. § 14.131 directs a state agency to include in the SONAR "the probable costs of complying with the proposed rule, including the portion of the total costs that will be borne by identifiable categories of affected

parties, such as separate classes of governmental units, businesses, or individuals" to the extent the agency, through reasonable effort, can ascertain this information.

The MPCA's statutory responsibility is to estimate costs to the extent the MPCA can ascertain cost information. As noted in the MPCA's July 2013 cost estimate, the expected investment in mercury controls differs between ferrous processing facilities, and depends on existing controls or scheduled improvements in air pollution control equipment. The MPCA relied on generally available information specific to mercury controls from reports prepared and reviewed by the taconite facilities. As such, the MPCA believes it has met its statutory responsibilities to estimate the cost of compliance.

The Taconite Companies commented that the MPCA failed to provide a reasonable cost estimate, disputing the MPCA's conclusion that the cost of compliance is not significant. The companies claim the size of the taconite industry in Minnesota has no bearing on the market share or profit margin of any particular facility and provides no insight into whether a facility can simply absorb the substantial additional costs. The companies believe their concerns are compounded by the fact that the cost of mercury control reflects only a fraction of the regulatory costs facing the industry (*letter comment #IIIA*). The commenters strongly-worded letter expressed great concern about the MPCA's estimate of compliance for ArcelorMittal and provided a separate, detailed estimate of the commenters' current estimate of capital and operating costs for this facility. Capital cost estimates were also included in Exhibit 5 for United Taconite without explanation or detail. The commenters did not provide any comment on MPCA cost estimates or offers of alternative estimates of the cost of compliance at the remaining taconite facilities.

The MPCA understands that inherent in the expressed concerns about the cost of compliance is the concern about how the Taconite Companies could demonstrate that any given technology is economically infeasible.

**Response:** The MPCA takes these comments very seriously and re-examined its costs estimates in the context of the overall regulatory environment for the taconite facilities and the status of research into mercury controls for the industry. In this context, the MPCA believes the commenters have overstated the impacts of this rule.

By this rule's compliance deadline of 2025, other ambient air protection regulatory requirements will require substantial investments in controls, and mercury control will be a necessary, but small, component part of the overall control requirements. The commenters describe their concerns as if the cost of the overall control measures were attributable to mercury control alone. For example, the companies must address their compliance status with new NAAQS for sulfur dioxide (SO2), which likely will require some units to install acid gas scrubbing. The estimate offered for the United Taconite plant in Exhibit 5 is an example. Exhibit 5 identifies types of control projects that it describes as mercury controls. In fact however, the projects are necessary to reduce SO2, which United Taconite must control because it burns coal with considerable sulfur in it, and preliminary ambient air impacts modeling shows this facility to be violating ambient air standards. The cost estimate provided fails to describe the significant and necessary SO2 and particulate matter reductions related to the project. In addition, facilities installing more efficient SO2 scrubbers will very easily be able to incorporate ACI into their facilities, similar to how the control system is used at coal-fired power plants. The facilities must also comply with similar requirements for fine particulate matter and nitrogen oxides. So, while this rulemaking requires a plan specifically for controlling mercury, mercury control will be only a part of the control regime that the facilities must install for other regulatory purposes. The cost of overall compliance with air quality standards cannot legitimately be attributed solely to mercury control.

As the MPCA stated in its cost estimate for the ferrous processing industry, "the capital and operating cost for the fabric filter was used in the MPCA's estimates to represent the cost of additional PM controls if high carbon injection rates cause PM emission increases". Earlier in this response to comments regarding technical feasibility, the MPCA explained that it recognized that PM control was potentially necessary to manage the additional particulate matter created with the use of ACI. Because the MPCA does not have sufficient information to determine the degree of control needed for each operating taconite furnace, the MPCA relied on information from the Taconite Companies Phase I mercury testing for a baghouse.

The MPCA has reviewed the cost estimate provided for ArcelorMittal, and is incorporating the cost estimate in its analysis to include the estimate for baghouses at ArcelorMittal without modification. The MPCA is aware that United Taconite (UTAC) will be required to include scrubbing to address SO2 emission issues, and is including the cost of SO2

controls in the current estimate as well. However, the MPCA does not believe that it is appropriate to assign the entire cost of this project solely to mercury, as the commenters have done. As a result, the cost estimate for UTAC now over estimates the cost of mercury control alone. Commenters did not offer comments on the remaining cost estimates and the MPCA is not making changes to the MPCA cost estimates for US Steel Keetac and Minntac, Hibbing Taconite, Essar or Mesabi Nugget.

In response to several comments that were raised about the MPCA's cost estimates:

- ACI injection rates. The Laudal report the MPCA relied on discussed two carbon injection rates: one at 2 pounds/mmacf when standard activated carbon is used, and one at 1.1 pounds/mmacf for treated carbon. The MPCA assumed the use of halogenated carbon (treated), and priced the carbon accordingly.
- Lost raw material. This rate is different at each facility currently and in the future and the MPCA has no information to determine rates.
- Other site-specific costs as described in the comments. The MPCA cannot account for variations in site-specific factors that are not known to or provided to the MPCA. Nor can the MPCA assess whether such costs are properly attributed to the cost of mercury control. Thus, conditions of stacks, power supply, whether existing fans could accommodate additional air flows, etc. are not accounted for in this estimate.
- Discount rates. The MPCA's analysis is an estimate the "probable cost of complying with the rule" as required by Minnesota statute. The selected discount rate reflects the cost of financing the purchasing and operation of a mercury control project. The MPCA made its selection of interest rates based on current and foreseeable economic conditions. Companies have different means of financing projects, borrowing being one method of financing a project. The MPCA would use a different discount rate when comparing costs and benefits to reflect the social costs and benefits related to mercury reductions. No such evaluation was undertaken in this rulemaking.

Based on the comments that the cost of mercury control will place the taconite industry at a competitive disadvantage, the MPCA made an estimate of the impacts of these control costs on the average price of taconite produced. This type of estimate is not required by statute or rule. The Minnesota Department of Revenue reports production and taxes collected on taconite. From that information the MPCA is making an estimate (see the table in Attachment 2).

The MPCA and the commenters agree that taconite facilities are part of a global market. The currently operating taconite facilities are owned by three companies: ArcelorMittal, US Steel, and Cliffs Natural Resources. According to its 2013 annual report, ArcelorMittal is the world's leading integrated steel and mining company, producing pellets for its own blast furnaces, but also purchasing pellets. US Steel is the largest integrated steel manufacturer in the United States and use Minnesota pellets in its plants. Cliffs Natural Resources is a merchant producer of pellets.

The Minnesota Department of Revenue calculates a value of a ton of taconite in order to collect a sales tax. The MPCA relied on that data to represent the cost of producing taconite and the revenues generated by the companies. Based on the recent publically-reported price range of iron pellets, compliance with the requirements of this rule and other ambient air demands outside of this rulemaking are expected to change the price of pellets by 0.5% to 3.0%. The largest price changes occur at ArcelorMittal and United Taconite, namely because of the size and complexity of the projects that are not directly related to this rule. The current world market price for iron pellets is volatile, fluctuating based on the demands of China and the ability of mines in Brazil and Australia to meet that demand. Within the United States, there is significant cost savings to the steel producers in avoiding that volatility by using Minnesota taconite. Current world iron ore prices in May 2014 are above $100/ton. It is expected that to accommodate potential cost increases related to environmental compliance, the companies will reduce profits, or pass along a price increase to steelmakers or purchasers of final steel products.

The Taconite Companies have pointed out that they are interested in piloting unique air pollution controls as a means of lowering the cost of compliance. To accommodate further research into such controls, the MPCA has elsewhere agreed to modify the proposed rule by delaying the deadline for submitting reduction plans. A longer time horizon, first in terms of preparing a reduction plan, and second in the final compliance deadline (2025), as well as the flexibilities already

provided in the rule, provides opportunity to innovate to meet the mercury reduction requirements at a reasonable cost.

In 2008-09, during the development of reduction strategies, the MPCA and the implementation strategies stakeholder workgroup recognized that the ferrous mining industry had yet to invest significant effort in identifying feasible means of reducing mercury emissions. We all recognized mercury control cannot interfere with the business of making taconite. The MPCA expects that between promulgation of this rule and the submittal of reduction plans, the industry will continue its work to develop control strategies, and that the development of technologies will also address the other objectives that the MPCA and the stakeholders identified in the reduction strategy for this industry. In the Strategy Framework for Implementation of Minnesota's Statewide Mercury TMDL (Appendix 1 to the Implementation Plan for Minnesota's Statewide Mercury TMDL), the MPCA reiterated the considerations underlying the choice of any reduction technology for the industry:

> "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."[17]

The Taconite Companies referred to these objectives, and the strategy as an "adaptive management" approach (*letter comment #IA, page 5)* and the MPCA has consistently agreed that adaptive management, including the objectives, is appropriate. When reviewing the industries' reduction plans, the MPCA will continue to keep the Taconite Companies' objectives in mind. The MPCA and its stakeholders have always viewed the strategy as objectives or criteria for the companies when making decisions in the development of control technologies; that as research continues and as technology improves, each decision will evaluate whether the technology meets the companies objectives related to cost, pellet quality, and the potential for furnace corrosion.

In addition, the MPCA built an alternative into the proposed rules. If a mercury emission source owner or operator determines that the mercury reductions identified in the proposed rule at part 7007.0502, subp. 6.A. are not technically achievable by the compliance date, the owner or operator may submit a plan that proposes an alternative reduction. Minn. R. 7007.0502, subp. 5.A.(2). To ensure that the rules are applied evenhandedly, the MPCA will generally look for documentation to support plans for alternative reductions.

**Comment 5b:** Southern Minnesota Beet Sugar Cooperative **(**SMBSC) comments that its pollution capture cost will be much higher on a dollar per ton basis than was presented in the cost analysis. The facility requests that the financial feasibility assessment be recalculated once MPCA has collected site specific emission data from subject facilities. (*letter comment #VI*). Virginia Department of Public Utilities (VDPU) requests a review of the economic feasibility for its facility. (*comment letter page 2*).

**Response:** A facility-specific cost analysis is not required for rulemaking nor will it be undertaken. The MPCA has met its obligation in the SONAR under Minn. Stat. § 14.131 to provide a reasonable estimate of projected compliance costs using readily available data and standard methods. The statute requires, in part: … "the probable costs of complying with the proposed rule, including the portion of the total costs that will be borne by identifiable categories of affected parties, such as separate classes of governmental units, businesses, or individuals."

The MPCA understands that facilities have concerns about the cost to install and operate add-on mercury controls (e.g. activated carbon injection). As described in the document *Estimated Costs Related to the Implementation of the Mercury Reduction Rules* (July 2013), attached to the SONAR, facilities with boilers have a variety of options available to meet the required reductions. The rule does not mandate the use of activated carbon injection. Facilities can choose other, lower-

[17] MPCA. "Implementation Plan for Minnesota's Statewide Mercury Total Maximum Daily Load" October 2009 p.18 of Appendix 1 "Strategy Framework for Implementation of Minnesota's Statewide Mercury TMDL"

cost, methods to reduce mercury air emissions. Such options include improving particulate capture or adjusting the fuel mix.

