Regional Haze

State Implementation Plan Supplement

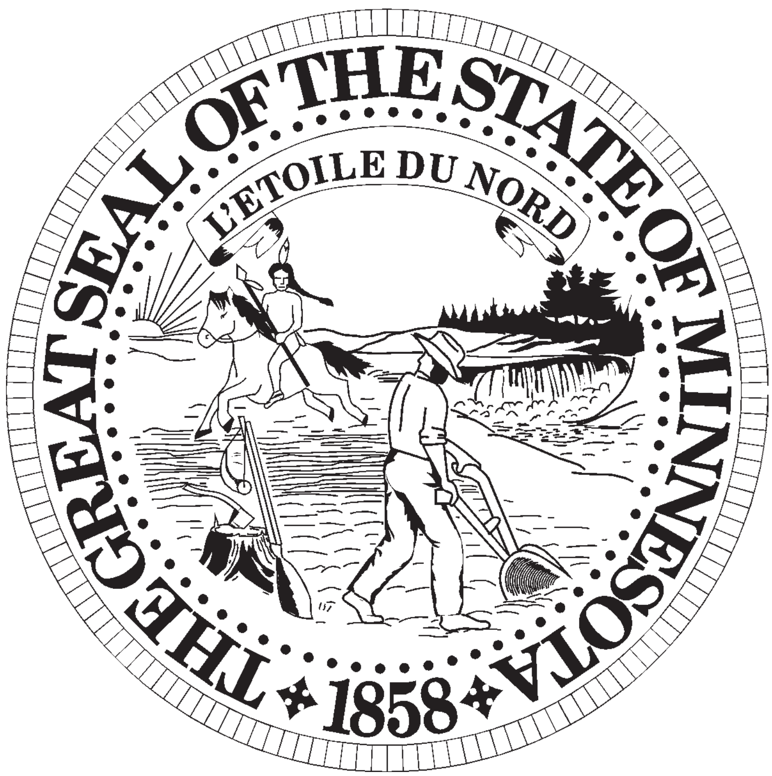
April 2012

Minnesota Pollution
Control Agency

Appendix 3: Public Notice and Meeting

State of Minnesota

State Register



Proposed, Adopted, & Expedited Rules; Executive Orders; Appointments;
Commissioners' Orders; Revenue Notices; Official Notices;
State Grants & Loans; State Contracts; Non-State Public Bids, Contracts & Grants

Published every Monday (Tuesday when Monday is a holiday)

Monday 19 December 2011

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State Register

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The *State Register* is the official publication of the State of Minnesota's Executive Branch of government, published weekly to fulfill the legislative mandate set forth in *Minnesota Statutes*, Chapter 14, and *Minnesota Rules*, Chapter 1400. The *State Register* contains:

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Vol. 36 Issue Number	PUBLISH DATE (**BOLDFACE** shows altered publish date)	Deadline for: Emergency Rules, Executive and Commissioner's Orders, Revenue and Official Notices, State Grants, Professional-Technical-Consulting Contracts, Non-State Bids and Public Contracts	Deadline for Proposed, Adopted and Exempt RULES
# 22	Monday 19 December	Noon Tuesday 13 December	Noon Wednesday 7 December
# 23	**TUESDAY 27 DECEMBER**	Noon Tuesday 20 December	Noon Wednesday 14 December
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100 Rev. Dr. Martin Luther King Jr Blvd., St. Paul, MN 55155
Website: *www.house.leg.state.mn.us/hinfo/hinfo.htm*

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St. Paul, MN 55155 **Website:** *www.mncourts.gov*

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Minnesota Pollution Control Agency (MPCA)

Environmental Analysis and Outcomes Division

Public Notice on Draft Supplemental Regional Haze State Implementation Plan Revision

NOTICE IS HEREBY GIVEN that the Commissioner has determined that a supplemental State Implementation Plan (SIP) revision must be submitted to meet Minnesota's requirements under the federal Regional Haze Rule (40 *Code of Federal Regulations* §§ 51.300 - 51.309).

Background. Under the authority of Section 169(a) of the Clean Air Act (the Act), the United States Environmental Protection Agency (EPA) on July 1, 1999 promulgated visibility goals for mandatory Class I Federal areas in the federal Regional Haze Rule. Section 169(a) of the Act and the Regional Haze Rule requires each state to adopt and submit a plan to EPA that addresses the state's contribution to visibility impairment at the mandatory Class I Federal areas. Class I areas within Minnesota are the Boundary Waters Canoe Area Wilderness and Voyageurs National Park.

Purpose of the SIP Revision. The MPCA submitted a Regional Haze SIP for Minnesota to the EPA in December 2009. That submittal laid out how Minnesota intends to implement the Regional Haze Rule. The previously submitted SIP includes information on the following core requirements of the Regional Haze Rule: reasonable progress goals, baseline and natural visibility conditions, long-term strategy for regional haze, monitoring strategy, and Best Available Retrofit Technology (BART). The BART requirement targets certain older emission sources that have not been regulated under other provisions of the Act for additional emission controls.

The supplemental SIP includes additional BART emission limits for the taconite facilities, set after the review of additional emission information. It also includes enforceable documents, in the form of Administrative Orders, to implement the BART emission limits for the taconite facilities. The supplemental SIP also includes a change to BART determinations for power plants. Rather than making enforceable individual BART emission limits on the subject-to-BART power plants, the supplemental SIP accepts the EPA's proposed determination that the Cross State Air Pollution Rule (CSAPR) can substitute for BART.

The supplemental SIP also proposes a change to the long-term strategy. As part of the long-term strategy, the MPCA developed a plan to target emission reductions in Northeast Minnesota. The strategy included a plan for pilot testing of emission controls at the taconite facilities. Implementation of new ambient air quality standards should provide appropriate evolution of emission controls at these facilities, so the supplemental SIP replaces the pilot testing requirement with requirements for expeditious attainment of new ambient standards.

The MPCA will consider changing the contents of the proposed SIP revision based on comments received during the comment period. **MPCA Contact Person.** The MPCA contact person is Catherine Neuschler. Written comments, requests and petitions should be mailed to: Catherine Neuschler, Minnesota Pollution Control Agency, Environmental Analysis and Outcomes Division, 520 Lafayette Road North, St. Paul, MN 55155-4194, **telephone number:** (651) 757-2607 Voice or **toll free:** 1-800-657-3864; **facsimile number:** 651-297-8324; and **e-mail:** *catherine.neuschler@state.mn.us*. **TTY** users may call the MPCA at TTY (651) 292-5332 or 1-800-657-3864.

Availability of SIP. A copy of the proposed SIP revision is available on the MPCA's Web site at *http://www.pca.state.mn.us/mvri4c0*. A copy of the proposed SIP is also available upon request by contacting Catherine Neuschler at 651-757-2607, or will be mailed to any interested person upon the MPCA's receipt of a written request. Materials relating to the SIP revision are available for inspection by appointment at the MPCA St. Paul Office, 520 Lafayette Road North, St. Paul, Minnesota 55155, between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday. To examine these materials, or for more information, please contact Catherine Neuschler.

Public Comment Period. Your comments must be in writing and received by the MPCA contact person by 4:30 p.m. on February 3, 2012. Written comments may be submitted to the MPCA contact person at the address, facsimile number, or e-mail address listed above.

Citizens' Board Meeting. As provided by *Minnesota Statutes* § 116.02, the MPCA Citizens' Board will make the decision on submitting the proposed SIP revision to the EPA. The Citizens' Board meeting will fulfill the requirement for public hearing under 40 *Code of Federal Regulations* § 51.102. The proposed Regional Haze SIP revision will be heard at the MPCA Citizens' Board Meeting on March 27, 2012. The Board meeting begins at 9 am. The Citizens' Board meeting dates and agenda can be found at

http://www.pca.state.mn.us/enzq405

Minnesota Pollution Control Agency (MPCA)

Municipal Division

Request for Comments on Possible Amendments to Rules Governing Animal Feedlots, *Minnesota Rules* 7020

Subject of Rules. The Minnesota Pollution Control Agency (Agency) requests comments on its planned amendments to rules governing animal feedlots.

The Agency is considering rule amendments that will administer the statutory changes that occurred in the special legislative session and remove some outdated language. Redundancies were removed and the language streamlined to be clearer and more concise.

Persons Affected. The amendment to the rules would likely affect animal feedlot owners.

Statutory Authority. *Minnesota Statutes*, section 115.03(1)(e) authorizes the Agency to adopt, issue, reissue, modify, deny, or revoke, enter into or enforce reasonable orders, permits, variances, standards, rules, schedules of compliance, and stipulation agreements, under such conditions as it may prescribe, in order to prevent, control or abate water pollution.

In addition, during the special session, the Legislature revised statute language in *Minnesota Statutes* 2010, section 116.07, subdivision 7c to streamline and clarify the statute. The rule needs to be updated to reflect these changes.

Public Comment. Interested persons or groups may submit comments or information on these draft rule amendments, in writing, until 4:30 p.m. on January 20, 2012.

Minnesota Pollution Control Agency

520 Lafayette Road North, St. Paul, Minnesota 55155-4194

MPCA CITIZENS' BOARD SPECIAL MEETING
MARCH 26, 2012

MONDAY, MARCH 26, 2012, 1:00 p.m.

I. ADMINISTRATIVE BUSINESS

1. Call to Order
2. Agenda Review and Adoption

II. DECISION ITEMS (Staff Presentation, Public Testimony and Discussion)

Northern Metals Request for Decision on the Need for an Environmental Impact Statement
William Lynott 651-757-2542; Craig Affeldt 651-757-2181; Jess Richards 651-757-2858; Kathleen Winters, Esq. 651-757-1355; Michelle Beeman 651-757-2013

III. RECESS (5:00 p.m.)

DAY 2 SPECIAL BOARD MEETING - TUESDAY, MARCH 27, 2012, 9:00 a.m.

I. DECISION ITEM CONTINUED (Board Discussion and Final Action)

Northern Metals Request for Decision on the Need for an Environmental Impact Statement

II. ADJOURN SPECIAL BOARD MEETING

MPCA CITIZENS' BOARD MEETING
MARCH 27, 2012
(The MPCA Citizens' Board Meeting for March the Administrative Business will convene at 10:30 a.m. and the Decision Item will begin at 11:00 a.m.)

I. ADMINISTRATIVE BUSINESS 10:30 a.m.

1. Call to Order
2. Approval of Minutes
3. Legal Report
4. Commissioner's Report

Minnesota Pollution Control Agency

520 Lafayette Road North, St. Paul, Minnesota 55155-4194

II. DECISION ITEM 11:00 a.m.

Minnesota's Supplemental Regional Haze State Implementation Plan - Request for Authorization to Submit
Catherine Neuschler 651-757-2607; Mary Jean Fenske 651-757-2354; Frank Kohlasch 651-757-2500; Kathleen Winters, Esq. 651-757-1355; J. David Thornton 651-757-2018

III. ADJOURN

FUTURE

MPCA CITIZEN'S BOARD MEETING

April 24, 2012

LOCATION:
MPCA Offices, 520 Lafayette Road North, St. Paul, Minnesota 55155 Lower Level Board Rooms

SCHEDULE:
Board intends to adhere to the scheduled time limits for each listed agenda item. Agenda available 10 days prior to Board meeting – contact the Board Administrator.

WRITTEN MATERIALS: (SUBMIT FIVE DAYS BEFORE MEETING)
Persons can provide written comments or information to Board members and Commissioner, five days in advance of meeting. Written material not served five days before a Board meeting may not be considered by the Board.

Contact the Board Administrator for permission to speak on an issue before the Board or sign up to speak while in attendance at meeting.

BOARD ADMINISTRATOR: 651-757-2025 email: citizensboard.pca@state.mn.us

OTHER:
Anyone who intends to file written comments on or exceptions to an administrative law judge's report for an agenda item must comply with Minn. R. 7000.2000, subps. 1 and 2, if it pertains to a matter for which a contested case hearing has been held, or with Minn. R. 7000.0650, subp. 6. B., if it pertains to a matter for which a rulemaking hearing has been held.

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Minnesota Pollution Control Agency

520 Lafayette Road North, St. Paul, Minnesota 55155-4194

MPCA CITIZENS' BOARD MEETING
TUESDAY, April 24, 2012

I. ADMINISTRATIVE BUSINESS

9:00 a.m.

1. Call to Order
2. Agenda Review and Adoption
3. Approval of Minutes
4. Legal Report
5. Items by Board Members

DECISION ITEM COULD BE HEARD AS EARLY AS 9:15 A.M.

II. DECISION ITEMS

Minnesota's Supplemental Regional Haze State Implementation Plan – Request for Authorization to Submit
Catherine Neuschler 651-757-2607; Mary Jean Fenske 651-757-2354; Frank Kohlasch 651-757-2500; Mike Sandusky 651-757-2689; J. David Thornton 651-757-2018; Kathleen Winters, Esq. 651-757-1355

Hometown BioEnergy Facility – Request for Approval of Findings of Fact, Conclusions of Law, and Order, and Authorization to Issue a Negative Declaration on the Need for an Environmental Impact Statement
William Lynott 651-757-2542; Craig Affeldt 651-757-2181; Jess Richards 651-757-2858; Dave Benke 651-757-2221; Kathleen Winters, Esq. 651-757-1330

III. COMMISSIONER'S REPORT

IV. ADJOURN

Minnesota Pollution Control Agency

520 Lafayette Road North, St. Paul, Minnesota 55155-4194

FUTURE
MPCA CITIZEN'S BOARD MEETING
May 22, 2012

LOCATION:
MPCA Offices 520 Lafayette Road North, St. Paul, Minnesota 55155 Lower Level Board Rooms

SCHEDULE:
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WRITTEN MATERIALS: (SUBMIT FIVE DAYS BEFORE MEETING)
Persons can provide written comments or information to Board members and Commissioner, five days in advance of meeting. Written material not served five days before a Board meeting may not be considered by the Board.

Contact the Board Administrator for permission to speak on an issue before the Board or sign up to speak while in attendance at meeting.

BOARD ADMINISTRATOR - CATHY SCHAEFER: 651-757-2025
email: citizensboard.pca@state.mn.us

OTHER:
Anyone who intends to file written comments on or exceptions to an administrative law judge's report for an agenda item must comply with Minn. R. 7000.2000, subps. 1 and 2, if it pertains to a matter for which a contested case hearing has been held, or with Minn. R. 7000.0650, subp. 6. B., if it pertains to a matter for which a rulemaking hearing has been held.

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WEBCASTING:
The MPCA Citizens' Board meetings are webcast. Events can be viewed online as they happen, or watched later from the online archive. Find them on the MPCA website: http://www.pca.state.mn.us/webcasts

Appendix 4: Public Comments and Response

Minnesota Pollution Control Agency

Supplemental Regional Haze SIP

LIST OF COMMENT LETTERS RECEIVED

TIMELY COMMENTS (A1)

1. Timothy A. Dabney and Trent Wickman for US Forest Service, Superior National Forest, Letter Received January 13, 2012
2. Susan Johnson and Don Shepherd for National Park Service, Letter Received February 2, 2012
3. Janette Brimmer, Matthew Gerhart, Kevin Reuther, Paul Danicic and Jody Tableporter for Earthjustice, National Park Conservation Association, Friends of the Boundary Waters Wilderness, Voyageurs National Park Association, and Fresh Energy, Letter Received February 3, 2012
4. Robb Kapla and Michelle Rosier for Sierra Club, Letter Received February 3, 2012
5. Richard Rosvold for Xcel Energy, Letter Received February 3, 2012
6. Chrissy Bartovich for US Steel, Letter Received February 3, 2012
7. Jaime Baggenstoss for Arcelor MIttal, Letter Received February 3, 2012

LATE COMMENTS (A2)

8. Mike Cashin for Minnesota Power, Letter Received February 3, 2012
9. Michael Long for Cliffs Natural Resources, Letter Received February 3, 2012

EPA COMMENTS (A3)

10. Doug Aburano for EPA Region 5, Letter Received February 10, 2012

A1

United States Department of Agriculture | Forest Service | Superior National Forest | 8901 Grand Ave. Place
Duluth, MN 55808-1122
Phone: (218) 626-4300
Fax: (218) 626-4398

File Code: 2580
Date: January 13, 2012

Mr. David Thornton
Assistant Commissioner
Minnesota Pollution Control Agency
520 Lafayette Rd
St. Paul, MN 55155

Dear Mr. Thornton:

Thank you for the opportunity to review the Regional Haze State Implementation Plan Supplement (Supplement). The Supplement focuses on the application of best available retrofit technology (BART) to the electrical generating units (EGUs) and taconite plants in Minnesota. BART is the last remaining part of Minnesota's Regional Haze Plan that needs to be completed.

The focus of the Supplement is to set emission limits that reflect the BART determinations made in the December 2009 Regional Haze Plan submittal. We believe that the methodology used by your agency to set the BART emission limits results in limits that are too high and ask that you reconsider them. Our technical analysis is attached to this letter. In many cases your proposed BART emission limits are higher than current actual emissions and therefore could lead to emission increases instead of the decreases needed to improve visibility.

Our high level of interest in the program is tied to our role as Federal Land Manager of the Boundary Waters Canoe Area Wilderness (BWCAW) and our "affirmative responsibility" to protect air quality related values of this area, one of which is visibility. As you know, we have taken a very active role in the implementation of the Regional Haze Program. We have interacted with your staff for almost ten years and sent formal comment letters regarding regional haze on: April 10, 2007; March 5, 2008; April 28, 2009; July 10, 2009; May 10, 2010; and August 11, 2011. We believe it is our shared goal that this Supplement, and the entire Regional Haze Plan, make reasonable progress possible toward the national goal of preventing any future and remedying any existing, impairment of visibility in mandatory Class I areas, such as the BWCAW.