**Comment 5c:** Gerdau commented that the MPCA cost estimate for flue dust landfilling is significantly underestimated (*letter comment #11*). The assumed price per ton of ash disposed is too low, and transportation costs increase. Gerdau comments that the cost of reducing mercury is much higher than the MPCA has estimated.

**Response:** The MPCA has reviewed its assumptions for landfilling flue dust, and agrees that the estimated cost is too low. The MPCA reviewed each of Gerdau's reported costs for landfilling dust in an approved landfill and for transportation, and agrees with them. The MPCA has recalculated the estimated cost of reducing mercury at Gerdau in the Table 2 below. Gerdau also stated that it is currently paying to recycle its collected flue dust. That cost was not known to the MPCA in its original assessment. It is important to the final estimated annual cost because recycling the flue dust is still a cost to Gerdau for managing this material, but would not be incurred if the flue dust were landfilled. The MPCA's re-estimated cost of controlling mercury at Gerdau, Table 2 is as follows:

**Table 2. Revising the cost estimate for managing flue dust at Gerdau**

| Parameter | Parameter value | Units | Estimated Cost |
|---|---|---|---|
| Flue dust landfilled 2013 *(revised per Gerdau)* | 5,377 | tons | |
| Cost to landfill flue dust $/ton *(revised per Gerdau)* | $92.00 | $/ton | $494,684.00 |
| Transportation of flue dust by truck (20 tons/truck) *(revised)* | $1,910.00 | $/truckload | $513,503.50 |
| Cost to recycle flue dust recycling *(revised per Gerdau)* | $59.90 | $/ton | $322,082.30 |
| | | | |
| **Revised cost estimate for installing ACI**<br>(Revisions based on comments from Gerdau are noted) | | | |
| Capital cost of installing ACI | | | $3,039,061 |
| Total fixed annual costs of ACI system | i=5%, n=20yrs | | $217,327 |
| Annual variable costs | | | $252,810 |
| Flue dust landfilling—(*included per Gerdau* comment) | | | $494,684 |
| Flue dust transportation—(*included per Gerdau* comment) | | | $513,503 |
| Flue dust recycling cost avoided—(*included per Gerdau* comment) | | | $(322,082) |
| Revised total annual cost | | | $1,156,242 |
| Total amount of mercury reduced | 53 | pounds | |
| Revised cost of controlling a pound of mercury from EAF | | $/lb | $21,815 |

The MPCA notes that it made a computational error in its July 2013 estimate of total mercury reduced. The July 2013 estimate used the amount of mercury remaining to calculate the cost per pound of mercury controlled, not the amount reduced. The estimated amount of mercury emitted in 2012 is 81 pounds (220 X 10-6 lb/ton produced) and with controls is 28 pounds (at 77 x 10-6 lb/ton produced). The estimated costs above use the correct reduction of 50 pounds, resulting in a final estimate of $21,815.

### 6. Discharge of mercury to waters of the state has already been reduced from SMBSC's wastewater treatment plant.

**Comment 6:** SMBSC commented it has already reduced its discharge of mercury to waters of the state from its wastewater treatment plant, and that the costs and impacts of this previous reduction should be accounted for in promulgating the rule (*letter comment #VII*).

**Response:** The MPCA acknowledges and appreciates efforts by SMBSC and other facilities to reduce direct discharges of mercury in wastewater. However, the impact of direct mercury discharges in wastewater is not the same as the impact from air emissions of mercury. The mercury TMDL implementation strategy did not equate direct water discharges with air emissions and intentionally established an air emission goal. In addition, it is common that a facility will invest in controls or practices separately to address air emissions, discharges to water, or for the proper handling and disposal of solid or hazardous waste.

### 7. Best control technology installed should be based on control effectiveness rather than cost.

**Comment 7:** The Fond du Lac Band comments in their letter that "Proven control technology currently exists to remove mercury from many types of waste streams and we would like to see the best control technology installed based on control effectiveness rather than cost."

**Response:** First, it is important to remember that the rule is focused on achieving the goal of no more than 789 pounds of mercury emissions per year from Minnesota sources. Regardless of cost, 789 pounds remains the goal.

The MPCA evaluated technical feasibility of achieving mercury reductions for each industrial sector identified in this rule. For the most part, mercury controls have been brought to the market within the past 10 years and emission limits or mercury reductions represent current best control. In the instance where it appeared that mercury controls are very costly, that is, for small industrial boilers, the MPCA raised the threshold of where mercury controls must be installed. The MPCA does not believe this will jeopardize achieving the 789 pound per year goal. The MPCA believes it has made a proper assessment in balancing emission reductions and the cost of achieving the reductions.

### 8. Mercury attributed to out-of-state sources is lower than USEPA reported.

**Comment 8:** SMBSC comments "it appears that MPCA calculated or assigned a much lower percentage contribution to the mercury in air from sources outside of Minnesota than EPA reported for sources outside of the United States" and asks the MPCA to explain how the national air quality concentration for mercury generated outside of the United States can be significantly higher than the concentration of mercury in air moving into Minnesota (*letter comment #VII*).

**Response:** The MPCA did not discuss source contribution to ambient air concentrations in the rule's SONAR. The MPCA believes SMBSC's comment is related to the assumptions made in the Mercury TMDL study establishing the statewide mercury emissions goal of 789 pounds. Minnesota's Statewide Mercury TMDL study went through public review and comments and was approved by USEPA in 2007. The Mercury TMDL is beyond the scope of this rulemaking and is not subject to review or comment at this time.

## C. Comments on specific rule parts

### 7005.0100 DEFINITIONS.

### 9. Part 7005.0100, Subparts 23a and 23b.

**Comment 9:** Several commenters have requested a number of changes to the definition of mercury or mercury emissions source: 1) The form of mercury. The rule should exclude mercury in particulate form. 2) Definition of a source regulated by this rule. The rule should focus on emission units and not on a stationary source, and mercury emissions from fugitive sources should be excluded. 3) Emission threshold. Modify the proposed emission threshold to one that is greater than three pounds per year.

**Response: 1) The form of mercury.** Xcel Energy comments that "including particulate mercury from combustion activities in the definition is not necessary as it is typically captured already and does not need to be specifically targeted" and recommends "that MPCA clarify the definition of mercury to specifically exclude particulate mercury from this definition"(*letter comment #1*). The Mercury TMDL study, approved by USEPA in 2007 and described in the SONAR (pages 6-8) provides a detailed description of the behavior of mercury, in all forms (particulate-bound, vapor phase, organic, inorganic) and includes an explanation of how mercury in all forms cycles in the environment and how the various forms of mercury, including mercury in its particulate form, represent environmental concerns. The Mercury TMDL was not a subject matter for which public comments were requested within this rulemaking. Public comment was

requested during the development of the Mercury TMDL and the significant public input provided was incorporated into the TMDL prior to approval by USEPA. The TMDL establishes the statewide mercury emissions goal of 789 pounds.[18]

The proposed definition of mercury in this rulemaking reflects the scientific understanding of the behavior of mercury in the environment that is the basis for the Mercury TMDL. Because atmospheric transformation will change the form of mercury released to the atmosphere, the form of mercury released to the atmosphere does not matter. The MPCA therefore will not modify the definition of mercury.

This rulemaking has been undertaken to support ongoing implementation of the reductions in the Mercury TMDL Implementation Plan. Due to the sheer quantity of materials involved, combustion or heating of materials like coal or iron ore accounts for much of the atmospheric input of mercury from Minnesota sources; however, the reduction strategies are not limited to strategies for combustion sources. Due to the volatility of mercury, releases occur at manufacturing facilities that purposefully use mercury, or are released incidentally in the absence of combustion (auto shredding, municipal solid waste handling)[19]. This rulemaking proposes requirements needed for successful implementation of many of the reduction strategies and programs administered by the MPCA, the central element being an accurate inventory of mercury emissions. The definition of mercury emissions source is intended to address all mercury emitters in Minnesota including non-combustion releases of mercury, which includes mercury in its particulate form.

**2) Definition of a source regulated by this rule.** Several commented that the rule should focus on emission units and not on a stationary source, and that mercury emissions from fugitive sources should be excluded from the definition of either "mercury" or "mercury emission source" (Taconite Companies letter comment #VA and VB, US Steel letter comment #1, and Cliffs Natural Resources letter comment #1). The MPCA determined that a term was needed to identify which facilities or emission sources were subject to the rule requirements, which in addition to the mercury reduction requirements also includes which sources are being required to report to the annual mercury emissions inventory. The inventory is central to the successful implementation of the reduction plan, as the annual mercury emissions determine whether implementation of reductions has been successful.

The existing emission inventory and permitting structure centers around the entire stationary source and not on individual emission units; leading to the decision to define a mercury emissions source at the stationary source level. The MPCA considered establishing the definition of mercury emissions source as the emissions unit, because the reduction strategies were developed based on the emissions source. However, some facilities have several types of emission sources (e.g. taconite furnaces and industrial boilers, or a lime kiln and an industrial boiler) or have multiple units of a single emissions unit type. Defining an emissions source at the unit level would result in having a reporting threshold that varies depending on the number of emitting units at a stationary source and not on total mercury emissions. The outcome would then be an inaccurate and unreliable emission inventory and an inequitable application of the requirement to reduce mercury emissions within similar source types. MPCA believes applicability is properly determined on a facility-wide basis rather than unit by unit. Once a stationary source (total facility) meets the definition of a "mercury emission source," other parts of these rules define thresholds for reduction plans and/or compliance for specific types of units and operations. Processes or units with emissions below the thresholds defined in parts 7007.0502 or 7019.3050 are not included in reduction plans or testing.

The proposed rule (part 7005.0100, subp. 23b) already excludes fugitive emissions as has been suggested by commenters. The definition of fugitive emissions (part 7005.0100, subp. 11c), excludes the type of particulate sources that the MPCA does not propose to regulate under these rules.

**3) Emission threshold.** Several commented that the definition of "mercury emission source" should establish a de minimis threshold and that the threshold be changed from 3 lb/yr to 5 lb/yr (Minnesota Chamber of Commerce

[18] Minnesota Pollution Control Agency Total Maximum Daily Load, Final March 27, 2007 http://www.pca.state.mn.us/index.php/view-document.html?gid=8507

[19] See the draft 2011 statewide inventory: http://www.pca.state.mn.us/index.php/view-document.html?gid=20254 and appended at the end of this document.

*comment letter page 2*, Cliffs Natural Resources *letter comment #1*, and Taconite Companies *letter comment #VB*). The Minnesota Chamber of Commerce (Chamber) specifically requests "that the definition of a mercury emission source be changed to apply only to those sources emitting more than five pounds per year, and that no requirements apply to sources which emit five pounds per year of mercury or less." The Chamber notes that reduction requirements for industrial boilers apply when the boiler emits greater than five pounds of mercury, a threshold established via an economic analysis conducted by the MPCA in this rulemaking, and if it is uneconomic to control mercury from boilers at this threshold, it must be uneconomic at other facilities as well. Cliffs Natural Resources believes that the definition of a mercury emissions source "should establish a de minimis threshold based on the level of mercury emissions that it is infeasible or economically unreasonable to control."