We are concerned your proposed BART limits will not make the progress envisioned by Congress. In the case of the EGUs, we and EPA found that some of the source-specific BART limits you previously proposed were too lenient (see our 2009 and 2011 letters and EPA's September 3, 2009 and June 6, 2011 letters). We also disagree with your alternate proposal of allowing the EGU cap and trade program (the Cross-State Air Pollution Rule, CSAPR) to be substituted for source-specific BART. For Minnesota we find CSAPR is more lenient than both your original, and our recommended lower emitting, source-specific BART limits. It is clear that the source-specific BART limits provide the greatest visibility improvement and request that you use the values the EPA and FLMs proposed. The uncertain federal regulatory landscape (as evidenced by the recent stay of CSAPR) gives an additional reason to choose the source-specific BART limits.

Minnesota and Michigan have the responsibility to oversee the taconite industry in the United States since all of the facilities are in these two states. The Regional Haze Rule is just one of the air quality regulations facing the industry. In the past we were told there were economic and technological reasons why environmental improvements could not be made in this industry. It appears that times have changed. We are encouraged by the leadership shown by US Steel to comprehensively address these issues. They have installed modern emission monitoring systems and have proposed to install, or already installed, modern air emission controls for sulfur, nitrogen and mercury. After some tough years, the industry has returned to profitability.[1] We encourage you to level the playing field across the industry and thereby improve visibility, environmental quality and public health.

We look forward to working with you to address our comments. If you have questions about any of the technical comments in the attachment please feel free to contact Trent Wickman, Air Resources Management (218-626-4372; twickman@fs.fed.us), of my staff.

Sincerely,

/s/ Timothy A. Dabney
TIMOTHY A. DABNEY
Acting Forest Supervisor

cc: Catherine Neuschler
Matt Rau
John Summerhays
Don Shepherd
Pat Brewer
Tim Allen
Robert Irvine
Todd Hawes

[1] For example, Cliffs Natural Resources, Inc. posted net income exceeding $200 million in each of the last four years, including over $1 billion in 2010. See http://investing.businessweek.com/research/stocks/financials/financials.asp?ticker=CLF:US

Technical Comments

Electrical Generating Units - EGUs

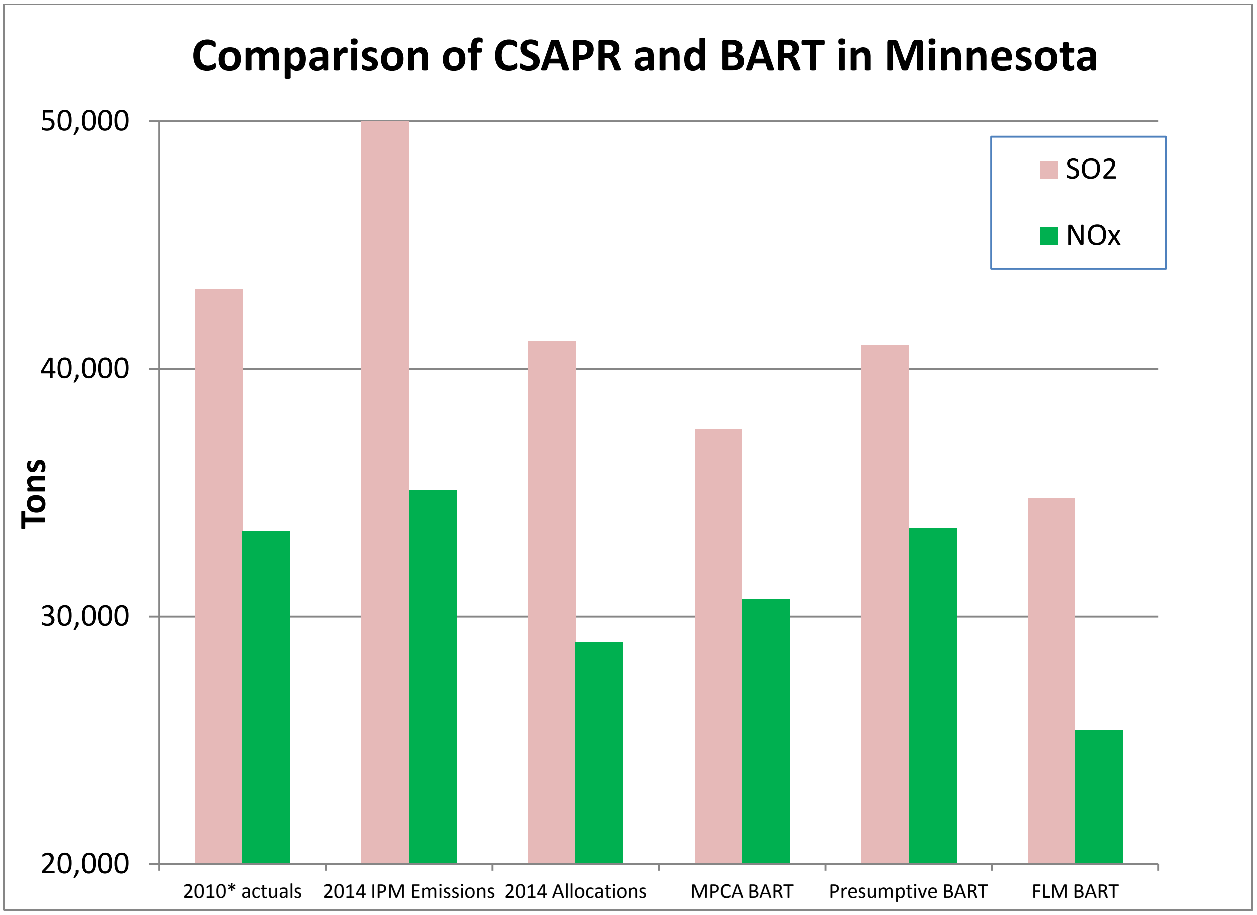
In letters dated April 28, 2009 and July 10, 2009 we commented on the source-specific EGU BART determinations proposed in the 2009 draft regional haze plan. In general we found that the BART emission limits for some of the facilities should have been lower, resulting in lower emissions (see previous letters for details). As was done in the 2008 draft of the regional haze plan, the transport rule (now known as the Cross-State Air Pollution Rule, CSAPR) is being substituted as BART for the source-specific EGU BART determinations.

We do not agree that CSAPR is better than source-specific BART in Minnesota. No state-specific demonstration has been made that we are aware of. In the Supplement the emissions budget under the previous transport rule is compared to CSAPR. We do not see any value in this comparison. Both are different versions of the same trading program.

Instead we attempted to compare source-specific EGU BART to CSAPR for Minnesota in Figure 1. The graph shows that the IPM prediction of the affect of CSAPR in 2014 (i.e. "2014 IPM Emissions") is an increase in emissions over current (2010) actual emissions. In addition CSAPR is well above both what was proposed as source-specific BART by MPCA and what we and the other Federal Land Managers (FLMs) proposed as source-specific BART. Without any other information specific to Minnesota we find source-specific BART to be far superior to CSAPR.

We strongly encourage the MPCA to reject using CSAPR as a replacement and believe the source-specific BART limit approach should be maintained. The MPCA should also re-evaluate the limits determined for Xcel Energy's Sherburne County and Northshore Mining's Power House and consider the comments made by EPA (in letters dated September 3, 2009 and June 6, 2011) and ourselves (in our 2009 letters). The recent stay of CSAPR puts its future in doubt. The regional haze plans are more than four years overdue already. Please do not delay the plan and visibility improvement any longer by keeping Minnesota's Regional Haze Plan tied to any of the federal trading rules. Please use source-specific BART limits in this plan.

Figure 1 – Comparison of Emissions Under CSAPR and BART for BART-subject Units in Minnesota



Taconite Facilities

In their 2009 regional haze plan submittal the MPCA proposed that for the taconite facilities that primarily used natural gas as a fuel;

> "For the taconite furnaces, BART for NOx is an operating standard of *good combustion practices in combination with some proposed process changes*, while BART for PM is equivalent to the taconite Maximum Available Control Technology (MACT) standard, and BART for SO_2 is generally *existing particulate scrubbers optimized for SO_2 removal*. The MPCA is also requiring application of better emission measurement systems to set a NOx BART emission limit, SO_2 limits at lines that burn high sulfur fuels, and determine compliance."

In the *highlighted* portions above it can be seen that the MPCA proposed BART controls for this group of units. The facilities have to take actions during operations to optimize scrubbers (for example, adjust scrubber liquid pH) and follow good combustions practices (for example, adjust the air to fuel ratio). Scrubbers can also be optimized physically by optimizing the scrubbing water distribution inside the vessel. The MPCA was unclear as to the specifics of each BART control option, but they were clear that BART was *not* "no control."

Due to a lack of emissions data, limits could not be set at that time. Most of the facilities now have continuous emission measurement systems (CEMS) and data from some of these were used to develop the proposed BART limits. We have repeatedly advocated that all facilities install these systems, and encourage the MPCA to take this opportunity and level the playing field by requiring the last few facilities to follow suit. As illustrated in a recent report by Minntac on their successes at reducing NOx "In order to reduce NOx emissions it is necessary to know what the emissions are on a short term basis. This enables real time data to be used when testing and tuning the equipment to better understand and evaluate how the changes are affecting NOx performance."[1] Stated another way, to be serious about reducing NOx, CEMS must be installed.

The Supplement says the MPCA felt that at least one year of emissions data was needed from each facility in order to determine the appropriate BART limits." It then goes on to say that only 150 hours of data was used to set the limits for most facilities. This is about six days versus the one year originally proposed and no explanation is given as to why such a small data set was chosen. We can only speculate that this was due to the fact that some of the facilities refused to install CEMS while others (such as Minntac) had CEMS installed and therefore had over a year's worth of data.

To compensate for this lack of data, the Supplement discusses how the goal of the testing was to collect -

> "a minimum of 150 one-hour data points under the range of [furnace] operating parameters that influence NOx emissions. The range of each operating parameter during testing should be representative of furnace's operating range for the parameters in the 12 months previous to testing."

Our view is that the testing should've been done under operating conditions that represent BART, as determined previously by MPCA to be good combustion parameters and scrubber optimization. Instead the incentive for the companies was to operate at the highest emitting levels during the testing. There is no other documentation in the Supplement regarding whether BART operating practices were being followed during the tests.

A further concern is the use of a 99% confidence interval. In other recent permit-related work the MPCA has used 95%. The MPCA chose a 99% value:

> "due to the need for limits to be met during all operating conditions, including during times of startup, shutdown, and malfunction."

Other technology-based limits, such as best available control technology (BACT) limits, are not set this way. The correct way is to set a separate limit for startup, shutdown, and malfunction (SSM) conditions and one for regular operations. Otherwise if an overall limit was set to encompass all possible emission scenarios (normal operations and SSM) the resulting limit

[1] US Steel Minntac Line 6 Low NOx Burner Final Report and Facility NOx Management, 12/1/11

would be inflated and not represent the capabilities of BACT. We believe a similar approach should be taken for BART.

The use of the 99% level in combination with a limited data set, while doing a good job of statistically encompassing all possible emission scenarios, artificially inflates the emission limits, which in the end do not require the facilities to operate according to BART.

United Taconite (United)

We believe the BART determination for United Taconite does not follow the Clean Air Act and does not follow the conditions in its permit.

United has two taconite lines. Previously it fired primarily natural gas in Line 1 and coal/coke in Line 2. This was the operating scenario under consideration when the original BART proposal was made by MPCA. For both lines NOx BART was proposed as good combustion practices. For SO_2 BART, scrubber optimization was proposed for Line 1 and a limit of 1.7 pounds of SO_2 per million BTUs (lb/MMBtu) was proposed for Line 2 that could be met with a scrubber and/or fuel blending. We provided compelling evidence in a letter dated July 10, 2009 that the MPCA's own analysis showed the Line 2 SO_2 limit should be 0.68 lb/MMBtu.

In August 2010 MPCA issued United a permit for a plant expansion that also allowed Line 1 to burn coal. United used the BART-required emission reductions at Line 2 to avoid Federal New Source permitting requirements for the expansion. We commented to MPCA and EPA that we believed this was not allowed under the Clean Air Act. In spite of this, the MPCA issued United a permit for the expansion that included a condition to address BART on the now coal-fired Line 1:

> Within 120 days of being notified by the MPCA in writing of the final proposed NOx BART limits for Lines 1 and 2 (EU 040 and EU 042), the Permittee shall submit an application for a permit amendment to incorporate into its air emissions permit either (1) NOx and SO2 BART emission limits as proposed or (2) a BART alternative as described in the December 2009 Regional Haze State Implementation Plan submittal.
>
> Alternatively, the Permittee may submit, within 120 days of the written notification, an updated BART analysis based on the modified Lines 1 and 2 for the facility with an appropriate permit amendment application to incorporate proposed NOx and SO2 BART limits into its air emissions permit

The Supplement states "On December 8, 2011, United Taconite proposed that the NOx and SO2 limits set as part of the abovementioned permit amendment be incorporated as the BART limits for the facility." It appears that the option chosen by United is not one of the three included in their permit. Nonetheless MPCA proposes to accept these limits "because these limits provided greater annual reductions of NOx and SO_2 than would be provided by the MPCA's initial BART limits."

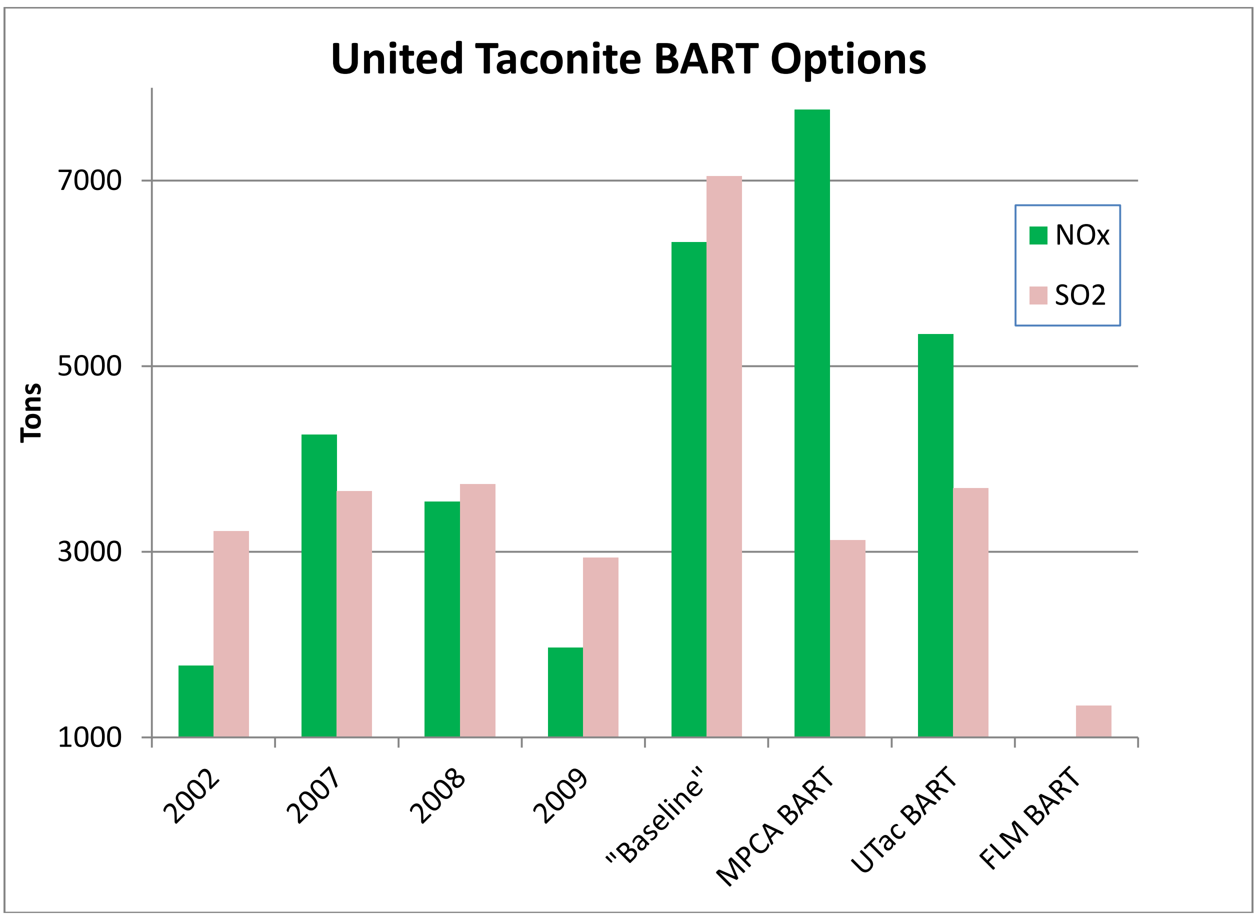
This approach is problematic for a number of reasons.

- It is unclear how United's proposal complies with its permit requirement included above. Is it a BART alternative? If so, what is the initial BART determination for coal-fired Line 1? To our knowledge no BART determination has been completed for a coal-fired Line 1. According to 40 CFR 51.308(e)(1)(ii)(A) the BART determination must consider the best system of continuous emissions control technology taking into account the following *factors*: "the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility." We find none of this information in the Supplement.

- The "reductions" in United's proposal were calculated from an inflated baseline. The baseline values used in the Supplement rely on the baseline emissions value calculated in the permit for the plant expansion. Under those regulations the facility is free to choose the highest emitting two years in the past ten. As can be seen in Figure 2, the result is a value well above recent actual emissions.
- A major reason United's proposed BART limits are more restrictive than the MPCA's is because the MPCA's NOx limits were set artificially high for many of the same reasons detailed above. In the case of SO_2, as stated above, we believe the limit for line 2 should be 0.68 and not 1.7 lb/MMBtu.

The combination of these factors results in paper emission reductions. The following graph illustrates the point. It also includes actual emissions for 2002, 2007, 2008, and 2009.

Figure 2 – Emissions of NOx and SO_2 Under Various BART Options for United Taconite



The Supplement includes a table that is used to "demonstrate that the MPCA's baseline BART proposal is essentially unconstraining, except for the SO_2 emissions limit for Line 2. Compared to past actual emissions, the MPCA's BART proposal results in about a 2500 tons per year decrease in overall emissions of NOx and SO_2 *(from "baseline")*. The proposal by UTac *(United)* results in a 4350 tons per year decrease in overall emissions as compared to the past emission scenario *("baseline")*, and 1855 tons per year as compared to MPCA's BART determination." Note, clarification was added to the above text with the italicized words.

Figure 2 shows that all the BART proposals are unconstraining except for our BART proposal (which is based on the original BART determination for Line 1 in combination with a limit of 0.68 lb/MMBtu for Line 2). Since a proper BART analysis was not submitted for NOx, we have no information from which to propose a BART limit for NOx. Therefore no value was included in Figure 2 under FLM BART.

In summary please submit a full BART analysis for coal-fired Line 1 and correct the NOx BART analysis for Line 2. The BART proposal in the Supplement does not include a consideration of the Clean Air Act factors for BART. It is irrelevant that the emission limit chosen is less than both an inflated baseline value, and an inflated, initial BART determination. The emission limit should be selected as an outcome of an analysis of the Clean Air Act factors.

Long Term Strategy

As a part of the long term strategy the 2009 Regional Haze Plan includes the Northeast Minnesota Plan which sets emission reduction goals for 2012 and 2018 for NOx and SO_2 from large sources in the six-county region. The Supplement expects that these goals will be met based on future emission projections. We would like to sound a note of caution. The most recent actual emission data cited was from 2009, a year where much of the taconite industry was shut down or curtailed. Future year projections have much uncertainty. To meet the 2012 and 2018 goals there will be very little room for any new projects other than those included in the projection, which generally were those that have already submitted permit applications.

While we agree in concept with MPCA's plan to replace pilot testing with the 1-hr SO_2 and NOx NAAQS modeling and compliance, we are concerned about possible changes to the NAAQS and their compliance provisions being contemplated by Congress. We are unsure what would happen to the administrative orders if, for example, the NAAQS are revoked. We would feel comfortable if the MPCA committed itself to a schedule to incorporate the 1-hr SO_2 and NOx NAAQS into state rules and the State Implementation Plan so they are enforceable under state law and not affected by changes at the Federal level.

United States Department of the Interior
NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
Denver, CO 80225

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IN REPLY REFER TO:

N3615 (2350)

February 2, 2012

Mr. David Thornton, Assistant Commissioner
Air Policy
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Dear Mr. Thornton:

Thank you for the opportunity to review Minnesota's proposed Regional Haze State Implementation Plan Supplement (Supplement). The Supplement sets emission limits intended to reflect the application of best available retrofit technology (BART) determinations made in the December 2009 Regional Haze Plan submittal for the electrical generating units (EGUs) and taconite plants.

We share the concerns expressed by the US Forest Service (USFS) in its January 13, 2012, comments to you. The methodology used by MPCA results in emissions limits that are too high, and we ask that you reconsider them. In many cases, MPCA's proposed BART emission limits are higher than current actual emissions and could lead to emission increases instead of the decreases needed to improve visibility. Our technical analysis is attached to this letter.

As the Federal Land Manager (FLM) of Voyageurs National Park (NP) and Isle Royale NP, the Department of the Interior (DOI) has an "affirmative responsibility" to protect air quality related values (e.g., visibility) of these areas. DOI and the National Park Service (NPS) have taken a very active role in the implementation of the Regional Haze Program; we have interacted with your staff for several years and sent formal comment letters regarding regional haze on April 4, 2008, May 8, 2008, and September 3, 2009 (September 3, 2009 letters enclosed for your reference).

We are concerned that MPCA's proposed BART limits will not make the progress envisioned by Congress. In the case of the EGUs, we and EPA found that some of the source-specific BART limits MPCA previously proposed were too lenient (see our 2008 and 2009 letters and EPA's September 3, 2009 and June 6, 2011 letters). We also disagree with MPCA's alternate proposal of allowing the EGU cap and trade program (the Cross-State Air Pollution Rule, CSAPR) to be substituted for source-specific BART. For Minnesota, we find CSAPR is more lenient than both MPCA's original, and our recommended lower-emitting, source-specific BART limits. It is clear that the source-specific BART limits provide the greatest visibility improvement, and we request that MPCA use the values that the FLMs proposed in 2009. The uncertain federal regulatory landscape (as evidenced by the recent stay of CSAPR) gives an additional urgency to choose the source-specific BART limits. We ask that you choose source-specific BART limits that provide the certainty of lower emissions and can be readily implemented, as opposed to the higher emission that might be allowed if CSAPR is upheld.

Minnesota and Michigan have significant responsibility to oversee the taconite industry in the United States, are these facilities are major causes of visibility impairment in several Class I areas in and near those states. In the past, we understood that there were economic and technological reasons why environmental improvements could not be made in this industry. We are encouraged, however, by the leadership shown by US Steel (USS) to comprehensively address these issues. USS has installed modern emission monitoring systems and has proposed to install, or has already installed, modern air emission controls for sulfur dioxide, nitrogen oxides, and mercury. After some difficult years, the industry appears to have returned to profitability, and new pollution control technologies provide the promise of dramatically reducing emissions at reasonable costs. We encourage MPCA to help EPA level the playing field across the industry and thereby improve visibility, environmental quality and public health.

For further information regarding our comments, please contact Don Shepherd at (303) 969-2075.

Again, we appreciate the opportunity to work closely with the State of Minnesota to improve visibility in our Class I areas.

Sincerely,

Susan Johnson
Acting Chief, Policy, Planning and Permit Review Branch

Enclosures

cc:
John Summerhays
U.S. EPA Region 5
77 W. Jackson Blvd.
Chicago, Illinois 60604

NPS Technical Comments on MPCA BART Supplement
February 2, 2012

Electrical Generating Units - EGUs
In our letter dated September 3, 2009 (attached), we commented on the source-specific EGU BART determinations proposed in MPCA's 2009 draft regional haze plan. In general, we found that the BART emission limits for some of the facilities should have been lower, resulting in lower emissions (see the previous letter for details). As was done in the 2008 draft of the regional haze plan, the transport rule (now known as the Cross-State Air Pollution Rule, CSAPR) is being substituted as BART for the source-specific EGU BART determinations.

We do not agree that CSAPR is better than source-specific BART in Minnesota. No state-specific demonstration has been made that we are aware of. In the Supplement, the emissions budget under the Clean Air Interstate Rule (the previous transport rule) is compared to CSAPR. We believe the relevant comparison that is required is a comparison of controls under CSAPR with controls under fully implemented BART.

US Forest Service (USFS) analysis[1] shows that the IPM prediction of the affect of CSAPR in 2014 is an increase in emissions over current (2010) actual emissions and above both what was proposed as source-specific BART by MPCA and what we and the other Federal Land Managers (FLMs) proposed as source-specific BART. Without any other information specific to Minnesota, we find source-specific BART to be far superior to CSAPR.

We strongly encourage the MPCA to reject using CSAPR as a replacement and believe the source-specific BART limit approach should be maintained. The MPCA should also re-evaluate the limits determined for Xcel Energy's Sherburne County and Northshore Mining's Power House and consider the comments made by EPA (in letters dated September 3, 2009 and June 6, 2011) and NPS (in our September 3, 2009 letter).

With regional haze plans overdue already, and the recent stay of CSAPR putting CSAPR's future in doubt, we are concerned with further delays in the plan and visibility improvement, and that Minnesota's Regional Haze Plan tied to rules that would provide less pollution reduction than those tailored specifically to Minnesota's needs. Instead, we ask that MPCA use source-specific BART limits that have already been evaluated and can be readily implemented in this plan.

Taconite Facilities
In their 2009 regional haze plan submittal, the MPCA proposed for the taconite facilities that primarily used natural gas as a fuel:

> For the taconite furnaces, BART for NO_X is an operating standard of *good combustion practices in combination with some proposed process changes*, while BART for PM is equivalent to the taconite Maximum Available Control Technology (MACT) standard, and BART for SO_2 is generally *existing particulate scrubbers optimized for SO_2 removal*. The MPCA is also requiring application of better emission measurement systems to set a NO_X BART emission limit, SO_2 limits at lines that burn high sulfur fuels, and determine compliance.

[1] USFS January 13, 2012 comments to MPCA

In the *italicized* portions above it can be seen that the MPCA proposed BART controls for this group of taconite units. The taconite facilities have to take actions during operations to optimize scrubbers and follow good combustions practices. The MPCA was unclear as to the specifics of each BART control option, but they were clear that BART was *not* "no control."

Due to a lack of emissions data, limits could not be set at the time the Regional Haze SIP was submitted. Most of the facilities now have continuous emission measurement systems (CEMS) and data from some of these were used to develop the proposed BART limits. We have repeatedly advocated that all facilities install these systems, and encourage the MPCA to take this opportunity to level the playing field by requiring the last few facilities to follow suit. As illustrated in a recent report[2] by Minntac on their successes at reducing NO_X: "In order to reduce NO_X emissions it is necessary to know what the emissions are on a short term basis. This enables real time data to be used when testing and tuning the equipment to better understand and evaluate how the changes are affecting NO_X performance." In order to reduce NO_X through use of combustion controls, NO_X CEMS must be installed.

The Supplement says the MPCA felt that at least one year of emissions data was needed from each facility in order to determine the appropriate BART limits. It then goes on to say that only 150 hours of data were used to set the limits for most facilities, which is less than 2% of the data originally said to be needed, and no explanation is given as to why such a small data set was chosen. To compensate for this lack of data, the Supplement discusses how the goal of the testing was to collect:

> a minimum of 150 one-hour data points under the range of [furnace] operating parameters that influence NOx emissions. The range of each operating parameter during testing should be representative of furnace's operating range for the parameters in the 12 months previous to testing.

MPCA does not explain how it determined that such a small data set was representative of 12 months of operation. Furthermore, testing should have been done under operating conditions that represent BART, as determined previously by MPCA to be good combustion parameters and scrubber optimization. Instead, the incentive for the companies was to operate at the highest emitting levels during the testing. There is no other documentation in the Supplement regarding whether BART operating practices were being followed during the tests.

A further concern is the use of a 99% confidence interval; in other recent permit-related work, the MPCA has used 95%. The MPCA chose a 99% value:

> due to the need for limits to be met during all operating conditions, including during times of startup, shutdown, and malfunction.

Other technology-based limits, such as best available control technology (BACT) limits, are not set this way. The correct way is to set a separate limit for startup, shutdown, and malfunction (SSM) conditions and one for regular operations. Otherwise, if an overall limit were set to encompass all possible emission scenarios (normal operations and SSM), the resulting limit would be inflated and not represent the capabilities of BACT. We believe a similar approach should be taken for BART.

[2] US Steel Minntac Line 6 Low NOx Burner Final Report and Facility NOx Management, 12/1/11

In addition to our concern about the confidence level chosen for its statistical analyses, MPCA did not use a valid statistical approach in setting its limits. For example, most of the data distributions were skewed, and some were not close to "normal" in the statistical sense. We saw no explanation of any adjustments made to the data to yield distributions to which conventional statistical procedures could be correctly applied. We therefore have serious concerns about the validity of these statistical analyses.

Our greatest concern is how the limits derived from the statistical analyses were used. MPCA used a (sometimes very small) set of **hourly** data to estimate an emission rate that could be met 99% of the operating **hours**. MPCA then assumed that this **hourly** maximum emission was an appropriate limit to be met on a **30-day rolling average basis**. In effect, **MPCA is allowing sources to emit at their almost-maximum one-hour emission rate every hour of every 30-day period.** Combined with the use of the 99% level derived from an invalid analysis of a limited data set, the MPCA process artificially inflates the emission limits, which, in the end, do not require the facilities to operate according to BART.

United Taconite (United)
The BART determination for United Taconite is not consistent with the factors required to be considered under the Clean Air Act nor does it follow the conditions in its permit. United has two taconite lines. Previously, it fired primarily natural gas in Line 1 and coal/coke in Line 2, and this was the operating scenario under consideration when the original BART proposal was made by MPCA. For both lines NO_X BART was proposed as good combustion practices. For SO_2 BART, scrubber optimization was proposed for Line 1, and a limit of 1.7 pounds of SO_2 per million BTUs (lb/mmBtu) was proposed for Line 2 (that could be met with a scrubber and/or fuel blending).

Mike Ward, the Superintendent of Voyageurs National Park personally testified at your June 22, 2010 Board meeting:

> Today, we are discussing a permit which, if approved, would take future emissions reductions promised by the Minnesota Regional Haze Plan and use them to allow a separate planned increase in emissions as a way of avoiding scrutiny under the PSD program. This scheme would effectively negate the intended benefits of both programs.
>
> As we have stated in our written comments, the Park Service doesn't believe such an emissions netting arrangement is legal. Even if EPA determines that this "double-counting" of emissions *is* allowed under a temporary loophole, the NPS believes that it flies in the face of Minnesota's Regional Haze Plan and is poor public policy.
>
> About eight months ago, many of us were here in this same room, before this Board, discussing Minnesota's Regional Haze Plan. That plan was developed specifically to reduce the impacts of regional haze on areas such as Voyageurs and Isle Royale National Parks.
>
> In December of 2009 this Board found the following conclusions of law to be evident enough to approve the RHSIP:
> * The Board concluded that the plan contained reasonable progress goals, calculations of baseline and natural visibility conditions, long term strategies for regional haze, and monitoring strategies, as required under 40 CFR.

*The Board concluded that the reasonable progress goals provide for reasonable progress towards natural visibility conditions and an improvement in visibility for the most impaired days while ensuring no degradation in visibility for the least impaired days.
*The Board concluded that the plan contained appropriate Bart determinations and emissions limitations, as required under 40 CFR, that will achieve emission reductions that contribute to visibility impairment in the three Class I areas impacted by Minnesota facilities.

These conclusions then led to an "order" by the Chair that stated the MPCA hereby "adopts", and directs the commission to submit the plan to the EPA for approval. Today all of these conclusions of law and the order to "adopt" the RHSIP are being placed in a position in which they are no longer conclusions of law nor are they adopted by the MPCA as ordered by the chair.

Not all of us approved of every provision of that plan, and some of us believed it was not aggressive enough in reducing pollution, but we all agreed it was an important step in improving visibility in our parks and wilderness areas. That plan was approved by this Board and is currently under EPA review. Based on the permit proposed today, we are left wondering what that approval meant. We are especially concerned that we were not advised at that time that Utac had submitted a complete application in July 2008 for this major modification of its operation. We find it inconceivable that emissions reductions promised under the Minnesota Regional Haze Plan may be used as a "get out of regulation free" card.

We provided compelling evidence that the MPCA's own analysis showed the Line 2 SO_2 limit should be 0.68 lb/mmBtu.

Despite the concerns we publicly expressed to you, in August 2010, MPCA issued United a permit for a plant expansion that also allowed Line 1 to burn coal. United used the BART-required emission reductions at Line 2 to avoid Federal New Source permitting requirements for the expansion. The MPCA included a condition to address BART on the now coal-fired Line 1:

> Within 120 days of being notified by the MPCA in writing of the final proposed NOx BART limits for Lines 1 and 2 (EU 040 and EU 042), the Permittee shall submit an application for a permit amendment to incorporate into its air emissions permit either (1) NOx and SO2 BART emission limits as proposed or (2) a BART alternative as described in the December 2009 Regional Haze State Implementation Plan submittal.
>
> Alternatively, the Permittee may submit, within 120 days of the written notification, an updated BART analysis based on the modified Lines 1 and 2 for the facility with an appropriate permit amendment application to incorporate proposed NOx and SO2 BART limits into its air emissions permit

The Supplement states "On December 8, 2011, United Taconite proposed that the NO_X and SO_2 limits set as part of the abovementioned permit amendment be incorporated as the BART limits for the facility." It appears that the option chosen by United is not one of the three included in their permit. Nonetheless MPCA proposes to accept these limits "because these limits provided greater annual reductions of NO_X and SO_2 than would be provided by the MPCA's initial BART limits."

We share the concerns expressed by the USFS in its January 13, 2012 comments to you:

- It is unclear how United's proposal complies with its permit requirement.
- The "reductions" in United's proposal were calculated from an inflated baseline.
- The combination of these factors results in paper emission reductions.

We support the USFS request that MPCA submit a full BART analysis for coal-fired Line 1 and correct both the SO_2 and NO_X BART analysis for Line 2. The BART proposal in the Supplement does not include a consideration of the Clean Air Act factors for BART. It is irrelevant that the emission limit chosen is less than both an inflated baseline value, and an inflated, initial BART determination. Instead, the emission limit should be selected as an outcome of a proper analysis of the BART factors.

United States Department of the Interior
NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
Denver, CO 80225

TAKE PRIDE IN AMERICA

IN REPLY REFER TO

September 3, 2009

N3615 (2350)

Ms. Catherine Neuschler
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Dear Ms. Neuschler:

Following are our general comments on the Minnesota Pollution Control Agency's (MPCA's) current Best Available Retrofit Technology (BART) proposals for the Electric Generating Units (EGUs) located in Minnesota that are subject to BART. These comments update and supplement the comments that we provided on June 26, 2009. While we recognize that many of the MN EGUs (especially MN Power) are making large investments toward reducing their emissions, we believe that significant additional reductions can be achieved and are warranted under the BART program. We have enclosed detailed comments that further support our position on the specific BART proposals.

Purpose of the BART Program

The core purpose of the BART program is to improve visibility in our Class I areas. BART is not necessarily the most cost-effective solution but instead, BART represents a broad consideration of technical, economic, energy, and environmental (including visibility improvement) factors. We believe that it is essential to consider both the degree of visibility improvement in a given Class I area as well as the cumulative effects of improving visibility across all of the Class I areas affected. Voyageurs National Park (NP) in Minnesota and Isle Royale NP in Michigan are two Class I areas administered by the National Park Service that are currently impacted by MN EGUs.