The MPCA intentionally does not define the regulatory threshold established in this rule as a "de minimis" level because there is no de minimis level of mercury emissions. The MPCA is intentionally avoiding an impression the mercury is safe when emitted at lower levels.

As explained above, the definition of a mercury emissions source hinges primarily on the need to develop and maintain an accurate emission inventory. As a result, the determination as to the appropriate threshold is based on capturing the best complete data while not overly burdening all emitting mercury sources. The MPCA believes that the threshold of actual mercury emissions of 3 lb/yr is an appropriate threshold as described in the SONAR (page 15) because it captures 99% of mercury emissions statewide. The MPCA notes that this threshold is currently exceeded by approximately 30-35 sources out of about 150 known mercury emitters. The MPCA has adjusted the requirements for reductions based on economic assessments within each source type.

The MPCA has proposed a rule for those sources emitting mercury for which substantial reductions are necessary. The proposed rule exempts many mercury emission sources from the need to comply with the reduction requirements because they are subject to reduction requirements in existing air emission permits or other mercury control programs (part 7007.0502 subp. 3. A through E). Additionally, the rule allows existing mercury emitters to reduce emissions below the threshold if possible and not prepare a reduction plan (part 7007.0502, subp. 2). In this way, the MPCA believes that it appropriately addressed the cost impacts related to the selection of the threshold used for defining the affected source.

Lastly, Cliffs Natural Resources raises concerns about the requirement to prepare reduction plans when the result of the sum of multiple and different mercury emission sources (in their case, taconite indurating furnaces and coal-fired power boilers) results in a requirement to prepare a reduction plan for the taconite furnaces and a reduction of 72% from those furnaces (*letter comment #1*).

The proposed rule does not specify what types of controls any source should implement, but allows sources to identify reduction strategies, including alternative plans that best suit their needs. The flexibility built into the rule addresses Cliffs Natural Resources concerns.

The MPCA therefore will not revise the definitions of mercury or mercury emissions source.

## 7007.0502 MERCURY EMISSIONS REDUCTION PLANS.

### 10. Part 7007.0502, Subpart 1.

**Comment 10:** The Chamber requested adding the following language to part 7007.0502, subpart 1 "The statewide mercury reduction goal is not in and of itself sufficient to remove the mercury impairments of Minnesota waters." (*comment letter page 5)* The Chamber believes the MPCA needs to acknowledge that these emission reductions will not result in fish that are safe for all citizens to eat on a regular basis.

**Response:** Statements such as the Chamber's proposal are not language that is generally suited to regulations. In addition, the MPCA does not believe that adding the requested language will result in additional clarity on how to implement the requirements of the rule. Rather, the comment appears to be made to suggest that there is some doubt about whether the Mercury TMDL emissions goal of 789 pound per year is needed or alternatively, is sufficient. The Statewide Mercury TMDL study including Minnesota's mercury load allocation to Minnesota surface waters was

established through its own proceedings under the Clean Water Act, and is not subject to review or comment in this rulemaking. Therefore, the MPCA will not revise Subpart 1 as requested.

### 11. Part 7007.0502, Subp. 2.

**Comment 11:** SMBSC (*letter comment #1*) and Cliffs Natural Resources (*letter comment page 3*) commented that it is not necessary to require facilities to wait three years before emissions are considered to be below the threshold of three pounds per year, and therefore not subject to the requirements of this part.

**Response:** Due to variability in weather and production, mercury emissions vary from year to year. For sources with emissions near the threshold, a three-year tracking period will help to establish that the total facility's emissions are consistently below the level for regulation. It is important to attainment of the statewide emissions reduction goal to ensure that emissions are in fact consistently below the threshold before removing them from the requirements of the rule. Therefore, no change is proposed for this subpart.

### 12. Part 7007.0502, Subp. 3.

**Comment 12:** Xcel Energy commented that "Clarification is needed on rule applicability on units ceasing operation under the federal mercury rule." (*letter comment #2*). Xcel notes that one method of complying with the federal regulation controlling mercury emissions from EGUs is to close the unit by the regulation's compliance date. The federal regulation controlling hazardous air pollutants from EGUs is being incorporated by reference in proposed rule 7011.0563. The compliance deadline of the federal standard is April 2015, two months prior to the June 30, 2015, deadline for submitting a mercury reduction plan.

**Response:** The MPCA does not need a mercury reduction plan for EGUs that permanently cease operating by April 2015. Federal regulations provide sufficient requirements to notify the MPCA of the owner or operator's plan for controlling mercury emissions. No rule modification is needed.

### 13. Part 7007.0502, Subp. 3.E.

**Comment 13:** Virginia Department of Public Utilities (VDPU) requests clarification on part 7007.0502, subp.3(E), and comments "If VPU would request a permit modification to limit mercury emissions to below five pounds per year, no longer subject to the 70% reduction requirement, this would not be a reduction equal to or greater than 70% that is required in subpart 6." (*comment letter page 2*) VDPU requests that the MPCA change the rule to reflect that reductions to below thresholds that require a reduction plan are allowed even if they are not 70% or greater reductions.

**Response:** The MPCA believes it is appropriate and equitable to apply the same standard to all ICI boilers whether a facility addresses its mercury reductions through an achievable permit modification or in a reduction plan prepared under these rules. Therefore, the MPCA will not revise Subpart 3, Item E as requested.

### 14. Part 7007.0502, Subp. 5(A)(1)(d).

**Comment 14:** Mesabi Nugget, Cliffs Natural Resources, the Chamber, and the Taconite Companies commented that it is not reasonable to require the mercury reduction plan to evaluate the use of mercury continuous emissions monitor (CEM). Their comments are summarized below:

Mesabi Nugget (*comment letter page 7*):

- CEM monitors are unnecessary because mercury is a chronic pollutant.
- MPCA did not state a need for or the reasonableness of a CEM.
- None of the federal New Source Performance Standards (NSPS) or NESHAP rules adopted by reference in the proposed rules require CEMs.
- The limits proposed by the rule are annual limits.

Cliffs Natural Resources (*letter comment #III*):

- MPCA inappropriately constrains flexibility by requiring an unnecessary evaluation of CEMs technology. The MPCA should allow facilities the flexibility to demonstrate compliance using a mass balance approach or any other alternative method that can be reasonably demonstrated as reliable for measuring mercury emissions.

Minnesota Chamber of Commerce (*comment letter page 7*):

- MPCA and USEPA monitoring policy has consistently required compliance demonstrations which match the averaging times of limits, whether by rule or in permits. An appropriate and reasonable demonstration for an annual limit is an annual performance test.
- An appropriate monitoring frequency for a limit which takes years, if not decades, to manifest itself in its environmental impacts is the proposed stack test once every five years.
- Although the use of mercury CEMs is an option for coal-fired EGUs, it is unnecessary and unreasonable requirement option for other sources. The requirement to evaluate CEMs should be removed from the rule for sources other than power plants.

Taconite Companies (*letter comment #VF*):

- Mercury CEMs have not been proven to be sustainable at a taconite furnace in the short- or long- term.
- The major drawback of mercury CEMS is that the method cannot and does not include the collection and analysis of particulate matter-bound mercury.
- CEMs are fundamentally inconsistent with the nature of the underlying TMDL at issue.

**Response:** In part 7007.0502, subp. 5(A)(1)(d), the owner or operator of a mercury emissions source is required to propose a periodic monitoring and recordkeeping system in their mercury reduction plan.

As explained in the SONAR (page 20), the information provided to the MPCA in the mercury reduction plan by requirements of unit (d) the rule will be used to place enforceable conditions for monitoring, reporting, and recordkeeping of mercury emission rates in the facility's permit. The proposed rule does not direct any specific type of monitoring; the monitoring must be in concert with the site-specific standard of performance the owner will propose under the requirements of unit (b) of the rule. The MPCA notes that the commenters have not raised issues with the general need for monitoring and recordkeeping, nor the reasonableness of the requirements of unit (b), a standard of performance for the mercury emissions source.

However, commenters are objecting to the provision in unit (d) to evaluate a CEM for monitoring mercury emissions in part, because one type of CEM does not measure particulate bound mercury. The Taconite Companies submitted a review of existing methods for measuring mercury in their Exhibit 7 to their comment letter. The exhibit accurately identifies most measurement methods that are available to measure mercury emissions from an indurating furnace, including the most frequently selected methods, and assesses the pros and cons of using mercury CEMs and Method 30B for measuring mercury (Tables 4 and 5).

The MPCA notes several aspects of the measurement method assessment:

- The commenters themselves point out the inherent variability of mercury needs to be evaluated. They state that mercury emissions are variable due to changes in ore or other material inputs, or changes in process operating variables. (Taconite Companies, Exhibit 2, page 3) As the Taconite Companies' pilot testing of mercury controls continues, questions about the behavior of mercury will arise, including variability of mercury emissions and removal efficiencies of mercury control methods under differing operating conditions. Concerns related to the variability of emissions nearly always demands the evaluation of continuous monitoring over stack sampling in order to accurately determine mass emissions, especially over longer time periods.

  The issue of variability also affects the concerns raised related to the frequency of testing if a continuous monitor is not used. Commentors accurately note that this rule is structured to monitor and reduce the actual amount of mercury emitted in a year. Commentors did not describe the variability of emissions at their facilities. Without understanding this, a single measurement during a year is nearly meaningless in measuring actual annual emissions. This situation will likely change as the companies conduct research and engineering

assessments of the facilities to prepare reduction plans. But this just reinforces the MPCA's position as stated in the rule: the use of continuous mercury monitors needs to be evaluated.

- The monitoring assessment focusses on collecting mercury data to design appropriate mercury controls but is silent on the topic of the need for or use of mercury monitoring as a process control parameter in operating mercury control systems. It is appropriate to collect data to design effective mercury controls, but it is likely that monitoring of some form is necessary for long term operation of mercury control equipment, particularly if sorbent injection is used. Mercury CEMs are used at utility power boilers to provide real-time feedback of mercury emissions to adjust carbon injection rates. With a continuous monitor, carbon injection rates are automatically adjusted in response to measured levels of mercury in the flue gases, potentially allowing for more efficient use of carbon. The evaluation summarized in Table 4 did not describe this capability, and did not weigh the pros and cons of such operational control.
- The exhibit identifies EPA Method 30B as capable of being modified to measure particulate bound mercury, and its potential as a means of measuring mercury in the long term. Exhibit 7 suggests additional study and validation (Table 5), contrary to the comment being made.
- Several indurating furnaces have already planned for removal of existing wet scrubbers to install dry acid gas scrubbing and fabric filters. Because fabric filters are very efficient at removing particulate matter, there will be very little particulate bound mercury.

At this time, the facilities have not selected a mercury control technology for reducing mercury from the indurating furnaces. The MPCA believes that because most decisions on how to control mercury, as well as appropriate means of measuring mercury have yet to be made, the MPCA will retain the requirement to evaluate CEMs within a facility's mercury reduction plan.