Level Playing Field

It is important that regulatory agencies provide a level playing field and that they treat similar emission sources in a similar manner, unless exceptions are properly documented and justified. It is also generally accepted, given economies of scale, that the large EGUs should be more-stringently-controlled than the smaller EGUs. (We suggest that the MN EGUs can be divided into two categories—above 370 MW capacity and below 80 MW capacity.) Instead, within the large EGU category, there appears to be a trend of declining stringency as the size of the EGU increases, and some of the smaller EGUs would actually be required to meet tighter limits than some of the larger EGUs. This is especially apparent when one compares the higher limits proposed for Units #1 and #2 at Xcel's 1,400 MW Sherco facility to the lower limits proposed by Minnesota Power for its 375 MW Boswell #3 (see table below). While we are pleased that the citizens of the Twin-Cities metropolitan area would receive some relief from Xcel's emissions, Xcel and the other EGUs still must address their impacts in Voyageurs and Isle Royale NPs. In the smaller EGU category, where the EGUs are virtually identical in size, we see that Minnesota Power has proposed the lowest Nitrogen Oxide (NO_X) limits for its Taconite Harbor #3.

Proposed NO_x Limits

Operating Company	Plant	Unit	Boiler Type	Fuel	Rating	Proposed Control	Proposed Limit (lb/mmBtu)
Xcel Energy	Sherburne County Generating Station	Unit #1	tangential	sub-bituminous	690	LNB+SOFA	0.15
Xcel Energy	Sherburne County Generating Station	Unit #2	tangential	sub-bituminous	683	Combustion Optimization	0.15
Xcel Energy	Allen S. King Generating Plant	Unit #1	cyclone	sub-bituminous	550	SCR	0.10
Minnesota Power	Boswell Energy Center	Unit #3	tangential	sub-bituminous	375	LNB+OFA+SCR	0.07
Northshore Mining	Silver Bay Power Plant	Unit #2	wall-fired	sub-bituminous	75	LNB+OFA	0.41
Minnesota Power	Taconite Harbor	Unit #3	tangential	bit/sub-bituminous	75	ROFA/Rotamix	0.13
Rochester Public Utilities	Silver Lake Plant	Unit #4	wall-fired	bituminous	60	ROFA/Rotamix	0.25

Proposed SO_2 Limits

Operating Company	Plant	Unit	Fuel	Rating (MW)	Proposed Control	Proposed Limit (lb/mmBtu)
Xcel Energy	Sherburne County Generating Station	Unit #1	sub-bituminous	690	FGD upgrade	0.12
Xcel Energy	Sherburne County Generating Station	Unit #2	sub-bituminous	683	FGD upgrade	0.12
Xcel Energy	Allen S. King Generating Plant	Unit #1	sub-bituminous	550	FGD upgrade	0.12
Minnesota Power	Boswell Energy Center	Unit #3	sub-bituminous	375	wet FGD	0.09
Northshore Mining	Silver Bay Power Plant	Unit #2	sub-bituminous	75	LSD+FF	0.06*
Minnesota Power	Taconite Harbor	Unit #3	bit/sub-bituminous	75	FSI and new FF	0.32
Rochester Public Utilities	Silver Lake Plant	Unit #4	bituminous	60	dry FGD	0.60

*MPCA has proposed an alternate limit for SO_2 at 0.48 lb/mmBtu at Northshore.

Proposed Total PM_{10} Limits

Operating Company	Plant	Unit	Fuel	Rating (MW)	Proposed Control	Proposed Limit (lb/mmBtu)
Xcel Energy	Sherburne County Generating Station	Unit #1	sub-bituminous	690	existing wet ESP	0.090
Xcel Energy	Sherburne County Generating Station	Unit #2	sub-bituminous	683	existing wet ESP	0.090
Xcel Energy	Allen S. King Generating Plant	Unit #1	sub-bituminous	550	FF	0.030
Minnesota Power	Boswell Energy Center	Unit #3	sub-bituminous	375	FF	0.035
Northshore Mining	Silver Bay Power Plant	Unit #2	sub-bituminous	75	existing FF	0.094*
Minnesota Power	Taconite Harbor	Unit #3	bit/sub-bituminous	75	FSI and new FF	0.012
Rochester Public Utilities	Silver Lake Plant	Unit #4	bituminous	60	dry FGD w FF	0.400

*0.046 gr/dscf

Five-step BART Process

It appears that MPCA has attempted to "re-brand" control programs already adopted by the EGUs to meet other requirements and take advantage of state rate recovery allowances, as satisfying BART, without conducting the required five-step BART analyses for Boswell #3.[1] Even when the five-step analysis is not a requirement, MPCA must still show (as it tried to do in its analysis for Northshore Mining) that it achieved an equivalent result.[2] While we understand that MPCA has been forced to quickly react to recent EPA decisions affecting the status of the MN EGUs, MPCA has effectively pre-empted the five-step BART analysis (or its equivalent) by saying that BART is equivalent to BACT, or to whatever the EGU has already committed to installing.[3] This approach is only allowed if MPCA demonstrates that the source has in place, or is committing to, federally-enforceable limits that represent the **most stringent level of control.**[4] None of the sources exempted by MPCA from the five-step BART process (or

[1] The five-step process is required for EGUs at facilities with a total capacity of 750 MW or more (e.g., Boswell, Sherburne County).

[2] Even though the five-step process is not required for the taconite plants reviewed by MPCA, that process was used by MPCA in its BART determinations for the taconite industry.

[3] MPCA repeatedly contends that, because a source has "existing" controls, they must be considered in its BART analysis. While this would be true for controls that truly were existing as of the 2005 publication of the BART Guidelines, to cite controls installed after the BART guidelines became known as reasons for requiring less than BART is not appropriate.

[4] According to the BART Guidelines, "If you find that a BART source has controls already in place which are the most stringent controls available (note that this means that all possible improvements to any control devices have been made), then it is not necessary to comprehensively complete each following step of the BART analysis in this section. As long as these most stringent controls available are made federally enforceable for the purpose of implementing BART for that source, you may skip the remaining analyses in this section, including the visibility analysis in step 5. Likewise, if a source commits to a BART

its equivalent) meet that criterion. Without a five-factor analysis (or its equivalent) from the company or MPCA, it is difficult for us to fully evaluate whatever reasoning went into the MPCA proposal. Although we agree with MPCA that "different facilities may end up with different controls or emission limits due to site-specific factors," MPCA should explain how those site-specific factors influenced its decisions. Therefore, we recommend that MPCA either adopt limits that really are the most-stringent, or move quickly to complete the five-step, or equivalent, BART process.

In general, Steps #1 (Identify all available retrofit options) and #2 (Eliminate technically infeasible options) of the BART process were adequately addressed, so we shall begin at:

Step 3 - Evaluate Control Effectiveness

On page 370 of its responses to comments, MPCA states that, "The MPCA has chosen in general, to accept each facility's determination of how effective a given control technology will be at that facility." As a result, MPCA and the BART sources have consistently underestimated the abilities of established pollution control technologies (e.g., wet scrubbers and Selective Catalytic Reduction) to reduce emissions. MPCA should also evaluate potential upgrades to the existing control equipment.

MPCA's estimates of control effectiveness appear inconsistent. For example, MPCA has determined that a spray dryer/fabric filter system can meet 0.06 lb SO_2/mmBtu at Northshore Mining's Unit 2, but the same system would only be required to meet a limit ten-times higher at Rochester Public Utilities' Silver Lake Unit #4. And, even for the inherently more-efficient wet scrubbing systems at the larger EGU, the SO_2 limits would be 50% to 100% higher than SO_2 BART at Northshore. MPCA should explain these inconsistencies.

Step 4 - Evaluate Impacts and Document Results

MPCA has accepted at face value cost estimates presented by the EGUs.[5] In the case of the Northshore Unit 2, those overestimates were so egregious that MPCA conducted its own analysis, and we commend MPCA for that. However, Xcel submitted estimates that consistently exceeded national norms without the supporting documentation or analyses required by the EPA BART Guidelines.

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determination that consists of the most stringent controls available, then there is no need to complete the remaining analyses in this section."

[5] On page 376 of its responses to comments, MPCA states that, "The MPCA relies on its permittees to understand their facilities, as well as the engineering, financing, construction and air pollution control equipment markets well enough to properly estimate project costs."

While it is appropriate to consider incremental costs in addition to average costs, we have a concern with the over-emphasis placed by MPCA upon this factor and with the way in which the incremental cost analysis was conducted.[6] Because, in most cases, the cost of pollution control rises exponentially with control efficiency, the slope of the cost-versus-efficiency curve will also increase. For this reason, rigid use of incremental cost effectiveness will always result in the choice of the cheapest option if carried to this extent. (For example, if this approach were used to evaluate particulate controls, it is likely that all controls more expensive than a multiple cyclone would be rejected.) According to the NSR Workshop manual, "As a precaution, the difference in incremental costs among dominant alternatives cannot be used by itself to argue one dominant alternative is preferred to another." Instead, it should be used to compare closely performing options.

Step 5 - Evaluate Visibility Impacts

MPCA repeatedly states that, "Because [a given unit's] emission reductions were included in the overall SIP modeling (see Tables 8.1 and 8.4 of the SIP), the visibility impact of the reductions at [the given unit] were considered." Only for Sherco and Northshore were the visibility impacts of any of the BART options specifically evaluated.[7] This fifth-step of the BART process is essential for assessing the ability of a potential control strategy to address the fundamental purpose of the BART program. And, this fifth-step can provide information critical to determining the true cost-effectiveness of a visibility-improvement strategy. This analysis can also provide useful information on the relative importance of, for example, reducing NO_X versus SO_2 emissions from a given source. Based upon the limited data provided, it appears that, on a per-ton basis, reducing NO_X provides greater visibility benefits than reducing SO_2 in the cool, moist climate of northern MN.

We believe that it is appropriate to consider both the degree of visibility improvement in a given Class I area as well as the cumulative effects of improving visibility across all of the Class I areas affected. It simply does not make sense to use the same metric to evaluate the effects of reducing emissions from a BART source that impacts only one Class I area as for a BART source that impacts multiple Class I areas. And, it does not make sense to evaluate impacts at one Class I area, while ignoring others that are similarly significantly impaired. If we look at only the most-impacted Class I area, we ignore that the other Class I areas are all suffering from impairment to visibility "caused"[8] by the BART source. It follows that, if emission from the BART source are reduced, the benefits will be spread well beyond only the most impacted Class I area, and this must be accounted for.

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[6]EPA BART Guideline: "You should consider the incremental cost effectiveness in combination with the average cost effectiveness when considering whether to eliminate a control option."... "You should exercise caution not to misuse these [average and incremental cost effectiveness] techniques... [but consider them in situations where an option shows]...slightly greater emission reductions..."

[7] Even though Northshore did provide some visibility modeling results, no analysis was provided for the critical comparison of the alternative BART options, as explained in our comments specific to that facility.

[8] EPA defines a source with an impact greater than one deciview as "causing" impairment.

The BART Guidelines represent an attempt to create a workable approach to estimating visibility impairment. As such, they require several assumptions, simplifications, and shortcuts about when visibility is impaired in a Class I area, and how much impairment is occurring. The Guidelines do not attempt to address the geographic extent of the impairment, but assume that all Class I areas are created equal, and that there is no difference between widespread impacts in a large Class I area and isolated impacts in a small Class I area. To address the problem of geographic extent, we have been looking at the cumulative impacts of a source on all Class I areas affected, as well as the cumulative benefits from reducing emissions. While there are certainly more sophisticated approaches to this problem, we believe that this is the most practical, especially when considering the modeling techniques and information available.

Compared to the typical control cost analysis in which estimates fall into the range of \$2,000 - \$10,000 per ton of pollutant removed, spending millions of dollars per deciview (dV) to improve visibility may appear extraordinarily expensive. However, our compilation[9] of BART analyses across the U.S. reveals that the **average cost per dV proposed by either a state or a BART source is \$9 - \$19 million**,[10] with a maximum of almost \$50 million per dV proposed by Colorado at the Martin Drake power plant in Colorado Springs.

BART Determinations

We are confused by these apparently contradictory statements on page 371 of MPCA's responses to comments:

- The MPCA's position is that cost-effective controls should be installed, even if they result in limited improvement in visibility, and technically infeasible or not cost-effective controls are not required under BART, even if they result in significant visibility improvement.
- Because of the small visibility impact that would result from controls, the MPCA deemed existing controls and emission limits to be BART.

We believe that it is the intent of the Regional Haze program to make visibility improvement a prominent factor in the BART determination process. Therefore, even if only a small visibility improvement would result from revisiting existing controls, MPCA should require any cost effective and technically feasible alternatives.

Reasonable Progress

Even if an EGU is exempt from BART, it may still be subject to review under the Reasonable Progress requirements of the Regional Haze Rule. MPCA may wish to consider additional emission reductions under that aspect of the Regional Haze program.

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[9] http://www.wrapair.org/forums/ssjf/bart.html

[10] For example, PacifiCorp has stated in its BART analysis for its Bridger Unit #2 that "The incremental cost effectiveness for Scenario 1 compared with the baseline for the Bridger WA, for example, is reasonable at \$580,000 per day and \$18.5 million per deciview."

In conclusion, we appreciate MPCA's efforts to date regarding the BART process, but we believe that significant additional reductions can be achieved and are warranted. We look forward to working with the MPCA as this process advances. We believe that good communication and sharing of information will help expedite this process, and suggest that you contact Don Shepherd (don_shepherd@nps.gov, 303-969-2075) if you have any questions or comments about this document.

Sincerely,

John Bunyak

John Bunyak
Chief, Policy, Planning and Permit Review Branch

Enclosures

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TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

September 3, 2009

N3615 (2350)

Ms. Catherine Neuschler
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Dear Ms. Neuschler:

Following are our general comments on the Minnesota Pollution Control Agency's (MPCA's) current Best Available Retrofit Technology (BART) proposals for the taconite plants located in Minnesota that are subject to BART. Due to their similarity, for the most part, the taconite BART determinations will be addressed as a group. (Certain issues related to United and Keetac will be addressed in separate enclosures.) We will focus our review on the indurating furnaces, due to the dominance of their impact over the other BART-eligible units at the taconite facilities.

The recently promulgated Taconite Maximum Achievable Control Technology (MACT) standard represents a BART level of control for particulates from the furnaces; that leaves sulfur dioxide (SO_2) and nitrogen oxide (NO_X) as the remaining visibility-impairing pollutants to be addressed from the furnaces.

Five-step BART Process

We commend MPCA for requiring that the taconite plants follow EPA's recommended five-step BART process. However, we have concerns about how those five steps were implemented.

Steps #1 (Identify all available retrofit options) and #2 (Eliminate technically infeasible options)

A couple of key quotes from the EPA BART guidelines are important to keep in mind: "a demonstration of technical infeasibility may involve a showing that there are unresolvable technical difficulties with applying the control to the source (*e.g.*, size of the unit, location of the proposed site, operating problems related to specific circumstances of the source, space constraints, reliability, and adverse side effects on the rest of the facility). *Where the resolution of technical difficulties is merely a matter of increased cost, you should consider the technology to be technically feasible.*" FR 7/6/05 pg 39165, emphasis added.

"Physical modifications needed to resolve technical obstacles do not, in and of themselves, provide a justification for eliminating the control technique on the basis of technical infeasibility." FR 7/6/05 pg. 39165.

Common Control Options Rejected as Technically Infeasible

Rejected Sulfur Dioxide Controls

The option of modifying the existing scrubbers was dismissed in the BART report from every facility as not being available and therefore not being technically feasible. The reasons stated included corrosion of the process water handling system and the creation of solid wastes. Sulfur scrubbing technology has been in existence since the 1960's. The issues described above are not new, unique, or insurmountable. In addition, these issues are not technical-feasibility issues but are economic-feasibility issues. The BART proposals did not provide the cost data for this option, so how economically infeasible they may, or may not be, is unknown.

The dry scrubbing options (Dry Sorbent Injection and Spray Dry Absorption) were deemed technically infeasible because the high moisture content of the gas stream would cause blinding of the baghouse typically used downstream of the lime injection. However, these facilities should investigate the application of a wet electrostatic precipitator (ESP) downstream of the lime injection point, instead of a baghouse. Or, these facilities could investigate injection of lime upstream of the wet ESP that they have deemed technically feasible.

Coal Processing was eliminated because these facilities do not consider it to be commercially available.

Alternate Fuels were rejected on the premise that EPA did not intend to promote fuel-switching. However, this does not preclude evaluation of lower sulfur fuels. In its BART preamble, EPA states, "Our economic analysis suggests that switching to low sulfur fuel oil is a cost effective method in reducing SO_2 emissions from oil fired units."[1] EPA's BART Guidelines recommend that, "...for oil-fired units, regardless of size, you should evaluate limiting the sulfur content of the fuel oil burned to 1 percent or less by weight."[2] We believe that evaluation of lower sulfur oil, coal, and petroleum coke is also appropriate for those taconite facilities that already burn any of those fuels.

Rejected Nitrogen Oxides Controls

All facilities rejected Low Temperature Oxidation (LoTOx) on the basis that it is not technically feasible because it has not been used on an indurating furnace.

The issue of control of NO_x from taconite furnaces has been approached in the past within the context of two Prevention of Significant Deterioration (PSD) permits: Minntac

[1] P 159 of the BART Preamble
[2] P 363 of the BART Guidelines

backwards PSD permit and the PSD permit for Minnesota Steel. Minntac is a grate-kiln furnace and Minnesota Steel is a straight grate furnace. This discussion initially focused on the application of selective catalytic reduction (SCR) and more recently has looked at LoTOx.

- In the Minntac case, in a letter dated October 22, 2003, the MPCA determined that SCR was technically feasible but not economically feasible. This configuration assumed reheating of the waste gas. The cost per ton calculated was sensitive to the assumed cost of natural gas and was "at or above the upper range of economic feasibility," and was rejected as best available control technology (BACT).
- In a letter dated August 18, 2006, the MPCA assessed the applicability of LoTOx at 90% control efficiency to Minntac and concluded that LoTOx was technically and economically feasible, and therefore BACT. Minntac is now required to test LoTOx.
- In their PSD permit, Minnesota Steel and MPCA proposed LoTOx on the waste gas stack at 90% control efficiency for their taconite furnace.

In summary, MPCA has declared that LoTOx is BACT for one type of taconite furnace (straight grate) and will soon require testing on the other (grate kiln). The technical feasibility issues brought up in the BART proposals for each facility have been addressed by the developer of the technology and in the analyses above. This supports MPCA's conclusion that LoTOx is a viable candidate for BACT, and that LoTOx can be applied to both types of indurating furnaces. In order to avoid further analysis of LoTOx, the other taconite plants must show why their indurating furnaces are so different from those at Minntac and MN Steel as to preclude its application. Otherwise, they must evaluate LoTOx by applying the remaining BART factors.

All facilities eliminated Regenerative Selective Catalytic reduction (RSCR) on the basis that it was technically infeasible, citing several reasons:

- Taconite dust is different from boiler ash. (True, but SCRs have been successfully located in "high-dust" areas downstream of coal-fired boilers and upstream of particulate control equipment.)
- Taconite dust is erosive. (True, but so is flyash.)
- RSCR has not been applied downstream of a wet scrubber. (Why is this a problem for RSCR but not for SCR?)
- SCR catalyst may oxidize mercury. (That is a positive benefit of SCR.)

We would like to see a response to these comments by a reputable vendor of RSCR. Furthermore, it is generally assumed that converting mercury to its oxidized state is a desirable co-benefit of SCR, which presents the opportunity to more easily capture it with a wet scrubber. Considering that all taconite facilities determined that conventional SCR is technically feasible, even though it has never been applied to a taconite furnace either, it appears that the taconite industry approach is biasing the analysis away from a potentially viable alternative (RSCR) and toward an alternative (SCR) that can be easily rejected later. (See the "Straw Man" discussion below.)

Common Control Options Accepted as Technically Feasible

All but Northshore depend upon Venturi-rod wet scrubbers for particulate removal and assume that these scrubbers also remove 15% - 30% of the uncontrolled SO_2. (Northshore uses a wet ESP which it assumes removes 90% of the uncontrolled SO_2.)

Step 3 - Evaluate Control Effectiveness

SO_2: Addition of a Wet-Wall Electrostatic Precipitator (WESP) was assumed to remove 80% of the remaining SO_2 in the gas stream, regardless of the degree of SO_2 removal already achieved. The facilities assume that an additional Wet Scrubber would remove 60% of the remaining SO_2 regardless of the degree of SO_2 removal already achieved. These facilities contend that the low scrubber efficiency estimate is due to the more dilute concentration of SO_2 in the exhaust gas stream due to much greater excess air in the indurating furnaces than in a boiler. However, we do not understand why a wet scrubber specifically designed for SO_2 removal would be less effective than a WESP which is more typically used to remove PM. We suggest that the wet scrubber would be able to achieve at least the same 80% additional SO_2 control as the WESP.[3] The facilities should provide documentation to show why they cannot achieve a similar level of control with a wet scrubber. We also do not understand why the efficiency of the add-on controls would be independent of the degree of removal of the existing controls.

NOx: Even though it has never been applied to a taconite furnace, all facilities assumed that addition of conventional SCR would reduce NO_x emissions by 80%, regardless of the type of indurating process to which it would be applied. We understand that SCR can reduce 90% of the NO_x in a given gas stream, but that it is most effective when applied to gas streams with relatively high NO_x concentrations, such as the grate/kiln exhausts and the waste gas exhausts from the straight-grate kilns. We believe that a valid evaluation of SCR would consider these factors.

Step 4 - Evaluate Impacts and Document Results

<u>BART Cost Ceilings for SO_2 and NO_x Control</u>

All facilities presented a BART cost range for SO_2 and NO_x of \$1,000 - \$1,300 per ton as a firm guideline that became the basis for deeming technically feasible control options as having unacceptable costs. All facilities postulated these ranges from information found in the Clean Air Interstate Rule (CAIR) and a few court cases.

All facilities appear to be confusing the costs incurred in BART versus costs incurred in trading programs such as CAIR. Any cost ranges derived from CAIR proceedings might be considered as relevant, but certainly not definitive. Any use of the value of a CAIR emission trading allowance to establish a BART cost range is erroneous, because the basis for the CAIR rule is reduction of SO_2 and NO_x emissions more cheaply than similar

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[3] In its March 2007 permit application, Minnesota Steel estimated that a wet scrubber could remove 90% of the SO_2 from both the hood exhaust and the waste gas exhausts on its straight-grate indurating furnace.

reductions achieved on a technology basis. Again, court verdicts regarding a specific set of circumstances should not be relied upon to set a particular cost range, because many differences in relevant facts may exist between the BART source and the litigant.

We reject the adoption by a BART-eligible source of a specific BART cost range above which technically feasible control options are arbitrarily deemed to be unacceptable. All of the above-named references to cost are relevant considerations, but the particular circumstance of the source (financially and with respect to the magnitude of necessary visibility improvements to be achieved now and in the future) bears heavily on acceptable cost ranges.

"Universal" Retrofit Cost

The taconite consultant should describe its "experience with similar projects" that allowed it to estimate a 60% retrofit factor for all of the retrofit technologies evaluated at every facility. We doubt that each situation presents the same degree of difficulty and warrants the same assumption.

BART "Straw Man"

Each BART analysis appears to bias the analysis toward the option that is most expensive (e.g., WESP, conventional SCR), and away from the option that is most cost-effective (lower sulfur fuels, caustic reagent, dedicated wet scrubbers, LoTOx, RSCR). For example, RSCR, with its 90% - 95% thermal efficiency was rejected as technically infeasible, while conventional SCR with its 60% - 70% thermal efficiency was accepted, even though neither has ever been applied to a taconite furnace. This essentially diverts attention from the option that might actually be chosen by an unbiased analysis.

Step 5 - Evaluate Visibility Impacts

Multiple Class I Areas

One of the factors comprising the BART evaluation is the resulting "degree of improvement in visibility..." In their analyses, the taconite facilities presented only the visibility improvements that were predicted to occur at the nearest Class I area. Because it is likely that reduced emissions from any of these facilities will result in improved visibility at more than one of the four Class I areas[4] for which they are significant contributors to impairment,[5] any analysis of visibility improvement should consider these multiple benefits. And, the facilities should model the impacts of their final BART proposals to increase emissions upon visibility at the four Class I areas.

[4] Boundary Waters Canoe Area (BWCA), Isle Royale National Park (NP), Seney National Wildlife Refuge (Seney), and Voyageurs NP
[5] The six taconite facilities cause or significantly contribute to impaired visibility in a total of 17 cases across the four Class I areas.

We believe that it is appropriate to consider both the degree of visibility improvement in a given Class I area as well as the cumulative effects of improving visibility across all of the Class I areas affected. It simply does not make sense to use the same metric to evaluate the effects of reducing emissions from a BART source that impacts only one Class I area as for a BART source that impacts multiple Class I areas. And, it does not make sense to evaluate impacts at one Class I area, while ignoring others that are similarly significantly impaired. If we look at only the most-impacted Class I area, we ignore that the other Class I areas are all suffering from impairment to visibility "caused"[6] by the BART source. It follows that, if emission from the BART source are reduced, the benefits will be spread well beyond only the most impacted Class I area, and this must be accounted for.

The BART Guidelines represent an attempt to create a workable approach to estimating visibility impairment. As such, they require several assumptions, simplifications, and shortcuts about when visibility is impaired in a Class I area, and how much impairment is occurring. The Guidelines do not attempt to address the geographic extent of the impairment, but assume that all Class I areas are created equal, and that there is no difference between widespread impacts in a large Class I area and isolated impacts in a small Class I area. To address the problem of geographic extent, we have been looking at the cumulative impacts of a source on all Class I areas affected, as well as the cumulative benefits from reducing emissions. While there are certainly more sophisticated approaches to this problem, we believe that this is the most practical, especially when considering the modeling techniques and information available.

Compared to the typical control cost analysis in which estimates fall into the range of $2,000 - $10,000 per ton of pollutant removed, spending millions of dollars per deciview (dV) to improve visibility may appear extraordinarily expensive. However, our compilation[7] of BART analyses across the U.S. reveals that the **average cost per dV proposed by either a state or a BART source for an Electric Generating Unit (EGU) is $9 - $19 million,**[8] with a maximum of almost $50 million per dV proposed by Colorado at the Martin Drake power plant in Colorado Springs.

BART Determinations

Although the taconite industry, which is already responsible for very large impacts on visibility in the northern Class I areas, is actually proposing to increase emissions and impacts, MPCA has proposed limits which would keep those increases to a minimum, and, in some cases (as discussed in separate enclosures) reduce emissions. Nevertheless, we believe that the taconite facilities should bear a similar share of the burden as the EGUs which are proposing to reduce emissions significantly.

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[6] EPA defines a source with an impact greater than one deciview as "causing" impairment.

[7] http://www.wrapair.org/forums/ssjf/bart.html

[8] For example, PacifiCorp has stated in its BART analysis for its Bridger Unit #2 that "The incremental cost effectiveness for Scenario 1 compared with the baseline for the Bridger WA, for example, is reasonable at $580,000 per day and $18.5 million per deciview."

We commend MPCA for asserting that (p613) "United Taconite may choose to propose a BART Alternative project that is equivalent or better than BART. The BART Alternative must result in equivalent or greater emissions reductions and visibility benefits from the facility when compared to the MPCA's BART determination." We ask that MPCA apply this same "greater emissions reductions and visibility benefits" standard to all of its BART alternatives.

Reasonable Progress

Even if a source is exempt from BART, it may still be subject to review under the Reasonable Progress requirements of the Regional Haze Rule. MPCA may wish to consider additional emission reductions under that aspect of the Regional Haze program. One component of MPCA's Reasonable Progress strategy is the Northeastern Minnesota Plan, discussed below.

While MPCA is correct in saying (p64) that "all the estimated future visibility conditions are moving in the desired downward direction toward natural conditions," they fall significantly short of the Uniform Rate of Progress (URP) needed to achieve that goal by the national target date of 2064. Instead, MPCA's proposed Reasonable Progress Goal (RPG) represents 35% of the URP at Voyageurs NP (and 67% at BWCA. Because it is generally understood that maintaining the URP will become more difficult as the "low hanging fruit" is controlled, it will likely become even more difficult in the future to attain the URP unless MPCA increases the stringency and expands the scope of its emission reduction efforts. For example, as discussed below, MPCA could reduce its BART-exemption threshold to a value lower than the maximum 0.5 dv allowed by the BART Guidelines.

We ask that MPCA reconcile the following statements:

- p369: "The MPCA agrees with the commenter that imperceptible visibility improvement is not a justification for rejecting otherwise feasible and cost-effective controls.
- p371: "The MPCA's position is that cost-effective controls should be installed, even if they result in limited improvement in visibility..."
- p67: "Although the MPCA could set the contribution threshold lower than 0.5 deciviews and is cognizant of a number of existing sources in close proximity to Class I areas, the modeling showed no sources causing impacts at levels just slightly below 0.5 deciviews. The 98th percentile deciview values for those subject-to-BART range from 0.6 – 4.4 deciviews, while the 98th percentile deciview values for those not subject-to-BART range from 0.0 – 0.4 deciviews."

MPCA goes on to say that:

A total of 15 facilities with BART-eligible sources were determined not subject-to-BART based on the 0.5 deciview threshold. Of those 15 facilities, three are subject to the Northeast Minnesota Plan [Boise White Paper, Hibbing Public Utilities, Virginia Public Utilities] and three are EGUs [Austin Public Utilities, Xcel—A.S. King, Otter Tail Power-Hoot Lake] that were initially subject to CAIR. Minnesota was initially included in CAIR, leading many utilities to install controls in anticipation of CAIR compliance.

EPA has recently published a proposed stay of CAIR in Minnesota until there is a re-promulgated CAIR rule. Should Minnesota not be included in a re-promulgated rule, two of the three EGUs that showed modeling results closest to the BART threshold (Austin Public Utilities and Otter Tail Power Hoot Lake) will be re-evaluated for reasonable progress controls at the time of the Five Year SIP Assessment.

Based on these facts, the application of BART would likely have little impact on the emission reductions expected from these facilities. Of the remaining nine facilities not subject to the Northeast Minnesota Plan or initially subject to CAIR, all have 98th percentile deciview values of 0.2 deciviews or less. Therefore, MPCA did not readjust the contribution threshold chosen for exempting sources from BART.

NPS believes that, in view of MPCA's failure to meet URP and its own commitment to require installation of cost-effective controls, "even if they result in limited improvement in visibility," MPCA should expand its BART or Reasonable Progress (RP) analyses to at least include sources (Boise White Paper, Hibbing Public Utilities, Virginia Public Utilities) with impacts between 0.2 and 0.5 dv. Inclusion in the Northeast Minnesota Plan does not guarantee that these sources will reduce emissions. Analysis of potential emission reduction strategies under the BART or RP provisions of the Regional Haze Rule could yield additional and needed emission reductions.

The Northeastern MN Plan

While we agree with the concept inherent in the Northeastern MN Plan, we have serious concerns about the validity of the 2002 emission estimates upon which the Plan is based. Although we have sufficient confidence in the emission data collected from the Electric Generating Units, that is far from the case with the taconite emission estimates. For example, in its taconite BART analyses, MPCA repeatedly states that, "Due to the lack of sufficient emissions data representing the range of operating conditions that influence emissions, the MPCA is unable at this time to set an emission limit that corresponds to BART for [the source's] indurating furnace." If the emissions data are not good enough for MPCA, then we question its use as a basis for determining the success of the NE MN Plan over the next nine years.

Our concerns are further illustrated by a closer inspection MPCA's "Northeast Minnesota Plan Emission Tracking Spreadsheet." For all practical purposes, if the 2002 NO_x emission estimates for Minntac are correct, then the NE MN Plan target is met with no additional reductions from the taconite industry. If the Minntac 2002 NO_x emissions are not correct, then the 2018 target is not met. We request an explanation from MPCA for the reduction in Minntac's NO_x emissions from 2002 to 2012 and to 2018.

One of the key elements of the NE MN Plan is that emissions must be accurately estimated and tracked. We understood that MPCA would require installation of Continuous Emission Monitors on all taconite lines to facilitate that process. We are very concerned that MPCA has not done so, and has allowed the taconite plants an option which we do not believe will provide equivalent results.

Continuous Emission Monitors (CEMs)

We understand that CEMs or an equivalent alternative were to have been installed or implemented at each of the taconite plants in 2008. However, that process has been delayed due to economic conditions and that "the MPCA is placing the revised SIP, including Administrative Orders for both CEMs and Alternative Methods, on public notice." (p366) However, at the same time, MPCA has rejected the concerns of the U. S. Forest Service that the alternative method to CEMs that will be used by several of the taconite facilities will not provide accurate enough data to achieve the aims of the Regional Haze SIP and will not allow facilities to identify operating scenarios that could result in lower emissions. The Forest Service requested that EPA performance specifications for predictive emission systems be used by the MPCA to evaluate the alternate systems. In rejecting that request, the MPCA responded that:

> The EPA's performance specification was finalized on March 25, 2009. The latest deadlines for any of the facilities to submit an alternative method proposal was March 1, 2009. **The MPCA committed to approve or disapprove that alternate method within 30 days of submittal.** Therefore, it was not feasible for the MPCA to evaluate the alternate method against EPA's promulgated performance specification. However, the MPCA acknowledges that the federal performance specification may be an appropriate compliance tool to ensure high quality data in the future.

If the MPCA has already made an irrevocable commitment "to approve or disapprove that alternate method" by the end of March, what is the point of now announcing that it is taking comments on those Administrative Orders? Furthermore, what decisions did MPCA make, and upon what bases?

Nevertheless, we shall take this opportunity—our first—to provide our comments on the issue of CEMs and their alternatives. First, it is clear that MPCA recognizes the value of good emissions data as a component of its BART strategies:

> The MPCA has determined that continuous emission monitors or a comparable alternative emission measurement method combined with hourly process data can provide data that would be necessary in setting BART NO_x limits based on BART as good combustion practices, past installation of Low NO_x Burners in the preheat zone and the upcoming implementation of furnace energy efficiency projects in early 2008.
>
> From its experience with electric utilities, refineries, and other facilities, the MPCA notes that strategies to use CEMs to reduce NO_X have been successful. The MPCA believes that monitoring NO_X emissions with CEMs or other parametric monitoring at pelletizing furnaces will identify operating conditions under which NO_X emissions can be reduced. The MPCA also notes that NO_X reductions have occurred at another taconite facility after installing CEMs. While those reductions cannot be directly tied to operational changes identified with the aid of CEMs, this observation strongly suggests that using CEMs at pelletizing furnaces will help reduce NO_X through the feedback to the operator and plant management that a CEMs or predictive emission monitoring system provides. Operators can fine tune the operation since it responds to a number of variables under their control and the results of these adjustments can be seen with a CEMs. Plant management can analyze temporal differences in individual furnace operations and differences in emissions among similar furnaces to gain understanding of the factors that influence NO_X formation and apply that knowledge to lower emissions.