### 15. Part 7007.0502, Subp.5 A(1)(f).

**Comment 15:** The proposed compliance dates in the rules are not consistent with the TMDL Implementation Plan and with part 7007.0502, subpart1. *(US Steel letter comment #3)*

**Response:** Part 7007.0502 subpart 1 states that the statewide mercury air emission goal of 789 pounds per year from Minnesota sources should be achieved by 2025, which is the same year as the TMDL Implementation Plan. The final compliance dates for the sectors that will prepare plans are the same as those in the TMDL Implementation Plan, either 2018 or 2025 depending on the sector but in no case later than 2025.

### 16. Part 7007.0502, Subp. 6.

**Comment 16:** SMBSC requested clarification on the staggered compliance timing between agriculture/food processing and mining industries, and commented that all industries should be in compliance at same time (*letter comment #IX*).

**Response:** The schedule for reductions from each mercury emission source type under part 7007.0502, subpart 6 was established based on the recommendations in the TMDL Implementation Plan, as well as other factors. Each affected sector's compliance deadline was discussed in the SONAR (pages 21-25). Because mercury control technologies are still in development for ferrous mining facilities, MPCA established a timeline in the Mercury TMDL to allow for development, trials, and installation. The industrial boilers at agricultural industries are required to address federal emission standards for boilers now, and the rule sets the same schedule as the federal rules (40 CFR 63.7495). For these reasons, no rule change is proposed.

### 17. Part 7007.0502, Subp. 6A

**Comment 17:** The Taconite Companies comment that the decision to set a 72% reduction requirement is arbitrary, and the baseline year for emissions (2010) may not be representative (l*etter comments #VC and VD*). Imposing mercury emission limitations based on 2010 levels is unreasonable and inflexible because mercury emissions change with ore body concentrations and pellet production. Instead of emissions limits based on efficiency and prior baselines, limits should be taconite-facility-specific and based on the plant iron ore source and the feasible control efficiency of dependable technology which meets the criteria of the Strategy Framework. The appropriate methodology to determine

the mercury control efficiency and annual mercury emissions should capture the gradual variability in the ore using periodic stack tests as described in proposed rule 7019.3050 to have a minimal impact technically and economically on the taconite production process.

The Taconite Companies also describe the reduction as a "bright line" or a "mandating reductions". With a goal date of 2025, the Companies say it is unreasonable to rush forward with a rule that requires installation of technology that will not achieve MPCA's goals.

**Response:** In this rulemaking, the MPCA has proposed rules that establish an enforceable process for implementing the TMDL mercury reduction strategies. Because the Implementation Plan was created with great effort by affected stakeholders over many months of careful deliberation, the MPCA has taken great care to not modify the conditions of the strategies. The taconite industry itself proposed the strategy of reducing mercury from the 2010 baseline year, which was eventually agreed to by all the stakeholders, not just the taconite industry. The proposed rule now codifies the plan for mercury reductions from the ferrous processing sector.

As participants in devising the TMDL Implementation Plan, the commenters are well aware that an important objective of the TMDL Implementation Plan Strategy is to place the implementation framework into rules, thus formalizing the process and progress to reduce mercury emissions. See SONAR Attachment 2, pages 10-11. As outlined in the SONAR (pages 70-72), the MPCA gave considerable time to voluntary reduction efforts beginning more than 20 years ago. Unfortunately, the voluntary approach yielded little progress. With the completion of this rulemaking, reductions are more firmly secured. The 20+ year history of the MPCA's efforts to reduce mercury emissions demonstrates that it has not rushed forward with the rule.

The reduction strategy for the sector is to achieve a 75% reduction from the year 2010 baseline for the industry as a whole[20]. The proposed rule puts the responsibility of reducing mercury emissions to each facility within the ferrous processing sector, that is, taconite processing and direct reduced iron facilities. This is an equitable distribution of the responsibility across the entire industry to reduce mercury emission.

The MPCA agrees that limits should be facility specific. The facility owners are in the best position to determine expected changes in the mercury content in the raw ore being mined, the products being produced and the variability of mercury in the additives used when producing taconite or iron. Therefore, the MPCA proposed that each facility produce their reduction plan rather than the MPCA mandating an emissions limit in this rule. This approach assures that the reduction strategy for each facility is suited to the facility.

The proposed rule gives the industry adequate time and flexibility to meet the requirements. The industry is engaged in mercury reduction technology testing that so far has very promising results. Initial pilot testing has identified technology that can achieve the reduction. The rule does not mandate a specific technology or a set emission limit that must be met. Instead, it has the facilities create their own plans to achieve a percentage reduction in total mercury, provides for alternatives to average reductions between emission units or stationary sources **and** allows a facility to propose an alternative reduction if 72% is demonstrated to be technically infeasible.

### 18. Part 7007.0502, Subp. 6A(1)

**Comment 18a:** Mesabi Nugget comments "MPCA already determined under its Clean Air Act authority the maximum level of mercury control achievable by Mesabi Nugget – 75 lbs/year with a targeted 50% reduction in the future. This current rulemaking ignores that Maximum Achievable Control Technology (MACT) determination and seeks — under Clean Water Act authority — to impose further air emissions reductions without any legal or scientific basis to support it" (*comment letter page 5*).

**Response:** Although the need to reduce mercury in fish tissue is grounded in the Clean Water Act, the MPCA is relying on its authorities in Minn. Stat. § 116.07 subd. 4(a) to conduct this rulemaking, not on the Clean Water Act.

[20] MPCA 2009. Implementation Plan for Minnesota's Statewide Mercury Total Maximum Daily Load October 2009. Document page 51 of 116pp. http://www.pca.state.mn.us/index.php/view-document.html?gid=11481

Mesabi Nugget states that its current air emissions construction permit included a case-by-case MACT determination that targeted a 50% reduction in mercury emissions. The Mesabi Nugget construction permit application was submitted to the MPCA in 2004, and the MPCA issued a permit for construction and operation with the case-by-case MACT determination establishing mercury limits in 2005 in compliance with the requirements of Clean Air Act Section 112(g) and federal regulation 40 CFR 63.43. Mesabi Nugget developed a mercury species profile from its rotary hearth furnace from operating a pilot plant and used the profile to conduct an evaluation of available mercury control technology. The evaluation determined that the MACT "floor" was "no control." This determination was based on the fact that at the time, there was no direct reduced iron facility that had operating air pollution controls that removed mercury. The determination satisfied the Clean Air Act MACT requirement.

The Clean Air Act MACT requirement does not address the Clean Water act requirement to reduce mercury to levels that ensure that water bodies are not under fish advisories. At the time the MACT determination was made, both Mesabi Nugget and the MPCA clearly understood air pollution control technology for reduced iron facilities was under development. Mesabi Nugget's construction permit was issued with the requirement that the facility be designed to accommodate the potential future use of mercury-reducing technologies, and that Mesabi Nugget was required to investigate and implement actions with the goal to reduce mercury emissions by at least 50% percent from baseline emissions. The MACT determination in Mesabi Nugget's permit remains as originally issued under the requirements of the Clean Air Act, section 112(g).

On the Clean Water Act side, the TMDL stakeholders created a strategy to reduce mercury across the ferrous processing industry, which includes Mesabi Nugget. The MPCA believes it is reasonable to include Mesabi Nugget in this effort. The TMDL stakeholders and now the MPCA through this rule, have devised a mercury reduction strategy that is narrowly focused on those sources whose emissions are significant contributors to Minnesota's mercury emissions. Under the rule, specifically, reductions from each source are important to achieve the over reduction goal. Without reduction at Mesabi Nugget, it will be difficult for Minnesota to achieve the statewide emissions goal of 789 pounds.

Mesabi Nugget states that the rule is flawed because it sets a mercury reduction percentage that has no data to support it. Mesabi Nugget expressed concerned that because its current trials of ACI have achieved at best a 28% reduction in mercury. Mesabi Nugget believes it is unreasonable to assume that it will be capable of achieving a 72% reduction as proposed by the rule. Mesabi Nugget also pointed out that there are additional strategies for addressing mercury emissions that have not been evaluated by the MPCA, and the MPCA did not estimate the cost of those technologies.

The MPCA evaluated one possible means of controlling mercury that pilot testing has demonstrated to be capable of controlling mercury to achieve the reductions required by this rulemaking — injecting carbon in front of an additional baghouse that is installed after the existing air pollution controls (see Attachment 7 to the SONAR). The information being collected from Mesabi Nugget's control technology trials indicates that the emission profiles do not seem to be different from the taconite facilities.[21] The MPCA believes its assessment is still appropriate. Alternatively, Mesabi Nugget refers to its current trials of modifying its existing air pollution control equipment by injecting activated carbon. Should its current efforts not yield mercury reductions that achieve the 72% reduction, Mesabi Nugget is free to consider other methods, including the method evaluated by the MPCA. If thorough evaluation of the various options demonstrates that a 72% reduction is not technically achievable, the rule allows Mesabi Nugget to propose an alternative.

Mesabi Nugget did not offer comments on the appropriateness of the 2025 deadline and its ability to accomplish the evaluation, installation and operation of controls by the deadline. Provided the company remains diligent, the MPCA continues to believe that the reduction requirements, coupled with the long compliance timeframe, and the opportunity to prepare alternatives with technical support, are reasonable.

[21] http://files.dnr.state.mn.us/lands_minerals/reclamation/Berndt2008.pdf as found on DNR's website http://www.dnr.state.mn.us/lands_minerals/dnr_hg_research.html, a website containing the technical studies relied on in this rulemaking (SONAR attachment 7, p 3, fn 1). Mesabi Nugget is required under its current permit to submit mercury performance test results, and have recently submitted performance tests conducted in 2013 and early 2014.

**Comment 18b:** The Taconite Companies expressed concern that more flexibility is needed to ensure the baseline chosen is appropriate for each facility. The Taconite Companies expressed deep concern about the provision in the proposed rule stating that "the commissioner shall determine the pounds of mercury emitted in 2010." (*letter comment #VD*) If the MPCA declines to reconsider its current baseline approach, the Taconite Companies requested that the rule be amended to allow facilities to submit individualized representative baselines for review and approval by MPCA.

**Response:** As discussed previously (in comment #1) related to the reasonableness of this rulemaking, the MPCA has proposed to require facilities to prepare reduction plans, rather than establishing a performance standard or emissions limit. To establish a mercury reduction for ferrous processing facilities to include in their reduction plans, the MPCA proposed a mercury reduction that is based on the final sector goal (210 pounds for the ferrous processing sector) that reflects current emissions and production. The taconite industry proposed, and the stakeholders agree to, the year 2010 as the baseline year for determining reductions in the TMDL implementation plan. It was generally agreed that the industry should use what was at the time a future year for the baseline to include the two as-yet operating ferrous processing units, Essar Steel and Mesabi Nugget.

The MPCA conducts a statewide mercury inventory once every three years as part of the National Air Toxics Inventory (NATA). The year 2008 is the most recent complete inventory, as it takes significant effort to complete the quality assurance on the NATA data. The MPCA must estimate 2010 emissions because 2010 is not an inventory year.

The ferrous processing sector collectively agreed to reduce mercury to 210 pounds a year. Because actual production in 2010 was slightly lower than in 2008 when the TMDL implementation plan was approved, the necessary reduction to reach 210 pounds is also slightly lower, now 72%. Table 3 below shows the calculations for deriving the 72% reduction proposed in the rule.