MPCA has approved installation and operation of CEMs for some taconite plants:

- p279: The U.S. Steel facilities will monitor their SO_2 emissions with Continuous Emission Monitors (CEMs), ensuring that the MPCA will have a more complete and accurate picture of actual emissions, compared to other facilities, and understand how emissions react to changes at the facility.
- Keetac (p6): An SO_2 Continuous Emission Monitoring Systems (CEMS) will be required to gather data to establish the appropriate BART limit. The CEMS will also be used to determine continuous compliance with that limit. Through Administrative Orders by Consent, the MPCA has required other taconite facilities that use solid fuels with a higher sulfur content (coal) to install SO_2 Continuous Emission Monitoring Systems and to monitor parameters that are linked to scrubber performance.
- p7: Keetac proposes existing combustion controls and fuel blending as BART, with the installation of continuous emission monitoring systems (CEMS) to monitor NO_X emissions. The NO_X limit for the furnace will be based on at least twelve months of monitoring data. The MPCA agrees with Keetac's proposal to install CEMS to monitor NO_X emissions and to set a limit based on those measurements after acquiring twelve months of emission data.
- Minntac p551: The MPCA has determined that continuous emission monitors combined with hourly process data can provide data that would be necessary in setting BART NO_X limits based on BART as good combustion practices, fuel blending and the operation of low-NO_X burners for Lines 4, 5, 6, and 7 and combustion controls and fuel blending for Line 3.
- p559: Minntac has agreed to install SO_2 Continuous Emission Monitoring Systems (CEMS) on the waste gas stacks for Lines 3, 4, and 5; in addition, SO_2 CEMS and the collection of scrubber operating data are being required through an Administrative Order by Consent to provide more accurate emission data and scrubber operating parameter data for determination of a BART limit for only Lines 6 and 7 where a high sulfur fuel (coal) is burned.
- p532: If HTC decides to monitor SO_2 emissions with CEMs, the MPCA may adjust the SO_2 emission limit based on scrubber performance parameters (e.g., pH) and on the data collected from CEMs.

MPCA has also required CEMs at small EGUs: (p666) Northshore Compliance with the NO_X and SO_2 limits will be through the use of CEMs.

We therefore endorse the use of CEMs in the contexts described above, and encourage their use wherever good emissions data are essential and where CEMs are applicable.

We have some major concerns about the potential for the comparable alternatives to be equivalent to CEMs:

- MPCA has not presented any evidence or examples that such an approach will work as well as the established CEM method. MPCA has consistently demanded that potential control technologies be demonstrated and proven before considering them as BART. MPCA should apply the same rigorous standard to the methods used to set and to verify compliance.

- MPCA should provide assurance that it is capable of obtaining the data necessary to adequately assess and evaluate the proposed alternatives. We are especially concerned by the apparent inability of MPCA to obtain data it had twice requested from United Taconite, which twice "declined" to comply with MPCA's requests, with no adverse consequences, as described below (by MPCA):

    > p608: The MPCA requested that United Taconite amend the BART analysis to include an additional control technology – a new recirculating particulate matter wet scrubber to replace existing equipment on Line 2 to achieve an overall SO2 control efficiency of at least 60%. When **United Taconite declined to provide such information**, the MPCA contracted with STS Consultants to prepare the cost estimate. The final cost estimate was completed by the MPCA, and is dated July 30, 2007. The final cost estimate is attached.
    > The MPCA also requested an analysis of alternative fuel blends (coal and petroleum coke) for Line 2 as an SO2 control alternative. **United Taconite declined to provide such analysis.** As a result, the MPCA prepared separately its analysis of fuel blends.

We strongly believe that CEMs should be the preferred and presumptive method to determine emissions, and that any alternative approach should be used only if CEMs cannot be relied upon due to site-specific circumstances or that the alternative meets or exceeds the EPA performance specifications for predictive emission systems. We also request assurance from MPCA that it has the authority to obtain any information it needs from a source to ensure that any proposed alternative monitoring strategy can be successfully and transparently implemented.

In conclusion, we appreciate MPCA's efforts to date regarding the BART process, but we believe that significant additional reductions can be achieved and are warranted. We look forward to working with the MPCA as this process advances. We believe that good communication and sharing of information will help expedite this process, and suggest that you contact Don Shepherd (don_shepherd@nps.gov, 303-969-2075) if you have any questions or comments about this document.

Sincerely,

John Bunyak

John Bunyak
Chief, Policy, Planning and Permit Review Branch

Enclosures

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BART Determinations for United Taconite
National Park Service (September 3, 2009)

On page 379 of the Response to Comments, the U. S. Forest Service (USFS) states that the MPCA's SO_2 BART determination for United Taconite of 1.7 lbs/mmBtu, based on fuel blending, was selected inappropriately. The USFS notes that the memo states that fuel blending was selected because "1) it does not require additional construction, 2) is quicker, and 3) avoids further degradation of water quality." The USFS believes that the first two reasons are not included as factors for consideration by the Clean Air Act. The USFS also states that reason 3 does not appear to be valid because water treatment costs are included as part of overall scrubber costs, sulfate treatment has been implemented at Minntac and is pr edicted to improve the quality of the tailing basin discharge, and therefore it is not clear that water quality would be degraded with a scrubber option. As the MPCA determined that all options are cost-effective, the USFS believes that fuel blending plus a polishing scrubber represents BART, with an emission limit of 0.68 lbs/mmBtu.

MPCA Response: The regulations at 40 CFR 51.308(e)(1)(ii)(A), mentioned by the commenter, specify c ertain mandatory criteria. The criteria are not identified as the exclusive criteria, however.

The consideration of the water quality drawbacks of scrubbing is part of the evaluation of "energy and nonair quality environmental impacts." A BART determination that does not exacerbate existing water quality issues is appropriate; when a BART determination is available that does not require extensive mitigation of nonair quality impacts such a determination should be strongly considered. Although the USFS states that sulfate treatment at Minntac "is predicted" to improve the quality of the discharge, the MPCA notes that this improvement has not yet been demonstrated. In addition, considerable energy usage is necessary for water treatment. Therefore, the MPCA believes its BART limit of 1.7 lbs SO_2/mmBtu heat input is reasonable and appropriate, and has been demonstrated as such using the five factors.

NPS: MPCA cannot "derive" additional reasons to exclude a control technology. Furthermore, only those "energy and nonair quality environmental impacts" that cannot be evaluated as part of the technical economic feasibility analyses should be considered under that category. MPCA should provide reasons why it does not believe that sulfate treatment at Minntac would improve the quality of the discharge.

p612: The BART limit for Line 2 is 1.7 lb SO_2/MMBtu heat input. This SO_2 limit can be met through modifying fuel blends; however, it could also be accomplished through use of additional air pollution control equipment. This limit is a 30-day rolling average, using SO_2 flue gas monitors. The emissions limit can be met through fuel changes, additional air pollution control equipment, or a combination of both.

NPS: MPCA should explain how it derived this limit.

BART Determinations for Keewatin Taconite
National Park Service (September 3, 2009)

MPCA p3: The permit for the US Steel – Keetac facility allows the combustion of natural gas, distillate fuel oils, coal, and petroleum coke in the pelletizing furnace. Coal and natural gas are the primary fuels; **coal is a significant source of sulfur**. Another source of sulfur emissions from this furnace is the iron ore used to form the green balls, although this represents a smaller contribution than the sulfur in the solid fuels burned. Sulfur dioxide emissions are currently controlled by wet scrubbers.

MPCA p5: The MPCA reviewed the BART analysis provided by Keetac and agrees with Keetac's assessment of technical infeasibility for Dry Sorbent Injection, Spray Dryer Absorption, **Alternate Fuels,** and Coal Processing.

NPS: MPCA should explain why it considers it technically infeasible for Keetac to burn a lower-sulfur coal.

February 3, 2012

Via Electronic and U.S. Mail

Catherine Neuschler
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Re: Minnesota Regional Haze Draft State Implementation Plan Supplement

On behalf of the National Parks Conservation Association, the Minnesota Center for Environmental Advocacy, the Friends of the Boundary Waters Wilderness, Fresh Energy, and the Voyageurs National Park Association (collectively, the "Conservation Organizations"), we submit these comments on Minnesota's draft State Implementation Plan Supplement (the "Supplement" or "SIP Supplement").

The most recent SIP Supplement, like the 2009 SIP submittal, does not contain the legally required measures that will ensure reasonable progress toward eliminating visibility impairment in the Boundary Waters Canoe Area Wilderness and Voyageurs and Isle Royale National Parks. In particular, the SIP Supplement does not meet the applicable requirements of the Clean Air Act ("CAA") in its proposal to substitute the Cross State Air Pollution Rule ("CSAPR") for best available retrofit technology ("BART") for electric generating units ("EGUs") and in the proposed BART determinations (or lack of BART) and in the proposed inadequate monitoring for taconite facilities. Finally, the Minnesota Pollution Control Agency ("MPCA") submitted the Supplement to the Environmental Protection Agency ("EPA") on January 5, 2012, and EPA has proposed its approval, all prior to completion of Minnesota's public comment process.[1] Plainly, the public comment period is not considered meaningful by MPCA given that it has already decided to submit the Supplement to EPA and EPA has already proposed its approval, thereby frustrating the very goal of public process.

I. INTRODUCTION

Minnesota is home to nationally important, iconic landscapes such as those preserved in the Boundary Waters Canoe Area Wilderness and Voyageurs National Park. Minnesota air pollutant emissions are also affecting places beyond the state's borders, including Isle Royale National Park, which is enormously important historically, scientifically, and as an iconic wild

[1] It appears that the MPCA Board will not take this matter up for final state action until the March 27 Board Meeting, 36 Minn. Reg. 679, 684-85 (Dec. 19, 2011), well after the comment period ends on EPA's recently-published proposal for Minnesota. This is a clear violation of public process requirements.

landscape. These special places are designated “Class I areas” under the Clean Air Act (“CAA”)—places where this country requires the air quality to be at its most pristine, unaffected by man-made pollutants. Sadly, the air in many of our most special Class I areas, including those mentioned above, is much less than clean, being fouled on a regular basis by man-made emissions from industry and vehicles. Complying with the CAA’s haze requirements will reduce pollutants that adversely affect air quality resulting in the balance and health of natural ecosystems, restoration of the magnificent vistas and landscapes that these areas have to offer, and protection of public health by reducing the air pollution that contributes to so many debilitating respiratory diseases.

The National Parks Conservation Association (“NPCA”) is a national non-profit organization working to protect and enhance America’s national parks for present and future generations. NPCA’s Midwest office works to protect air quality in national parks in the region, including Voyageurs and Isle Royale. NPCA represents many members who use Boundary Waters, Voyageurs, and Isle Royale National Parks and are dedicated to protecting these areas for present and future generations.

The Minnesota Center for Environmental Advocacy (“MCEA”) is a Minnesota-based nonprofit environmental organization whose mission is to use law, science, and research to preserve and protect Minnesota’s natural resources, wildlife, and the health of its people. MCEA’s members live, work, and recreate in the Boundary Waters, Voyageurs, and Isle Royale National Parks.

The Friends of the Boundary Waters Wilderness (“Friends”) is the only organization in the country focused squarely on protecting the Boundary Waters Canoe Area Wilderness. The Friends, a non-profit organization, exists to protect, preserve, and restore the recreational and ecological treasures of the BWCAW, and to defend the BWCAW against pressures created by excessive logging, invasive species, overuse, development, and industrial pollution. The Friends represent nearly 4,500 individuals, family foundations, and organizations, many of whom live adjacent to or regularly visit the Boundary Waters.

Voyageurs National Park Association is a private, non-profit organization with the mission of protecting and promoting Minnesota’s only National Park, Voyageurs National Park. The Voyageurs National Park Association meets its mission through a focus on protecting the park by addressing policy issues, providing direct support to Park projects, and advocating to ensure long-term protection of the Park’s resources.

Fresh Energy is a nonprofit organization that works in the public interest to catalyze state and regional policy and regulation that will stimulate the technological advancements necessary for an energy system that sustains the economy, people, and the planet.

The Conservation Organizations submitted comments on Minnesota’s proposed SIP in 2009, wherein the Conservation Organizations criticized the failures of the MPCA to follow the required process for determining BART limits for EGUs and the failure to adequately address haze-causing pollutants from taconite industrial sources. Minnesota’s SIP submission still contains those flaws, and the Conservation Organizations reiterate those criticisms.[2] This comment letter will address primarily the items contained in the more recent SIP Supplement.[3]

II. MPCA'S PROCESS DENIES EFFECTIVE PUBLIC PARTICIPATION.

As noted above, Minnesota first submitted its proposed haze SIP to the EPA in late 2009. Minnesota was one of a number of states that EPA had previously found to be in violation of the Clean Air Act for failure to timely submit a proposed haze SIP. Early in 2011, a number of environmental organizations commenced suit against EPA for failure to enforce its earlier decision regarding states in violation of the CAA, by failing to timely approve or disapprove the SIPs that were submitted, and for EPA's failure to prepare federal implementation plans for those states that had inadequate or nonexistent haze SIPs. The lawsuit against EPA is in the final stages of resolution, with a consent decree containing deadlines by which EPA must issue decisions on state haze SIPs awaiting final review and approval by the court. The deadline in the consent decree for EPA to act on Minnesota's haze SIP was January 17, 2012.

In late December of 2011, Minnesota published the SIP Supplement that is the subject of these comments, giving the public until February 3, 2012 to comment—weeks beyond EPA's deadline to take action on Minnesota's SIP. It is our understanding from EPA that Minnesota also submitted the Supplement to EPA for approval on January 5, 2012, a month before public comments in the state process need be complete and more than two months before the MPCA Board will take final action to decide whether the Supplement should be approved by the state. Minnesota's actions, combined with EPA's simultaneous consideration, plainly deprive the public of a meaningful opportunity to review and comment on this significant decision.[4]

III. THE SIP SUPPLEMENT VIOLATES THE CLEAN AIR ACT.

A. The SIP Supplement's Proposal to Substitute CSAPR Allocations for BART Violates the CAA.

Minnesota's 2009 SIP submittal included BART determinations for five EGUs: Taconite Harbor; Boswell Energy Center; North Shore Mining, Silver Bay; Rochester Public Utilities, Silver Lake; and Sherco. Minnesota Pollution Control Agency, Regional Haze State Implementation Plan at 68, 70-71, Appendix 9.4 (2009). The 2011 Supplement proposes to relieve these five Minnesota EGUs of the BART requirements on the grounds that the EGUs will be subject to pollutant allocations under CSAPR. "Rather than complying with the specific BART determinations made in the initial SIP submittal, Minnesota's subject to BART power plants simply need to comply with their obligations under the transport rule in order to meet the

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[2] Each of the undersigned organizations incorporates by reference its prior comments on the 2009 Minnesota SIP submittal.

[3] Please note that the Conservation Organizations will be submitting detailed comments to the EPA by the February 24, 2012 comment deadline. We will provide a copy of those comments to MPCA and we hereby request that the entirety of those comments be incorporated into MPCA's record.

[4] EPA can approve only state SIP submissions that have properly followed state public process requirements. 42 U.S.C. § 7410(l) ("Each revision to an implementation plan submitted by a State under this chapter shall be adopted by such State after reasonable notice and public hearing.").

BART obligations." Minnesota Pollution Control Agency, Regional Haze State Implementation Plan Supplement at 3 (Dec. 2011).

Relying on EPA's proposed alternative to BART fails to ensure that the purpose and requirements of the regional haze program will be satisfied. Substituting CSAPR for BART would violate the Clean Air Act because CSAPR has been stayed by the D.C. Circuit Court of Appeals; EPA's proposed "CSAPR is better than BART" rule suffers from fatal legal flaws; neither the state nor EPA has demonstrated that CSAPR is better than BART for Minnesota; and EPA's regulations do not allow an alternative to BART for sources such as the Sherco facility that have been certified as reasonably anticipated to cause or contribute to the impairment of visibility in a Class I area.

1. The SIP Supplement cannot substitute CSAPR for BART while the D.C. Circuit continues the stay of CSAPR.

In response to the D.C. Circuit Court of Appeals rejecting an earlier pollutant trading rule ("CAIR"), EPA issued a replacement, CSAPR. 76 Fed. Reg. 48,208 (Aug. 8, 2011). EPA also recently proposed (but has not made a final determination) that CSAPR will "achieve greater reasonable progress towards a national goal of achieving natural visibility conditions in mandatory Class I federal areas than source-specific BART," and therefore states may substitute CSAPR for BART. 76 Fed. Reg. 82,219, 82,221 (Dec. 30, 2011).

The ability of states to substitute CSAPR is still only in the preliminary stage as EPA has yet to finalize its rulemaking and recent litigation has thrown EPA's ability to do so into some doubt. On December 30, 2011, the D.C. Circuit issued a stay of CSAPR pending review on the merits of several consolidated petitions for review of the rule. EME Homer City Generation, L.P. v. EPA, No. 11-1302 (D.C. Cir. stay issued Dec. 30, 2011). As a result of the stay, CSAPR currently has no legal effect and is not a binding legal requirement on states and covered sources. This in turn means that EPA's proposal to allow states to substitute CSAPR is premature and lacks foundation because CSAPR has not yet been allowed to take effect. Effectively, the Minnesota SIP Supplement is a house of cards and is not approvable under the law. This is true for two reasons under the CAA.

First, to reduce the air pollution that contributes to haze, the CAA requires each state[5] to include in its SIP "a requirement" that certain major stationary sources "shall procure, install, and operate . . . the best available retrofit technology." 42 U.S.C. § 7491(b)(2)(A); 40 C.F.R. § 51.308(e). Any trading program substituted for BART must also satisfy the statutory criteria by being a "requirement" that each source "shall procure, install, and operate" BART or equivalent technologies. Because the D.C. Circuit has stayed CSAPR, and no source is required to implement CSAPR, CSAPR is not a "requirement" and therefore cannot meet the requirement in the CAA for BART substitutions. Until the stay is lifted and CSAPR actually takes effect imposing requirements on air pollution sources, CSAPR cannot satisfy the CAA's mandate to

[5] Clean Air Act section 169A requires SIP revisions for each state that either (a) has within its borders a Class I area that has been designated by the Secretary of the Interior as an area where visibility is an important value or (b) is reasonably anticipated to cause or contribute to visibility impairment in such a Class I area in another state. 42 U.S.C. § 7491(b)(2).

include a requirement that sources install BART or an alternative that makes as much progress towards improving visibility in Class I areas as would BART.

Second, the BART requirement must be included in each state's SIP, 42 U.S.C. § 7491(b)(2), and the elements of a SIP must be legally enforceable against the relevant sources. Id. § 7410(a)(2)(A). As EPA has reminded Minnesota, "under section 110 of the Clean Air Act, the U.S. Environmental Protection Agency cannot approve Minnesota's plan as meeting requirements for BART without these requirements first being established in an enforceable form." Letter from Doug Aburano, Chief, Control Strategies Section, EPA Region 5, to John Seltz, Chief, Air Assessment Section, MPCA at 1 (June 6, 2011). EPA has made clear that if Minnesota were to adopt source-specific BART in its SIP, BART must be included in an enforceable form; the CAA requires nothing less if Minnesota substitutes an alternative for BART. Right now, CSAPR limits are not enforceable and cannot be made so while the stay is in place.[6] Therefore, EPA cannot approve the Supplement as it is not enforceable.

EPA faces a May 30, 2012 deadline for either granting final approval of the Minnesota SIP or approving a final FIP. Nat'l Parks Conservation Ass'n v. Jackson, No. 11-01548 (D.D.C. consent decree proposed Nov. 9, 2011) (as modified by agreement of parties). If, on May 30, the D.C. Circuit stay of CSAPR remains in effect, the final regional haze plan cannot substitute CSAPR for BART.

2. *EPA regulations do not authorize the substitution of CSAPR for BART for a particular source if a Federal Land Manager has certified that visibility impairment is reasonably attributable to that source.*

EPA's regional haze regulations allow EPA or a state to approve an alternative to BART if the state demonstrates that the alternative meets a two-part test for ensuring that the alternative makes as much progress towards improving visibility as would BART. 40 C.F.R. § 51.308(e)(2)-(4). But EPA's regulations have never allowed an alternative to BART for a source certified as reasonably anticipated to cause or contribute to impairment of visibility in a Class I area ("RAVI" or "RAVI source"). See id. § 51.302. Once an FLM certifies a source as RAVI, nothing less than BART is required for that source. Id. § 51.302(c).

Indeed, when EPA issued its prior "CAIR is better than BART" determination, EPA expressly acknowledged that states participating in CAIR retain the obligation to impose BART on sources certified as RAVI. 70 Fed. Reg. 39,104, 39,137 (July 6, 2005) ("[T]he possibility of BART for reasonably attributable visibility protects against any potential 'hot spots.'"); see also

[6] If Minnesota wishes to use the CSAPR allocations for BART independent of EPA's actions, Minnesota must comply with the independent analysis requirements for demonstrating that assigned allocations are in fact "Better than BART" for Minnesota for protecting and improving the haze pollution in the three Class I areas. 40 C.F.R. § 51.308(e)(2)-(3). Minnesota has not engaged in that process and therefore cannot claim that it "independently" proposes the CSAPR allocations as a BART alternative. Further, given what has been demonstrated in numerous comments to the agency from the Conservation Organizations and the Federal Land Managers, Minnesota cannot so demonstrate: even the extremely inadequate and non-compliant BART determinations in Minnesota's 2009 SIP submission show better protection and improvement for the Class I areas than the CSAPR allocations. See Letter from Timothy A. Dabney, Acting Forest Supervisor, Superior National Forest, to David Thornton, Assistant Commissioner, MPCA at Attachment, p.1 (Jan. 13, 2012). .

40 C.F.R. § 51.308(e)(4) ("A State that chooses to participate in such trading programs may also adopt provisions, consistent with such trading programs, for a geographic enhancement to the program to address the requirement under §51.302(c) related to BART for reasonably attributable impairment from the pollutants covered by the CAIR cap-and-trade programs.").

On October 21, 2009, prior to Minnesota's submission of its original haze SIP proposal, the United States Department of the Interior certified that "a portion of the existing visibility impairment in Voyageurs and Isle Royale [National Parks] is reasonably attributable to pollution emissions from [Xcel Energy's] Sherco Units 1 and 2." Letter from Thomas L. Strickland, Assistant Secretary for Fish and Wildlife and Parks, U.S. Department of the Interior, to Mr. Bharat Mathur, Acting Regional Administrator, EPA Region 5 at 2 (Oct. 21, 2009). In light of this certification, the Sherco facility must comply with the BART obligations imposed by the regional haze and RAVI rules. The only way Sherco can comply with RAVI BART is through the establishment of BART emissions limits, consistent with 40 C.F.R. § 51.302(c)(2)(iii) and (c)(4). To the extent that the Supplement implies that the CSAPR allocations may serve as RAVI BART limits, the Supplement has no basis in the law—since the regulations do not authorize an alternative to RAVI BART—or in the record—since the CSAPR allocations are higher than the emissions limits represented by RAVI BART.[7]

3. Minnesota has not performed the required analysis of whether CSAPR will achieve more visibility improvement at Minnesota's Class I Areas than would source-specific BART and analysis by the FLMs shows it will not.

MPCA seeks to rely on a proposed, nationwide determination by EPA that "CSAPR is better than BART."[8] EPA's proposed rule, however, is fatally flawed. In the proposed rule, EPA uses the CSAPR allotments—meant for achieving different CAA goals—to assess the visibility improvement that will occur under CSAPR averaged across 60 Class I areas in the eastern United States as well as averaged across 140 Class I areas nationwide. EPA then compares the emissions reductions anticipated under CSAPR to the reductions attainable under BART.

But instead of using actual, source-specific BART, EPA uses "presumptive BART" emissions, 76 Fed. Reg. at 82,222, 82,225, a level of emissions that EPA itself has repeatedly stated is inadequate and in most cases is not BART for particular sources. See, e.g., 76 Fed. Reg. 64,186, 64,201 (Oct. 17, 2011) ("The presumptive limits accordingly are the starting point in a BART determination . . . EPA did not provide that states could avoid a source-specific BART

[7] While the public comment period for Minnesota's SIP supplement is still open, EPA has proposed to approve MPCA's submittal, and has proposed to deal with RAVI BART separately from regional haze. 77 Fed. Reg. at 3,689 ("EPA will act on RAVI BART in a separate notice."). There is every reason for EPA to deal with regional haze and RAVI BART at the same time, given that all of these requirements pertain to the same problem of haze in Class I areas. Given that DOI certified Sherco as RAVI in 2009, and MPCA, the federal land managers, and EPA have all analyzed BART for Sherco, there is no reason for EPA to further delay the RAVI BART determination.

[8] NPCA and Earthjustice are reviewing EPA's "CSAPR is better than BART" proposal to determine the extent to which the rule is based on presumptive BART rather than actual BART as well as other problems with the EPA's proposal.

determination by adopting the presumptive limits. In fact, nothing on the record would support the conclusion that the presumptive limits represent the "best available retrofit controls" for all EGUs at these large power plants."). Conducting a comprehensive five-step BART analysis is critical to ensuring that a source will appropriately control its pollution and that the region will make reasonable progress toward meeting visibility goals. Presumptive limits may be BART, but only after a thorough analysis shows that no more stringent limit is achievable. EPA, in its proposed rule, has not completed such an analysis. In short, even if it were proper for Minnesota to rely on a rule that purports only to show that CSAPR is better than BART *on average* across affected Class I areas, Minnesota should not rely on a rule that is not yet final and is of doubtful legality.

Moreover, EPA has not attempted to demonstrate that CSAPR is better than BART on a state-by-state basis or what it means for the Class I areas adversely affected by Minnesota sources of air pollution. The CAA requires that the Minnesota regional haze SIP ensure reasonable progress toward attaining natural visibility at the Class I areas located in Minnesota as well as the Class I areas affected by Minnesota's emissions. Whereas EPA purports to show that CSAPR is better than BART nationwide, no one has attempted to demonstrate that CSAPR is better than BART for Minnesota—and, as explained below, the existing analyses suggest that CSAPR is worse than BART for Minnesota.

For at least one Minnesota EGU, the CSAPR allocations far exceed the emissions that would be allowed under BART. The Xcel Energy Sherco facility in Becker, Minnesota is the largest single source of pollutants that are currently (and have been) damaging the Class I areas in Minnesota and several other states, including Michigan, North Dakota, and South Dakota. This is shown by MPCA's own modeling performed as part of the development of its initial haze SIP and verified by the RAVI certification by the Department of Interior. See MPCA, Results of Best Available Retrofit Technology (BART) Modeling to Determine Sources Subject-to-BART in the State of Minnesota at 19 (2006).

Both the National Park Service and EPA have indicated that NO_x BART for Sherco units 1 and 2 is the installation of selective catalytic reduction ("SCR") at an emission level of .05 lb/mmbtu. Letter from John Bunyak, Chief, Policy, Planning and Permit Review Branch, NPS to Catherine Neuschler, MPCA at Attachment, p.7 (June 26, 2009); Letter from Doug Aburano, Chief, Control Strategies Section, EPA Region 5, to John Seltz, Chief, Air Assessment Section, MPCA at 2 (June 6, 2011). Based upon 2010 data, this emission rate would result in approximately 2450 tons of NO_x per year. The CSAPR allocations, however, are more than *300% higher* than the emission limit that would be authorized under BART, since CSAPR authorizes Sherco units 1 and 2 to emit 7800 tons of NO_x per year.[9] Plainly, for Sherco units 1 and 2, CSAPR is not better than BART.[10]

[9] EPA, Final CSAPR Unit Level Allocations under the FIP at 44 (2011), available at http://www.epa.gov/airtransport/pdfs/UnitLevelAlloc.pdf

[10] Furthermore, CSAPR inexplicably allows Sherco unit 2 to emit 5789 tons of sulfur dioxide ("SO_2") for 2012 and 2014. EPA, Final CSAPR Unit Level Allocations under the FIP at 44, available at http://www.epa.gov/crossstaterule/pdfs/UnitLevelAlloc.pdf. Sherco unit 2 actually emitted less than that—5250 tons of SO_2 --in 2010. EPA, Clean Air Markets Database, available at http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard. To make the point quite fine, the

We are not aware of any analysis conducted by either EPA Region 5 or MPCA demonstrating that CSAPR would be better than BART in Minnesota. Conversely, a United States Forest Service ("USFS") analysis concluded "[i]t appears that ***CSAPR will not drive any emission reductions in Minnesota***." Letter from James W. Sanders, Forest Supervisor, Superior National Forest, to Doug Aburano, Chief, Control Strategies Section, EPA Region 5 at 3 (Aug. 11, 2011) (emphasis added).

More recently, the USFS has once again informed MPCA that the Forest Service does "not agree that CSAPR is better than source-specific BART in Minnesota." Letter from Timothy A. Dabney, Acting Forest Supervisor, Superior National Forest, to David Thornton, Assistant Commissioner, MPCA at Attachment, p.1 (Jan. 13, 2012). The Forest Service reached this conclusion after calculating that the 2014 CSAPR allocations authorize SO_2 emissions which exceed the SO_2 emissions that would be authorized under source-specific BART, as determined by the Forest Service. Id. at Attachment, Figure 1, p.2. Moreover, the Forest Service analysis indicates that the 2014 CSAPR allocations for SO_2 exceed the SO_2 emissions under MPCA's 2009 BART determination, and the 2014 CSAPR allocations for NO_x is only slightly below MPCAs 2009 BART determination for NO_x. Id.

The Forest Service has conducted the only study to date which quantifies and compares the emissions reductions anticipated under CSAPR, the proposed MPCA BART determinations, presumptive BART, and BART as determined by the FLMs. The study demonstrates that CSAPR will result in higher emissions than would source-specific BART if BART were properly determined. By authorizing higher emissions levels, CSAPR will result in less visibility improvement than would source-specific BART. Simply put, CSAPR is not better than BART for Minnesota. We urge MPCA to revise the proposed rule and propose source-specific BART for each Minnesota EGU subject to BART.

B. Even If It Were Lawful to Substitute CSAPR for BART, Minnesota Must Impose BART On EGUs in Order to Satisfy Its Legal Obligation to Meet the Reasonable Progress Goals.

The CAA requires Minnesota to submit a state implementation plan that contains "such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal" of returning Class I areas to natural visibility conditions. 42 U.S.C. § 7491(b)(2). Furthermore, EPA has interpreted the statute to mean that each state must establish a reasonable progress goal for each Class I area, 40 C.F.R. § 51.308(d)(1), and then, in its long-term strategy, adopt enforceable emissions limitations and other measures "as necessary to achieve the reasonable progress goals." Id. § 51.308(d)(3). If CSAPR alone will not ensure reasonable progress toward attaining natural visibility at Boundary Waters, Voyageurs, and Isle Royale—and it is plain it will not—Minnesota must include in its regional haze SIP additional measures to ensure that reasonable progress is made.

CSAPR allowance will allow Sherco—perhaps the worst polluter in the region for Class I areas-- to ***increase*** its SO_2 pollution emissions.

As explained above, the FLMs have amply demonstrated that CSAPR will not result in as much visibility improvement at Boundary Waters, Voyageurs, and Isle Royale as would BART. Further, MPCA acknowledged that even its 2009 source-specific BART determinations would not allow Minnesota to achieve the uniform rate of progress toward attaining natural visibility. 2009 SIP at 94 ("It appears that ongoing air pollution control programs are not sufficient to meet the URP at Minnesota's Class I areas, or at Isle Royale, to which Minnesota is a significant contributor, through 2018.").[11] Now, Minnesota is proposing to make even less progress toward natural visibility, since the current proposal to rely on CSAPR allocations will result in higher emissions than would source-specific BART.

If Minnesota were to substitute CSAPR for source-specific BART, it would have to compensate for the underregulation of EGUs subject to BART in order to have a haze SIP that meets the requirements of the CAA to make reasonable progress. For example, Minnesota would then have to accept additional restrictions on other sources in order to meet the reasonable progress goals. The most obvious "other source" is taconite. Yet, as detailed below, the SIP requires little to no additional reductions on taconite either. This leaves other, smaller sources to carry the burden; an unlikely outcome given that reductions from smaller sources will have much less impact.[12] Nor does Minnesota appear ready to curtail new sources of pollutants, particularly in Northern Minnesota, calling into question the ability to even maintain the status quo.

Plainly, substituting CSAPR, combined with the underregulation in other areas of the SIP, results in a SIP that will not meet the most basic requirements of the CAA for haze pollution in Class I areas. In order to meet the requirements of the CAA, Minnesota must impose BART on all EGUs and taconite facilities.[13]

[11] In fact, Minnesota unashamedly predicts that it will not meet the goals of returning to natural air quality conditions until 2093, for the Boundary Waters, and 2177, for Voyageurs National Park. 2009 SIP at 107. Where a state will not meet the goal of restoring natural visibility conditions by 2064, the state has an obligation to demonstrate to EPA that it has considered regulating all sources of visibility impairment, 40 C.F.R. § 51.308 (d)(3)(iv)-(v), and that despite application of BART and other controls, it is unreasonable to meet the deadline of clean air in parks and wilderness by 2064. Id. § 51.308(d)(ii) ("[I]f the State establishes a reasonable progress goal that provides for a slower rate of improvement in visibility than the rate that would be needed to attain natural conditions by 2064 . . . the State must demonstrate . . . that the rate of progress for the implementation plan to attain natural conditions by 2064 is not reasonable."). Minnesota not only fails the reasonable progress test, it makes no effort to meet the requirements of demonstrating why it is unreasonable to meet that requirement and that it is perfectly fine to wait for clean air for 81 and 165 years.

[12] Similarly, it is implausible to think that Minnesota will gain all it needs from mobile sources, a source of pollutants that Minnesota and other states have found next to impossible to control and reduce.

[13] And, as set forth in previous comments and comments that will be submitted to EPA, BART in many of those instances is emissions limitations more stringent than those proposed by the MPCA in its 2009 proposal. The 2009 proposal contained glaring inconsistencies and failed to analyze BART under the factors required by the CAA. MPCA should withdraw the Supplement and assist EPA in proposing a FIP that includes compliant BART analyses for these industries and results in real reductions of these harmful pollutants.

IV. MINNESOTA'S TACONITE FACILITIES HAVE A VERY SIGNIFICANT ADVERSE IMPACT ON ALL THREE CLASS I AREAS.

A critical component of Minnesota's haze SIP concerns the taconite facilities in northern Minnesota. Due to the discrete location and size of this industry, it has not been subject to many of the overall air quality improvements and controls that have been imposed on other industrial sectors through the years such as power plants, cement kilns, or refineries. The haze BART requirements mandate cleaning up the problematic emissions of this industry. Minnesota should fully enforce the BART program and other Clean Air Act requirements at taconite plants in a manner that achieves real progress toward protecting public lands and public health for current and future generations.

MPCA's modeling demonstrates the magnitude of the negative impact this industry has on Voyageurs National Park, Isle Royale National Park and the Boundary Waters Wilderness. Northshore Mining, Hibtac, Minntac, and Utac stand out as the cause of many days of significant pollution in all three Class I areas. <u>See</u> MPCA, Results of Best Available Retrofit Technology (BART) Modeling to Determine Sources Subject-to-BART in the State of Minnesota (March 2006); Letter from James W. Sanders, Forest Supervisor, Superior National Forest, to Mary Jean Fenske, Staff Engineer, MPCA at Technical Comments, p.5 (Apr. 10, 2007).

MPCA modeled the number of days, over a three-year period, during which taconite facilities would cause a visibility change greater than .5 deciviews. MPCA's results indicated that, over a three-year period, Minntac reduces visibility by at least .5 deciviews for 530 days in the Boundary Waters Wilderness and 289 days at Voyageurs; Utac reduces visibility by at least .5 deciviews for 442 days on the Boundary Waters and 214 days on Voyageurs; Northshore Mining impairs visibility by at least .5 deciviews for 316 days in the Boundary Waters; and Hibtac reduces visibility by at least .5 deciviews for 247 days in the Boundary Waters and 205 days in Voyageurs.

Due to the largely uncontrolled pollutant emissions from these facilities and their very close proximity to Minnesota's and the region's most treasured natural and wild places, these facilities should be subject to adequate BART determinations and controls. Unfortunately, neither MPCA's 2009 haze SIP submission nor the current SIP Supplement provide for valid BART determinations nor enforceable BART emissions limits that will result in any real reductions in pollution coming from taconite facilities.