**Table 3. Derivation of Percent Reduction Needed by the Ferrous Processing Industry to Achieve the TMDL Sector Goal**

| | Mercury Emissions (MPCA 2008 Hg Inventory) | Production mmlt | lb Hg/mmlt | Production mmlt | Calculated Mercury Emissions |
|---|---|---|---|---|---|
| | **2008** | **2008** | **2008** | **2010** | **2010** |
| Northshore Mining Co – Silver Bay (furnaces) | 4.4 | 5.299 | 0.83 | 4.599 | 3.8 |
| US Steel Corp – Minntac | 178 | 13.588 | 13.10 | 12.226 | 160.2 |
| Hibbing Taconite Co | 224 | 8.058 | 27.80 | 5.697 | 158.4 |
| Arcelor Mittal | 32.6 | 2.571 | 12.68 | 2.604 | 33.0 |
| US Steel – Keewatin Taconite | 98.5 | 4.663 | 21.12 | 4.883 | 103.1 |
| United Taconite LLC – Fairlane Plant | 132.6 | 4.986 | 26.59 | 5.028 | 133.7 |
| Essar (MSI) | 77 | | | | 77.0 |
| Mesabi Nugget | 70 | | | | 70.0 |
| **Total Mercury Emissions** | **817.1** | | | 0.069 | **739.2** |
| TMDL Goal for Sector | | | | | 210 |
| % of 2010 actual emissions to achieve TMDL goal | | | | | 28% |

(Production from November 2011 Minnesota Mining Tax Guide)

The MPCA declines to include a consultative or approval process in the rule for determining a facility's baseline emissions. The MPCA expects that facilities will include in their reduction plans their representation of the 2010 baseline, and how the reduction plan achieves the 72% reduction proposed in this rule. The MPCA will review and offer comments on the plan, including the facilities' representation of their baseline emissions.

The MPCA has overall responsibility for achieving the statewide mercury emissions goal of 789 pounds, of which 210 pounds will potentially be emitted by the ferrous processing industry when control strategies are fully implemented in

2025. If, through MPCA's review and incorporation of the plans into facility permits, it is determined that additional mercury emissions reductions are needed to achieve the statewide goal, the MPCA will need to evaluate where further reductions can be accomplished.

### 19. Part 7007.0502, Subp.6(C)(1) and 6(C)(2).

**Comment 19a:** SMBSC comments that "…the mercury emissions reduction plan must demonstrate reductions of 70% from 2005 mercury emissions. However, in sections (1) and (2) of this subpart, the rule includes separate consideration as to whether 70% of the mercury present in the fuel when combusted is captured and not emitted." SMBSC requests that the MPCA clarify the intended requirements (*letter comment #IV*).

**Response:** The MPCA acknowledges that the exemption and reduction plan controls are different. The exemption calculation could be considered to be more stringent. The MPCA believes this is reasonable as no reduction plan is prepared and no additional compliance actions must be taken if the exemption is met.

The proposed rule for the reduction requirement under a plan for ICI boilers was changed in response to comments submitted. Those changes are discussed in the Order Adopting Rules.

**Comment 19b:** Several commenters suggest either that it is unnecessary for MPCA to regulate beyond the requirements of the USEPA Boiler MACT mercury limits or had questions about how this rule imposes additional requirements at boiler units subject to federal standards (*Taconite Companies letter comment #VG, Cliffs Natural Resources, letter comment #II, VDPU comment letter page 3, and Minnesota Power e-mail.*) The Taconite Companies specifically commented that "The proposed rule would impose additional obligations on owners of coal-fired boilers that go well beyond those established in EPA's carefully considered Boiler MACT rulemaking." And, "By attempting to mandate reductions that would go well beyond U.S. EPA's considered "maximum" available reductions without articulating any technical basis, MPCA invites a host of legal and technical feasibility problems that are not warranted given the minute amounts of mercury involved.". "Accordingly, MPCA should delete this requirement and incorporate the Boiler MACT mercury standards as promulgated by U.S. EPA."

**Response:** The federal NESHAPs (MACT standards) have a different structure and purpose than the proposed state rule, which implements the statewide mercury reduction target. NESHAPs are technology-based standards to address specified toxic air pollutants. NESHAPs require poorer-performing facilities in a given sector to meet similar emission limits or apply work practices comparable to the best-performing sources. When NESHAPs are initially promulgated, they are a technology-based standard, and at this time are not created to achieve a public health goal such as the minimization of exposure to mercury through ingesting fish. States can impose more stringent standards to address local issues should the state determine federal standards are not sufficient. [22]

When developing the TMDL Implementation Plan (2009), the TMDL stakeholders relied on reductions they expected would be required by the federal boiler rules. As stated in the SONAR (pages 23-25); however, USEPA relaxed the allowable emissions rate for mercury over the course of promulgating, and then revising, the federal boiler standard. While the MPCA and the TMDL stakeholders originally intended to rely on the federal boiler rule for mercury reductions from that sector, the MPCA determined that the final federal ICI boiler standards issued in 2013 will not result in achieving the mercury reductions identified the Statewide Mercury TMDL. In fact, if units in Minnesota emit mercury at the limit allowed in the federal rule, mercury emissions in Minnesota would actually increase substantially from current conditions. Therefore, the MPCA proposed enforceable reduction requirements in this rule for boilers to do their share to meet the statewide mercury reduction goal, rather than to increase the problem.

[22] NESHAPs are later evaluated by EPA for their human health and environmental impacts, called "residual risks" and can be, and have been, revised to be more stringent. The Risk and Technology Review (RTR) is a combined effort to evaluate both risk and technology as required by the Clean Air Act (CAA) after the application of maximum achievable control technology (MACT) standards. Section 112(f)(2) of the Clean Air Act directs EPA to conduct risk assessments on each source category subject to MACT standards, and to determine if additional standards are needed to reduce residual risks. Section 112(d)(6) of the CAA requires EPA to review and revise the MACT standards, as necessary, taking into account developments in practices, processes and control technologies.

The timing for the submittal of a reduction plan has been proposed to align with the timing of the compliance deadline of the industrial boiler MACT to ensure that pollutant emissions, including mercury, are evaluated at the same time as a facility considers compliance requirements for other pollutants regulated by the NESHAP. Including mercury control at the same time as a facility evaluates compliance with other pollutants allows for consideration of a complete project and results in a more cost efficient project.

**Comment 19c:** The MPCA received multiple comments regarding the use of the federal boiler compliance methods to satisfy state requirements. The Taconite Companies (*letter comment #VG*), and Cliffs Natural Resources (*letter comment #III*) commented that the MPCA should allow flexibility in how industrial boilers achieve compliance. The Taconite Companies "…recommend that MPCA add provisions that offer operational flexibility to reduce the cost of compliance without compromising the emission control benefits of the Rule." The Taconite Companies also support alternate methods for demonstrating compliance in the rule. The Taconite Companies and Cliffs Natural Resources comment that the "MPCA should allow facilities the flexibility to demonstrate compliance using a mass balance approach or any other alternate method that can be reasonably demonstrated as reliable for measuring mercury emissions." VDPU (*comment letter page 2*) commented that they operate multiple units subject to the federal rule. Their Boiler 7 will be permitted as a "limited use boiler" and will have a federally enforceable reduction. VDPU will demonstrate compliance with the NESHAP based on averaging emissions between Boilers 9 and 11 stating that "Boiler 9, which individually has mercury emissions greater than 5 pounds per year, can currently comply with Boiler MACT by averaging emissions with Boiler 11, a biomass boiler that has very low mercury emissions." The MPCA should allow use of the federal provisions, like emissions averaging, to meet the intent of this rule.

**Response:** The Taconite Companies requested operational flexibility; however, did not offer suggestions on the kind of flexibilities that would be useful. The Taconite Companies and Cliffs Natural Resources also requested using alternative methods of demonstrating compliance. The MPCA notes that the proposed rule at part 7007.0502, subp. 5(A)(d) allows a facility owner or operator to propose periodic monitoring. The only requirement is to evaluate the use of a continuous monitor when the reduction plan is prepared. Therefore, because alternative methods of demonstrating compliance already exist in the proposed rules, the MPCA will not revise Subparts 6(C)(1) and (2) as they apply to industrial boilers.

Next, while the MPCA acknowledges and appreciates the proposed reductions at VDPU's Boiler 7, the entire facility will have actual mercury emissions greater than 3 lb/yr and will continue to meet the definition of a "mercury emission source" after the reductions at Boiler 7. However, because mercury air emissions from Boiler 7 are well below 5 lb/yr, that unit is not subject to a reduction plan under these rules.

The mercury emission limit in the NESHAP is in terms of pounds per million British thermal unit (BTU). The facility may be able to meet the requirements of the NESHAP by averaging emission rates between boilers. Averaging under the federal standard, however, does not result in the reductions in total mass of mercury emitted needed to meet the Statewide Mercury TMDL reduction goal.

The MPCA's analysis has shown that 5 lb/yr is a reasonable threshold for the owners/operators of an ICI boiler to prepare a reduction plan and reduce mercury air emissions. This assessment is discussed in the SONAR (pages 23-25), and in the SONAR Attachment 7 *Estimated Costs Related to the Implementation of the Mercury Reduction Rules* (July 2013).

Boiler 9 has emissions of approximately 7 lb/yr according to the facility's 2013 emission inventory submittal. Emissions over 5 lb/yr would make Boiler 9 subject to a reduction plan. Boiler 11, however, has emissions below 5 lb/yr. The facility's 2013 emission inventory submittal indicates mercury emission from Boiler 11 were 4.5 lb/yr. If the MPCA were to agree to averaging mercury emissions across all boilers at a source, the average from Boilers 9 and 11 would be about 5.7 lb/yr. This would lead to both units being subject to having a reduction plan, a more stringent outcome for the facility than under the rules as proposed. Therefore, the MPCA will maintain the ICI boiler framework in these rules to apply to individual units and not revise the boiler reduction plan language to allow averaging across ICI boilers.

**7011.0561 CONTROL OF MERCURY FROM ELECTRIC GENERATING UNITS.**

### 20. Part 7011.0561.

**Comment 20:** Minnesota Power asks whether the requirements of part 7011.0561 "impose any new emission reductions or costs beyond what is already required by state statutes or the federal standards" because Minnesota Power has been unable to match 7011.0561 exactly with final UMATS, despite assumption of incorporation by reference.

**Response:** Part 7011.0561 is intended to incorporate existing federal requirements for EGUs that are currently in effect into state rules. As described in the SONAR (page 27), the MPCA must incorporate promulgated federal standards for the MPCA to be delegated implementation and enforcement authority of the federal rule. An MPCA agreement with USEPA states that the federal rule must be effective as state law. Therefore, the MPCA has developed part 7011.0561 to incorporate the existing compliance and monitoring standards in federal rules promulgated in 2012 (40 CFR 63 subpart UUUUU, including Appendix A to Subpart UUUUU – Hg Monitoring Provisions). The MPCA has worked to harmonize the state rules for mercury reductions with the requirements of the federal rule while still meeting the intent of the Mercury Emissions Reduction Act and the Mercury TMDL Implementation Plan.

### 21. Part 7011.0561, Subp. 2.

**Comment 21a:** Minnesota Power asked why the definition of "minimally emitting units" that was in the working rule draft was deleted (*e-mail point #4*).

**Response:** The definition of minimally emitting unit was used in the working rule draft to identify EGUs that emit five pounds per year or less. The definition of "minimally emitting unit" was deleted because the threshold for applicability was moved to part 7011.0561, Subpart 1, Applicability. This subpart defines the applicability of this part to units that emit 5 lb/yr or more. With the addition of an applicability threshold to Subpart 1, a separate definition for "minimally emitting unit" is no longer necessary. In addition, the MPCA wanted to avoid creating an impression that it was establishing a de minimis emission definition or level with this rule.

That said, the MPCA believes the procedures necessary for demonstrating a unit is emitting 5 pounds a year or more of mercury each year is not clear. Therefore, the MPCA is proposing to modify subpart 3 to provide instructions on this demonstration. Those changes are fully described in the Findings of Fact and Conclusions in support of the Order to Adopt the Rules.

**Comment 21b:** Xcel Energy commented that Subp.2 should be modified to provide instructions on how to calculate a 30-day rolling average. Xcel suggested using the language of part 7011.0561, Subp. 6.H to define how to calculate a 30-day rolling average (*letter comment #5*).

**Response:** Existing Minn. R. 7007.0100, subp. 21a. defines the term "rolling average" and states that "The average is calculated by summing all data points for the time period and dividing the total by the number of data points." Subp. 6.H tells a utility boiler to calculate a 30 boiler day rolling average. "Boiler Day" is defined in subp. 2. With the addition of "boiler day" all parts of the term 30-day rolling average are defined. Given these definitions, no rule change is proposed.

### 22. Part 7011.0561 Subp. 4.A.

**Comment 22:** Minnesota Power states that it understood the compliance date would be January 1, 2019, not January 1, 2018, as published in the proposed rules (*e-mail point #5*).

**Response:** The working draft rule that was shared with interested parties in July, 2012 did not include a final date in this subpart; it read January 1, 201X. The federal standard requires that existing EGUs achieve compliance no later than April 16, 2015 (40 CFR 63.9984). EGUs should have already met their requirements by the date in the state rules. The MPCA proposed January 1, 2018, because an assessment of progress toward the Statewide Mercury TMDL reduction goal is due that year.

### 23. Part 7011.0561 subpart 4.A(1) and (2)

**Comment 23a:** Minnesota Power notes the working draft rule identified the emission limit as 8 lb/Tbtu or 90%, whichever is less stringent; and that the proposed rules lack the "less stringent" language; and asks the MPCA to explain why this language has been eliminated (*e-mail point #6*).

**Response:** The language "less stringent" was not maintained in the proposed rules because the MPCA restructured Subpart 4, Item A in the working draft to make the rule read more clearly. With the revised rule structure, using "or" between the subitems (1) and (2), the phrase "whichever is less stringent" is no longer necessary. The revised text reads as follows:

> *A. By January 1, 2018, owners or operators of a coal-fired EGU with a nameplate electricity generation capacity greater than 100 MW must:*
> *(1) control mercury such that 90 percent of the mercury present in the fuel when combusted is captured and not emitted; or*
> *(2) demonstrate that the unit emits no more than 0.8 pounds of mercury per trillion British thermal units (Tbtu) of heat input.*

**Comment 23b:** Xcel Energy commented that the performance standard cited in Subpart 4(A)(2) needs to include an averaging period (*letter comment #8*).
**Response:** Compliance with the emission limits established in subpart 4(A)(2) are determined by the monitoring requirements of subpart 5: electric generating units greater than 250 MW must install a continuous mercury monitor, for which a 30-day rolling average is appropriate, as Xcel suggested in its comments.

However, subpart 5 states that for EGUs smaller than 250 MW, the owner or operator may elect to rely on periodic performance tests. In those instances, the emission limit is not a rolling average. Subpart 5(b) explains how to determine compliance with the emission limit when conducting a performance test. The MPCA will not modify this subpart.

### 24. Part 7011.0561, Subp. 5.B(1).

**Comment 24:** Xcel Energy commented that use of mercury CEMS should be allowed for compliance demonstration (*letter comment #10*).

**Response:** The MPCA agrees that mercury CEMs should be used for compliance demonstration if they are installed at a boiler. However, this subpart provides instruction on the frequency of stack sampling in the absence of a CEM. Therefore, no change is proposed for Subpart 5.B(1).

### 25. Part 7011.0561, Subp. 6I.

**Comment 25:** Xcel Energy suggested several changes to Subpart 6.I.; first clarify the rule language by adding an averaging period of 30-day rolling average when relying on fuel sampling, and second, add "whichever is less stringent" to the end of the last sentence of this item (*letter comment #13*).

**Response:** The MPCA will not be revising this subpart as suggested, as the language offered by the commenter suggests that fuel sampling would have to be conducted on a 30-day rolling average basis, a fuel sampling regime not contemplated at this time by the MPCA. However, a facility may choose to propose such a sampling period in its reduction plan required in Subpart 8. The phrase "whichever is less stringent" will not be added because the rule at part 7011.0561, subpart 4 explains the format of the emission limit.

## 7011.1215 APPLICABILITY OF STANDARDS OF PERFORMANCE FOR WASTE COMBUSTORS.

### 26. Part 7011.1215, Subp. 4.

**Comment 26:** USEPA commented on a portion of the existing rule that explains the application of standards of performance for incinerators during periods of startup, shutdown and malfunction or SSM *(rule comments page 23)*. USEPA explained that it is in litigation over the applicability of exemptions from standards of performance during

periods of startup, shutdown and malfunction, and recommends removing the existing rule language in Subpart 4 related to SSM, specifically as it applies to sewage sludge incinerators.

**Response:** MPCA proposed amendments to part 7011.1215 Subpart 4 to modify existing rule language to remove a reference to rules that are proposed for repeal; part 7011.1231. Part 7011.1215 Subpart 4 as amended in this rulemaking applies only to municipal waste combustors, not sewage sludge incinerators as USEPA suggests. The MPCA has properly incorporated by reference the sewage sludge incinerator standards at part 7011.1350 and 7011.1355, including USEPA's treatment of periods of startup, shutdown and malfunction.

The MPCA believes a change to the requirements for startup, shutdown and malfunction could be viewed as substantial because the subject matter of startup, shutdown and malfunction was not identified as a subject of this rulemaking in the MPCA's July 2009 public notice of Request for Comments on the planned new air quality rules governing mercury emissions. MPCA did not indicate in its public notice that the subject of SSM would be addressed in this rulemaking, and affected facilities have not had sufficient notice that USEPA's requested rule change might occur. Further, making this change is not a natural outgrowth of the rulemaking. Application of emission limits during periods of SSM is not a trivial matter.

The MPCA will not revise Subpart 4 as requested. The MPCA can however address USEPA's comment in another rulemaking.

## 7011.1291 INCORPORATION BY REFERENCE OF NEW SOURCE PREFORMANCE STANDARD FOR NEW LARGE MUNICIPAL WASTE COMBUSTORS.

### 27. Part 7011.1291.

**Comment 27:** USEPA asked if MPCA is amending existing rules for existing large and small municipal waste combustors, as the current rule does not meet 40 CFR Part 60 subpart Cb or BBBB *(rule comments page 23)*.

**Response:** The MPCA did not propose to amend existing state rules regulating existing large and small municipal waste combustor emissions at this time because doing so would be outside the scope of this rulemaking. The MPCA acknowledges that current state rules do not meet the requirements of federal rules for existing sources and will address USEPA's comment in another future rulemaking.

## 7011.1292 INCORPORATION BY REFERENCE OF NEW SOURCE PERFORMANCE STANDARDS FOR NEW HOSPITAL/MEDICAL/INFECTIOUS WASTE INCINERATORS

### 28. Part 7011.1292.

**Comment 28:** USEPA asked if the MPCA considered incorporating by reference the hospital/medical/infectious waste incinerator Federal Plan for existing sources *(rule comments page 24)*.

**Response:** The MPCA is not incorporating the federal plan for hospital/medical/infectious waste incinerators in this rulemaking, but can address it in another future rulemaking.

## 7011.1355 STANDARDS OF PERFORMANCE FOR EXISTING SEWAGE SLUDGE INCINERATOR UNITS; COMPLIANCE WITH CLEAN AIR ACT SECTION 129 STANDARDS.

### 29. Part 7011.1355.

**Comment 29:** USEPA noted that if MPCA is incorporating by reference the emission guidelines for existing sewage sludge incinerators, the MPCA will need to get AG [attorney general] approval to be accepted in a State Plan *(rule comments page 28)*.

**Response:** USEPA is referring to the procedures a state must follow in order to demonstrate that it has the authority to act on behalf of the USEPA administrator in the state. One component of that demonstration is for the appropriate state legal authority to affirm that the state agency, in this case the MPCA, has the authority to adopt and administer rules related to the standards of performance for sewage sludge incinerators.

The MPCA will request such a declaration at the time it submits this rule to USEPA in its request for delegation of the sewage sludge incinerator standards.

## 7011.1360 EXISTING COMMERCIAL AND INDUSTRIAL SOLID WASTE INCINERATOR COMPLIANCE REQUIREMENTS.

### 30. Part 7011.1360.

**Comment 30:** USEPA noted that if MPCA is incorporating by reference the emission guidelines for existing commercial and industrial incinerators, the MPCA will need to get appropriate legal authority approval to be accepted in a State Plan *(rule comments page 30)*.

**Response:** See response to comment #28. The MPCA will request such a declaration at the time it submits this rule to USEPA in its request for delegation of the sewage sludge incinerator standards.

### 31. Part 7011.1360, Subp. 2.

**Comment 31:** Fibrominn requested that MPCA's compliance deadlines should reflect those in USEPA's final rule for commercial and industrial solid waste incinerators (CISWI). Fibrominn also commented that compliance with the CISWI regulations will be difficult and costly, the USEPA rule is still open to review in the Court of Appeals, Fibrominn submitted a request to USEPA in July 2013 seeking a determination that fuel it uses is a nonhazardous secondary material and not a waste at all, and because the State Implementation Plan has a delegation of authority from USEPA "…at a minimum, MPCA should modify its compliance deadline to conform with federal rule" (*comment letter page 2*).

**Response:** Fibrominn was permitted with case-by-case MACT limits for hazardous air pollutants in 2003. Fibrominn's boiler represents state of the art in air emission controls from small power boilers with sophisticated combustion controls, acid gas controls, a fabric filter and nonselective catalytic reduction for nitrogen oxides control. Emissions testing conducted under its current air emission permit consistently demonstrates that Fibrominn is already achieving the emission levels required by the federal CISWI rule. The MPCA appreciates that ongoing compliance testing requirements under federal rules are more expansive and frequent than the schedule in Fibrominn's existing permit. However, changes in testing schedules do not necessitate a delay in compliance deadlines. Fibrominn did not identify any modifications it would have to make at the facility to comply with federal standards.

This rule has proposed a reasonable deadline and the MPCA makes no change.

## 7011.1365 INCORPORATION BY REFERENCE OF STANDARDS OF PERFORMANCE EMISSION GUIDELINES AND COMPLIANCE TIMES FOR EXISTING COMMERCIAL AND INDUSTRIAL SOLID WASTE INCINERATORS.

### 32. Part 7011.1365, Item A(10).

**Comment 32:** USEPA commented on Item A subitem 10 that federal regulation [40 CFR] "60.2805 says must submit permit under CAA 129(e) — 3 years after rule promulgation" *(rule comments page 34)*.

Federal regulation states: "Yes. Each CISWI unit and air curtain incinerator subject to standards under this subpart must operate pursuant to a permit issued under Clean Air Act sections 129(e) and Title V." This regulation requires that a CISWI operate under a Title V permit, but it does not state when the permit must contain the requirements of the federal emission guidelines. Federal regulation 40 CFR 60.2535 establishes the schedule of compliance with the standards.

**Response:** The MPCA believes that USEPA is attempting to point out that the Title V permit must contain the requirements established under Section 129 of the Clean Air Act. While the proposed subitem (10) requires a permit application if an affected facility does not have a permit, without revising the proposed rule, existing Minn. R. 7007.1600 requires that a permittee apply for a permit modification when a new federal regulation applies. Existing permit rules, already approved by USEPA in delegating the permit program to the MPCA, address the schedule for permits. No rule change is necessary.

**7019.3050 PERFORMANCE TEST DATA**

### 33. Part 7019.3050, Item E(5).

**Comment 33a:** Several comments were submitted regarding the performance test schedule in this part. US Steel comments "Due to the availability of stack testing personnel and appropriate weather to perform stack tests, the rule should offer flexibility related to stack testing that is consistent with existing MPCA rules." (*letter comment #7*). The Chamber comments "There is a clear inconsistency between the requirements for initial performance test, for subsequent performance tests, and for calculation of the emission inventory."
"… the Chamber suggests that the original test be taken within five years of the effective date of the rule." (*comment letter page 6*).

**Response:** The MPCA encourages facilities to plan ahead to meet testing due dates and thus avoid potential non-compliance. In the case of unforeseen events, the MPCA understands the need for flexibility. The intention is that reduction plans will be incorporated into an enforceable document, preferably the air emission permit for the stationary source. Once incorporated into a permit, general rule provisions that address changes to permit conditions would apply. Therefore, the MPCA believes it would be redundant to add a similar provision to these rules.

**Comment 33b:** The Chamber comments "There is a clear inconsistency between the requirements for initial performance test, for subsequent performance tests, and for calculation of the emission inventory." "… [T]he Chamber suggests that the original test be taken within five years of the effective date of the rule." (*comment letter page 6*).

**Response:** The Chamber's comment appears to delay the conduct of a performance test from one year after this rule is effective to five years after this rule is effective. If the source is emitting less mercury than currently estimated, a source could potentially be exempted from preparing a reduction plan, or will learn that the required reductions are less than previously understood. If the estimate is greater, the source may now find itself needing to prepare a plan. Delaying this test by four years deprives the affected source of the compliance timeframes established elsewhere in this rule. The MPCA will not make this change as the suggested change delays the resolution of the status of a mercury emitting source, with considerable consequence.

**Comment 33c:** SMBSC comments they are planning to demonstrate compliance with boiler GACT through the use of coal sampling for mercury content, and that this testing method is acceptable under the Boiler GACT rules. SMBSC further comments "However, it is unclear whether this will exempt SMBSC from performance test requirements under the Minnesota mercury reduction rules." (*letter comment #V*).

**Response:** Coal sampling would not inform the MPCA of the amount of mercury being emitted because it provides the amount of mercury input into the boilers and not the air emissions after controls. One purpose of this rulemaking is to improve the statewide air emission inventory. To support improving the inventory, facilities will conduct baseline and periodic testing on larger-emitting units (individually, 3 lb/yr or more) for mercury emissions under these rules. This testing occurs only if no other mercury testing requirement applies.

### 34. Copy of multiple rule parts and SONAR

**Comment 34:** With its comment letter, SMBSC attached several pages excerpted from the proposed rules, SONAR, and attachments to the SONAR. These pages included text that was highlighted or crossed out.

**Response:** While some rule sections in the attached pages corresponded to rule subparts specifically addressed in SMBSC's comment letter, others did not. The attached pages appear to be SMBSC's working documents. Because no explanations or notes were included on these attached pages and no reference was made to them in SMBSC's comment letter, the MPCA did not make changes based on the attached pages.

**Attachment 1**

## EAF Mercury Emissions Summary for Meltshops at 29 Facilities: 2010 EPA ICR Results

| | Facility Name/Number | Footnote | 2009 Production from ICR Response (ton/yr) | | | | 2009 Total Capacity from AIST Directory | Actual EAF Meltshop Hg Emissions Factor | Actual Annual Hg Emissions Using Test Data in lb/ton and Facility Steel Production for 2009 Reported in Survey (a) | Type of Steel Produced at Facility during 2009 (b) | EPA Test Method Used |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Carbon Steel | Stainless Steel | Other Steel | Total Steel | ton/year | lb Hg/ton | lb Hg/yr | | |
| 1 | AKSteel-Mansfield-OH | c | | 254,815 | | 254,815 | 952,650 | 0.00020 | 50 | stainless | 30B |
| 2 | Allegheny-Brackenridge-PA | | | 372,481 | | 372,481 | 550,000 | 0.000125 | 46 | stainless | 30B |
| 3 | Allegheny-Latrobe-PA | d | | 19,084 | | 19,084 | 28,179 | 0.0000023 | 0.04 | stainless | 30B |
| 4 | CMC-Birmingham-AL | | 374,659 | | | 374,659 | 800,000 | 0.00027 | 100 | carbon | 30B |
| 5 | CMC-Cayce-SC | | 529,630 | | | 529,630 | 800,050 | 0.00033 | 175 | carbon | 30B |
| 6 | CMC-Mesa-AZ | e | 29,474 | | | 29,474 | 280,000 | 0.00023 | 6.7 | carbon | 30B |
| 7 | CMC-Seguin-TX | | 816,348 | | | 816,348 | 1,000,000 | 0.00035 | 288 | carbon | 30B |
| 8 | Gerdau-Beaumont-TX | f | 429,963 | | | 429,963 | 1,002,000 | 0.00024 | 102 | carbon | 30B |
| 9 | Gerdau-Cartersville-GA | f | 547,272 | | | 547,272 | 658,000 | 0.00034 | 186 | carbon | 30B |
| 10 | Gerdau-Charlotte-NC | | 275,510 | | | 275,510 | 450,000 | 0.00068 | 186 | carbon | 30B |
| 11 | Gerdau-Jackson-TN | f | 396,071 | | | 396,071 | 892,000 | 0.00035 | 138 | carbon | 30B |
| 12 | Gerdau-Jacksonville-FL | | 448,574 | | | 448,574 | 1,100,000 | 0.00023 | 105 | carbon | 30B |
| 13 | Gerdau-Knoxville-TN | | 463,492 | | | 463,492 | 600,000 | 0.00016 | 75 | carbon | 30B |
| 14 | Gerdau-StPaul-MN | f | 221,719 | | 28,818 | 250,537 | 843,000 | 0.00023 | 58 | carbon (g) | 30B |
| 15 | Gerdau-Wilton-IA | f | 158,176 | | | 158,176 | 917,000 | 0.00035 | 55 | carbon | 30B |
| 16 | N.A.Stainless-Ghent-KY | | | 752,022 | | 752,022 | 1,600,000 | 0.00028 | 207 | stainless | 30B |
| 17 | Nucor-Blytheville-AR | | 1,669,096 | | | 1,669,096 | 3,000,000 | 0.00018 | 305 | carbon | PS12A (CEM) |
| 18 | Nucor-Cofield-NC | | 1,164,813 | | | 1,164,813 | 1,400,000 | 0.00050 | 583 | carbon | 30B |
| 19 | Nucor-Darlington-SC | | 768,691 | | | 768,691 | 1,050,000 | 0.00032 | 244 | carbon | 30B |
| 20 | Nucor-Huger-SC | | 2,285,967 | | | 2,285,967 | 3,450,000 | 0.00015 | 332 | carbon | 30B |
| 21 | Nucor-Jewett-TX | | 706,543 | | | 706,543 | 1,250,000 | 0.00042 | 296 | carbon | 30B |
| 22 | Nucor-Norfolk-NE | | 655,868 | | | 655,868 | 1,100,000 | 0.00025 | 163 | carbon | 30B |
| 23 | Nucor-Plymouth-UT | | 616,763 | | | 616,763 | 1,120,000 | 0.00028 | 174 | carbon | 30B |
| 24 | Steel Dynamics-Butler-IN | | 2,299,954 | | | 2,299,954 | 3,000,000 | 0.000061 | 139 | carbon | PS12B |
| 25 | Steel Dynamics-ColumbiaCity-IN | | 641,987 | | | 641,987 | 2,000,000 | 0.00018 | 113 | carbon | PS12B |
| 26 | Steel Dynamics-Pittsboro-IN | | 203,194 | | 181,643 | 384,837 | 720,000 | 0.00017 | 67 | carbon/other | PS12B |
| 27 | SSAB-Axis-AL | | 914,093 | | | 914,093 | 1,250,000 | 0.00023 | 208 | carbon | 30B |
| 28 | Timken-Faircrest-OH | | | | 455,769 | 455,769 | 870,000 | 0.00000097 | 0.4 | other | 30B |
| 29 | Timken-Harrison-OH | | | | 284,015 | 284,015 | 358,000 | 0.0000023 | 0.6 | other | 30B |
| | Total - tons | | 16,617,858 | 1,398,402 | 950,245 | 18,966,505 | 33,040,879 | | 2.2 (tons) | | |
| | **Averages (h)** | | | | | | | | | | |
| | Overall | | | | | 654,017 | 1,139,341 | 0.00024 | 152 | | |
| | Carbon steel | | 722,516 | | | | | | 178 | | |
| | Stainless steel | | | 349,601 | | | | | 76 | | |
| | Other | | | | 369,892 | | | | 0.5 | | |

*(a) Note deleted runs. Details listed on individual worksheet.*
*For any run that did not meet the paired sorbent trap agreement criteria, we deleted that run.*
*For Nucor Jewett, TX, we deleted Run 10 because of possible contamination, spike recovery was 486%. Acceptable range is 85-115%.*
*For Timken Harrison baghouse #2, we deleted spiked runs that made the average spike recovery out of the acceptable range (85-115%).*
*For Timken Harrison baghouse #9, we deleted spiked runs that made the average spike recovery out of the acceptable range (85%-115%).*
*(b) We are in the process of confirming that the type of steel produced during the emission tests are the same as reported for 2009 in the survey.*
*(c) Capacity provided by company because data not included in 2009 AIST Directory.*
*(d) Capacity estimated from Brackenridge actual vs. capacity production (68%) because data not included in 2009 AIST Directory.*
*(e) Capacity taken from company website because data not included in 2009 AIST Directory.*
*(f) Capacity taken from data acquired by EPA for 2007 EAF area source rule (Table 2-1 from EAF BID) because data not included in 2009 AIST Directory.*
*(g) This is the predominant type of steel produced during the year although other types were produced in small amounts.*
*(h) Only included data where one type of steel was produced.*

## Attachment 2

| PARAMETER | | UNIT | KEEWATIN TACONITE (KEETAC) | HIBBING TACONITE (HIBTAC) | | | Arcelor | MinnTAC | | | | | UNITED TACONITE (U-TAC) | | Northshore Mining | Essar | Mesabi Nugget |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | | | Keewatin | Hibbing | | | | Mountain Iron | | | | | Eveleth | | Silver Bay | | |
| LINE NO. | | (-) | 1 | 1 | 2 | 3 | 1 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | | 1 | |
| INDURATION TYPE | | (-) | Grate Kiln | Straight Grate | Straight Grate | Straight Grate | Straight Grate | Grate Kiln | Grate Kiln | Grate Kiln | Grate Kiln | Grate Kiln | Grate Kiln | Grate Kiln | | Straight Grate | Rotating Hearth |
| PRODUCTION RATE | | ton/hr | 700 | 476 | 476 | 476 | 487 | 250 | 450 | 450 | 450 | 450 | 280 | 672 | | 700 | 100 |
| EXISTING PM CONTROL DEVICE | · Wet Venturi Type Scrubber | (-) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Wet ESPs | No | |
| | · Multiclone | (-) | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | No | | No | |
| | · Lime Neutralization | (-) | Yes | No | No | No | No | Yes | No | No | No | No | No | No | | No | |
| | · Dry Scrubber/FF | | | | | | | | | | yes--2015+ | yes--2015+ | | | | Yes | |
| FUEL | | | natural gas, coal | NG | NG | NG | NG | NG, biomass | NG, biomass | NG, biomass | NG, biomass | NG, biomass | NG, coal | NG, coal | | NG | |
| Mercury Conc. | | ug/dscm | 7 | 5 | 5 | 5 | 6 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 7 | 7 | | 4 | 5 |
| SCRUBBER TYPE | | (-) | | Once through | Once through | Once through | Recirculating | Recirculating | | Once Through | Once Through | Once Through | Recirculating | Recirculating | | | |
| WASTE GAS TO SCRUBBER | | Kdscfm | 570000 | 620 | 620 | 620 | 629 | 247 | 381 | 349 | 302 | 304 | 250 | 580 | | | |
| WASTE GAS AFTER SCRUBBER | | Kacfm | 750 | 771 | 771 | 771 | 854 | 276 | 581 | 533 | 461 | 464 | 289 | 493 | | 756 | 435 |
| SOLID RECYCLE TO THE PROCESS | | (-) | No | Yes | Yes | Yes | Yes | No | Yes | Not given | no | Not given | Not given | Yes | | NA | |
| RECYCLE LOCATION | | (-) | N/A | Grinding Mills | Grinding Mills | Grinding Mills | Tailing Thickener | N/A | Green Ball Feed | Not given | Not given | Not given | Not given | Green Ball Feed | | | |
| modify recycle location: | | | no | no | no | no | yes | NO | yes | Yes | *no* | *no* | no | no | | | |
| lbs Hg /yr (at 8335 operating hours per year) | | | 122 | 96 | 96 | 96 | 116 | 40 | 40 | 36 | 31 | 32 | 54 | 125 | | 77 | 70 |
| Lb controlled (75% reduction) | | | 30.5 | 23.9 | 23.9 | 23.9 | 29.1 | 9.9 | 9.9 | 9.1 | 7.9 | 7.9 | 10.8 | 25.0 | | 19.3 | 17.5 |
| **Mercury reduction** | | | | | | | | | | | | | | | | | |
| **capital cost ACI** | | | | | | | | | | | | | | | | | |
| ACI injection rate | | lb/mmacf | 7 | 3 | 3 | 3 | 5 | 3 | 3 | 3 | 1.1 | 1.1 | 5 | 5 | | 1.1 | 1.1 |
| ACI injection rate | | lb/hr | 315 | 139 | 139 | 139 | 256 | 50 | 105 | 96 | 30 | 31 | 87 | 148 | | 50 | 29 |
| Pipe diameter | | | | | | | 10 | | 15 | 15 | | | 10 | 10 | | | 10 |
| | ACI system TCI | | $ 3,863,381 | $ 3,416,410 | $ 3,416,410 | $ 3,416,410 | $ 3,745,483 | $ 2,928,520 | $ 3,274,449 | $ 3,232,368 | $ 2,720,869 | $ 2,723,518 | $ 3,183,639 | $ 3,449,182 | | | $ 2,697,279 |
| | scrubber sludge reroute | | | | | | $190,000 | | $265,000 | $265,000 | | | | | | | $190,000 |
| | **Total Capital Investment** | | $ 3,863,381 | $ 3,416,410 | $ 3,416,410 | $ 3,416,410 | $ 3,935,483 | $ 2,928,520 | $ 3,539,449 | $ 3,497,368 | $ 2,720,869 | $ 2,723,518 | $ 3,183,639 | $ 3,449,182 | | $ - | $ 2,887,279 |
| **Annual operating costs** | | | | | | | | | | | | | | | | | |
| | tons carbon /yr | 8250 | 1,299 | 572 | 572 | 572 | 1,057 | 205 | 431 | 396 | 126 | 126 | 358 | 610 | | 206 | 118 |
| | carbon purchase $/ton | $ 1,500 | $ 1,949,063 | $ 858,701 | $ 858,701 | $ 858,701 | $ 1,585,238 | $ 307,395 | $ 647,089 | $ 593,629 | $ 188,261 | $ 189,486 | $ 536,456 | $ 915,131 | | $ 308,732 | $ 177,643 |
| | Fixed OM | | $ 19,549 | $ 17,287 | $ 17,287 | $ 17,287 | $ 18,952 | $ 14,818 | $ 16,569 | $ 16,356 | $ 13,768 | $ 13,781 | $ 16,109 | $ 17,453 | | $ - | $ 13,648 |
| | CRF (5%, n=20 years) | 0.08024 | $ 309,998 | $ 274,133 | $ 274,133 | $ 274,133 | $ 315,783 | $ 234,984 | $ 284,005 | $ 280,629 | $ 218,323 | $ 218,535 | $ 255,455 | $ 276,762 | | $ - | $ 231,675 |
| **TOTAL ANNUAL COST** | | | $ 2,278,609 | $ 1,150,121 | $ 1,150,121 | $ 1,150,121 | $ 1,919,973 | $ 557,198 | $ 947,663 | $ 890,613 | $ 420,351 | $ 421,802 | $ 808,021 | $ 1,209,346 | | $ 308,732 | $ 422,967 |
| | | | | | | | | | | | | | | | | | |
| **Capital cost for Baghouse and ACI** | | | | | | | | | | | | | | | | | |
| ACI injection rate | | lb/Mmacf | | | | | 1.1 | 1.1 | 1.1 | 1.1 | | | 1.1 | 1.1 | | | 1.1 |
| ACI injection rate | | lb/hr | | | | | 56.4 | 18.2 | 38.3 | 35.2 | | | 19.1 | 32.5 | | | 28.7 |
| | scrubber sludge reroute | | | | | | | | $265,000 | $265,000 | | | | | | | $ 190,000 |
| | baghouse | | | | | | | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | | | $ 10,000,000 | $ 10,000,000 | | | 10,000,000 |
| | ACI System | | | | | | | $ 2,519,352 | $ 2,816,949 | $ 2,780,748 | | | | | | | $ 2,697,279 |
| | **Total Capital Investment** | | | | | | $ 32,700,000 | $ 12,519,352 | $ 13,081,949 | $ 13,045,748 | | | $ 32,500,000 | $ 61,000,000 | | | $ 12,887,279 |
| **Annual Operating Cost--Baghouse** | | | | | | | $ 4,540,000 | $ 2,011,920 | $ 2,011,920 | $ 2,011,920 | | | | | | | $ 2,011,920 |
| **Annual Operating Cost--ACI** | | | | | | | | | | | | | | | | | |
| | tons carbon /yr | 8250 | | | | | 233 | 75 | 158 | 145 | | | 79 | 134 | | | 118 |
| | carbon purchase $/ton | $ 1,500 | | | | | $ 348,752 | $ 112,712 | $ 237,266 | $ 217,664 | | | | | | | $ 177,643 |
| | Fixed OM | | | | | | $ - | $ 12,748 | $ 14,254 | $ 14,071 | | | | | | | $ 13,648 |
| | CRF (5%, n=20 years) | 0.08024 | | | | | $ 2,623,848 | $ 1,004,553 | $ 1,049,696 | $ 1,046,791 | | | | | | | $ 1,034,075 |
| **TOTAL ANNUAL COST Baghouse + ACI** | | | | | | | $ 7,512,600 | $ 3,141,932 | $ 3,313,135 | $ 3,290,445 | | | $ 5,100,000 | $ 12,200,000 | | | $ 3,237,287 |
| **Total Capital Investment in Mercury Control** | | | $ 3,863,381 | $ 3,416,410 | $ 3,416,410 | $ 3,416,410 | $ 32,700,000 | $ 12,519,352 | $ 13,081,949 | $ 13,045,748 | $ 2,720,869 | $ 2,723,518 | $ 32,500,000 | $ 61,000,000 | | | $ 12,887,279 |
| **Total Annual Cost of Mercury Control** | | | $ 2,278,609 | $ 1,150,121 | $ 1,150,121 | $ 1,150,121 | $ 7,512,600 | $ 3,141,932 | $ 3,313,135 | $ 3,290,445 | $ 420,351 | $ 421,802 | $ 5,100,000 | $ 12,200,000 | | $ 308,732 | $ 3,237,287 |
| | | | | | | | | | | | | | | | | | |
| annual tons produced (2012) (Mesabi Nugget estimate future) | | | 5,144,477 | | | 7,753,828 | 2,658,023 | | | | | 13,063,450 | | 5,220,491 | 5,140,985 | 4,959,325 | 825,000 |
| annual cost Hg controls/ton pellets | | | $ 0.44 | | | $ 0.44 | $ 2.83 | | | | | $ 0.81 | | $ 3.31 | $ - | $ 0.06 | $ 3.92 |
| **Reported cost of production (From Occupancy tax calculations 2013 Tax guide)** | | | | | | | | | | | | | | | | | |
| **2012** | 56 | $/ton | 0.79% | | | 0.79% | 5.02% | | | | | 1.44% | | 5.88% | 0.00% | | |
| **Minnesota taconite value** | | | | | | | | | | | | | | | | | |
| 2012 | 90 | $/ton | 0.49% | | | 0.49% | 3.14% | | | | | 0.90% | | 3.68% | 0.00% | | |
| **Price of Iron Ore, Brazilian Port, long ton** | | | | | | | | | | | | | | | | | |
| **moly April 2014** | $ 116.88 | $/ton | 0.38% | | | 0.38% | 2.42% | | | | | 0.69% | | 2.84% | 0.00% | | 3.36% |

updates
3/25 increased flue gas flow rate for Mesabi Nugget based on January 2014 Hg stack tests
4/15/14 replaced arcelor and utac costs