V. NEITHER THE SIP SUPPLEMENT NOR THE 2009 HAZE SIP SUBMISSION COMPLIES WITH THE CAA FOR TACONITE IN MINNESOTA.

A. <u>MPCA Has Not Done Proper BART Analysis for the Taconite Facilities and Therefore the Emissions Limits in the Supplement Require No Real Pollutant Reduction and Do Not Satisfy BART Requirements.</u>

The Conservation Organizations refer to and incorporate by reference the FLM comments that are part of the record, including letters dated July 10, 2009 (USFS), September 3, 2009 (NPS), and August 11, 2011 (USFS). As continually set forth in comments to MPCA and EPA, MPCA's BART analysis for taconite has been nonexistent, incomplete, and/or inadequately-supported. The Conservation Organizations have engaged the services of an expert to try and work through the analysis of these issues and will provide that expert analysis in the comments to EPA due February 24, 2012. The Conservation Organizations specifically refer MPCA to those upcoming comments and incorporate them into the record for MPCA's Supplement proposal.

Conservation Organizations will here address specific examples of problems with MPCA's proposals for taconite.

1. MPCA failed to consider the five factors the Clean Air Act requires to be considered in every BART analysis.

The Clean Air Act requires states to consider the five factors listed in the statute when determining BART for any source subject to BART. MPCA has failed to documents that it properly analyzed the five factors required to demonstrate and determine BART for any BART-eligible taconite facility. 42 U.S.C. § 7491(b), (g). Any BART analysis, such as MPCA's analyses for taconite, that does not consider the five statutory factors is per se invalid.

2. MPCA rejected potential control technologies without an adequate explanation.

Overall, due to the failure of MPCA to consider the five statutory factors to determine BART, MPCA has improperly rejected technologies for control of taconite air pollution that should have been included in a full BART analysis. As noted in previous FLM correspondence, SCR, RSCR, and SNCR have all been rejected without proper analysis of those technologies. See, e.g., Letter from James W. Sanders, Forest Supervisor, Superior National Forest, to Mr. David Thornton, Assistant Commissioner, MPCA at Attachment, pp.2-3 (Mar. 5, 2008) (recommending that the BART analysis consider installation of a recirculating scrubber for United Taconite, and noting that BART may also include improvements to the existing particulate scrubbers); Letter from James W. Sanders, Forest Supervisor, Superior National Forest, to Mary Jean Fenske, Staff Engineer, MPCA at Attachment (April 10, 2007) (concluding that the taconite BART analyses should address the technical and economic feasibility of low temperature oxidation, SCR, optimizing existing scrubbers, and fuel switching).

Additionally, MPCA improperly used Cue Cost instead of EPA's cost manual, and MPCA failed to consider the cumulative number of Class I areas that are affected by a source and the improvements to all of those Class I areas as a result of appropriate BART controls at a source. Even technologies such as LoTox that are less-effective in reducing pollutants, but are in use at some of the facilities, have been rejected for inadequately-documented reasons at other facilities.[14] The 2009 haze SIP is so poor that the National Park Service points out MPCA's plan

[14] Another example of MPCA's failure to acknowledge the need for BART at taconite facilities concerns Northshore's status as an EGU and an exchange between MPCA and the FLMs where MPCA appeared to reject strict BART analysis and controls on Northshore Mining as an EGU because it was a "small" source in comparison to EGUs. This is an invalid and improper consideration, particularly in light of Northshore's proximity to the Class I areas of concern and MPCA's own modeling showing the significant adverse impact Northshore has on area air quality.

may well increase impacts from sources like Northshore and Utac to the Class I areas—a kind of "anti-reasonable progress" or "unreasonable progress" result. In sum, for the most part, the 2009 SIP provided only for "good combustion controls" and in a few cases, "fuel blending" as BART for the taconite facilities.

3. MPCA calculated emissions limits at a 99% confidence interval, on a 30-day rolling average, an approach that is unsupported in the law and that assures no pollution reduction.

For even those minimal BART requirements of good combustion and fuel blending, MPCA claimed it couldn't actually set pollution emissions limits for the taconite operations—a requirement of BART—because of the lack of data. MPCA indicated it would therefore require installation of Continuous Emissions Monitors ("CEMs") at all taconite facilities so that data could be gathered for setting emission limits. Unfortunately, MPCA never did require CEMs in all the taconite facilities. In particular, it simply immediately capitulated when Northshore and UTAC refused, despite repeated requests and protests from the FLMs asking that MPCA remain firm on the CEMs requirement as a critical component of BART decision-making.

Because MPCA failed to follow-through on its earlier claim that it would require CEMs in order to determine BART limits for taconite, MPCA used inferior data to set inadequate emissions limits in the Supplement. MPCA required the taconite facilities to collect only 150 hours of emissions data for MPCA to set pollution emissions limits. MPCA's requirements for the data collected were that the data "be collected under the range of [furnace] operating parameters that influence NO_x emissions" and that the range of each operating parameter reflect "the furnace's operating range for the parameters in the 12 months previous to testing."[15] Although MPCA required the data to reflect the range of operations, it does not appear that MPCA required data to be submitted in the taconite pellet production rate and/or the fuel firing rate during the periods tested based on a review of the NO_x testing data presented in Appendix A of the Regional Haze Supplement. Without that data, MPCA could not verify that the companies had truly collected the required range of data.

In setting NO_x BART limits for each unit, MPCA then determined the 99^{th} percentile Upper Confidence Level ("UPL") emission rate based on this 150 hours of emissions data. In plain terms, this means that MPCA set BART emission limits for each unit at levels such that the unit's NOx emissions are *currently* lower than the emissions limits 99 percent of the time[16] and sets that 99 percent level as the BART emissions "limit." Then, in case setting a limit that the facility currently meets 99 percent of the time is not lenient enough, MPCA calculates the limit based on a 30-day rolling average. This is effectively no reduction for these facilities from current haze-causing emissions. In fact, MPCA shows that for some test results on taconite facilities, the facilities emitted on average much lower than the emissions "limits" set forth in the Supplement. This effectively means that for those facilities, the BART "limit" will allow an increase in pollution emissions.

[15] See SIP Supplement, Appendix 1, Section 2.4 of each memo establishing NO_x BART limits.

[16] Again, this could have been during 150 of the dirtiest hours of a facility's operations.

4. MPCA has presented no evidence that the emissions limits are based on operating practices that reflect the use of BART.

Even if we were to accept that "good combustion practices" might be BART for NO_x (which they are not), there is no evidence that the limits set will actually require use of the "good combustion practices" that MPCA claims are BART for the taconite industry. As noted above, there is no information or assurance provided to support the Supplement conclusions that the 150 hours provided by the taconite facilities are actually from when "good combustion practices" were being utilized at each furnace. If the only data MPCA has is the straight 150 hours of emissions data, then MPCA has no evidence that the data is representative of good combustion practices and therefore there is no evidence to support MPCA setting BART emissions limits for good combustion practices based on this data. Further, 150 hours of data, which does not even reflect one week's worth of operation, much less one 30-day period, is simply not long enough of a period to know whether it reflects good combustion practices.

Similarly, for the units where MPCA decided that fuel blending would be BART (Keetac, Minntac, Utac), MPCA provides no evidence that the 150 hours of data upon which it bases the emissions limits reflect any fuel blending done specifically to lower NO_x emissions. There is no way to tell whether the emissions limits reflect a valid connection to fuel blending that is to be used as BART.

5. For the facilities that are not required to install continuous emission monitors, the emissions limits are not enforceable and therefore are not approvable under the Clean Air Act.

Finally, in the Supplement, MPCA appears ready to continue the pattern of allowing a number of the taconite facilities to evade the obligation to install CEMs. And yet, MPCA states that it will assess compliance with the weak BART limits it is imposing on a 30-day rolling average. It is impossible for MPCA, without CEMs, to acquire data to make a 30-day rolling average assessment. No CEMs means that MPCA cannot assess compliance with emissions limits it is imposing, meaning in turn, the emissions limits for the facilities without CEMs are unenforceable. If a BART emissions limit is not enforceable, the Supplement cannot be approved under the CAA.

Moreover, MPCA has not provided an adequate explanation for requiring some taconite facilities to install CEMs, but relieving other facilities of this obligation. Nor has the agency explained how its decision not to require CEMs for some facilities is consistent with EPA's regulations, which require that BART be "based on an analysis of the best system of continuous emission control technology available." 40 C.F.R. § 51.308(e)(1)(ii)(A).

In sum, MPCA's current proposal for taconite (1) sets emissions limits that result in no reductions of haze pollution from taconite facilities (and maybe even allow increases in pollution); (2) is based upon inadequate data; (3) does not allow the Agency to actually determine whether BART practices correspond to the facility is supposed to employ them; and (4) will not require monitoring, for all facilities, that is adequate for it to enforce the "limits" that allow current levels of pollution to continue. MPCA's Supplement and 2009 BART determinations for the taconite industry fail to follow the legal requirements of the CAA, have little to no factual underpinning in the record, and will result in little to no reductions in haze-causing air pollutants in our national parks and Boundary Water Wilderness. The Supplement should not be adopted.

B. MPCA Must Require Significant Reductions in Haze Pollutants From Taconite if it is Going to Apply CSAPR Allocations for EGUs as BART.

As noted above, application of the CSAPR allocations for EGUs means that Minnesota must obtain pollutant reductions elsewhere in order to demonstrate reasonable progress on haze in Class I areas as is required by the CAA. The most obvious and effective choice for those reductions from non-power plant facilities is from the taconite industry which so plainly affects the Class I areas. Yet MPCA does not require reductions from the taconite industry. By refusing to require actual BART-level emissions reductions at either of the two industries that adversely affect the Class I areas, MPCA cannot demonstrate that the 2009 haze SIP, modified by the Supplement, results in the reasonable progress required by law. As such, Minnesota's haze SIP cannot be approved.

CONCLUSION

The Supplement proposes to substitute CSAPR allocations for source-specific BART limits. This is unlawful for any source subject to BART because CSAPR currently is stayed and also because neither Minnesota nor EPA has demonstrated that CSAPR is better than BART for Minnesota or the Class I areas impacted by Minnesota facilities. Furthermore, source-specific BART must be imposed for Sherco, due to its certification as a RAVI source.

The proposed BART limits for taconite facilities suffer from numerous procedural and substantive defects. MPCA failed to consider the five statutory factors in determining BART; MPCA avoided full analyses of suggested pollution control technologies; the agency based the numeric emission limits on a data set that is arbitrary and that does not necessarily reflect the use of technologies identified as BART; and, lastly, the agency has not required all taconite facilities to install continuous emission monitoring devices that would permit adequate monitoring and enforcement of the BART limits.

The residents of Minnesota, and visitors from around the country who come to its Class I areas, have waited decades for the state to come up with a plan for reducing haze pollution in Boundary Waters and Voyageurs. The regional haze plan is too important to finalize without adequate provisions. We urge the MPCA to revise its SIP submittal to propose source-specific BART limits for EGUs and taconite facilities that fully comply with the Clean Air Act.

Sincerely,

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cc: EPA, Region 5
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SIERRA CLUB
FOUNDED 1892

February 3, 2012

Via Electronic and U.S. Mail

Catherine Neuschler
Minnesota Pollution Control Agency
Environmental Analysis and Outcomes Division
520 Lafayette Road North
St. Paul, MN 55155-4194

Re: Minnesota Regional Haze Draft State Implementation Plan Supplement

The Sierra Club respectfully submits these comments on Minnesota Pollution Control Agency's ("MPCA") draft State Implementation Plan supplement ("SIP Supplement"). The Sierra Club's mission is to explore, enjoy, and protect the wild places of the earth and educate and enlist humanity to protect and restore the quality of the natural and human environment. A primary focus of the Sierra Club's efforts to fulfill this mission is to advocate for enforcement of air quality regulations. The Sierra Club's North Star Chapter's 15,000 members have direct and significant interests in the natural and human environment of the areas impacted by the SIP Supplement.

Together the SIP Supplement and the 2009 SIP fail to contain the legally required measures that will ensure reasonable progress toward eliminating visibility impairment and improving air quality in the Boundary Waters Canoe Area Wilderness and Voyageurs and Isle Royale National Parks. Specifically, the SIP Supplement's proposal to substitute the Cross State Air Pollution Rule ("CSAPR") for best available retrofit technology ("BART") for electric generating units ("EGUs") fails to meet the requirements of the Clean Air Act ("CAA").

I. Introduction

The CAA calls for protecting air quality and visibility in 156 nationally significant natural areas ("Class I areas"), in order to eventually attain pristine natural conditions unaffected by man-made pollutants. Recognized for their historic, scientific, and recreational value, the Boundary Waters Canoe Area Wilderness and Voyageurs National Park in Minnesota and Isle Royale National Park in Lake Superior are Class I areas subject to the CAA protection. Currently, man-made pollutants from sources in Minnesota, including five coal-burning EGUs, adversely impact air quality in all three areas. Under the CAA, Minnesota is required to develop a SIP that outlines specific and enforceable BART emissions limits for these EGUs. But

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Minnesota's 2009 SIP failed make adequate BART determinations and the SIP Supplement proposes to skip BART altogether and rely on CSAPR to improve air quality in the Class I areas. As outlined below, MPCA's proposal fails to meet the requirements of the CAA and therefore MPCA should withdraw and revise the SIP Supplement to include BART emissions limits for all five EGUs.

II. The SIP Supplement Violates the Clean Air Act

The Regional Haze Rule applies to EGUs built between 1962 and 1977. There are five such EGUs in Minnesota: Minnesota Power, Taconite Harbor; Minnesota Power, Boswell Energy Center; North Shore Mining, Silver Bay; Rochester Public Utilities, Silver Lake; and Xcel Energy's Sherburne County (Sherco). MPCA's 2009 SIP made BART determinations for all five EGUs. Minnesota Pollution Control Agency, Regional Haze State Implementation Plan at 68, 70-71, Appendix 9.4 (2009). The SIP Supplement erases these BART determinations and proposes that the five EGUs "simply need to comply with their obligations under the transport rule in order to meet the BART obligations." Minnesota Pollution Control Agency, Regional Haze State Implementation Plan Supplement at 3 (Dec. 2011).

This substitution of CSAPR for BART is unwarranted and improper under the CAA. First, the DC Circuit Court has stayed CSAPR and thus CSAPR cannot be relied upon as an enforceable requirement in place of BART in the SIP. Second, EGUs that have been certified as directly impacting a Class I area must have BART emissions limits and cannot be assigned alternative means of compliance. Finally, to the extent CSAPR—when/if the rule is implemented—could apply to these EGUs, MPCA has not provided analysis illustrating that CSAPR will result in greater visibility improvements than BART emissions limits. In fact, as detailed below, the only substantive analysis in the record proves that CSAPR will not produce visibility improvements approaching those achieved by BART.

A. The SIP Supplement cannot substitute CSAPR for BART while the D.C. Circuit continues the stay of CSAPR.

MPCA proposes substituting CSAPR for BART based upon the EPA's recent proposal that, once finalized, CSAPR will "achieve greater reasonable progress towards a national goal of achieving natural visibility conditions in mandatory Class I federal areas than source-specific BART," and therefore states may substitute CSAPR for BART. 76 Fed. Reg. 82,219, 82,221 (Dec. 30, 2011). The proposed rule allowing substitution of CSAPR has not itself been finalized and, more significantly, the DC Circuit Court of Appeals stayed CSAPR pending the result of litigation over the rule. *EME Homer City Generation, L.P. v. EPA*, No. 11-1302 (D.C. Cir. stay issued Dec. 30, 2011). With CSAPR stayed, the rule has no legal effect and is not a binding legal requirement that can be relied upon in a SIP.

The CAA requires each state to include in its SIP "a requirement" that certain major stationary sources "shall procure, install, and operate . . . the best available retrofit technology." 42 U.S.C. § 7491(b)(2)(A); 40 C.F.R. § 51.308(e). Any alternative means for controlling emissions that is substituted for BART must satisfy the statutory criteria by being a "requirement" for each source to "procure, install, and operate" technologies equivalent to

BART. With CSAPR stayed, no sources are subject to CSAPR and the rule imposes no requirements on any source. Thus, CSAPR is not a "requirement" and MPCA cannot substitute CSAPR for BART in its SIP.

Further, even if CSAPR was a requirement equivalent to BART, the requirement would need to be included in the SIP, 42 U.S.C. § 7491(b)(2), and the elements of a SIP must be legally enforceable. *Id*. § 7410(a)(2)(A). As EPA has reminded Minnesota, "under section 110 of the Clean Air Act, the U.S. Environmental Protection Agency cannot approve Minnesota's plan as meeting requirements for BART without these requirements first being established in an enforceable form." Letter from Doug Aburano, Chief, Control Strategies Section, EPA Region to 5, to John Seltz, Chief, Air Assessment Section, MPCA at 1 (June 6, 2011). The SIP Supplement fails to include CSAPR as an enforceable provision of the SIP and, in fact, cannot do so while the DC Circuit stay remains in place.

B. EPA regulations do not authorize the substitution of CSAPR for BART for a particular source if a Federal Land Manager has certified that visibility impairment is reasonably attributable to that source.

Once a Federal Land Manager ("FLM") certifies that a facility causes reasonably attributable visibility impairment ("RAVI") to a Class I area, BART emissions limits must be determined and those limits must not be replaced by an alternative. 40 C.F.R. § 51.302(c). In the previous "CAIR is better than BART" determination, EPA acknowledged that states participating in CAIR retain the obligation to impose BART on sources certified as RAVI. 70 Fed. Reg. 39104, 39143 (July 6, 2005) *id.* at 39,137 ("[T]he possibility of BART for reasonably attributable visibility protects against any potential 'hot spots.'"); *see also* 40 C.F.R. § 51.308(e)(4) ("A State that chooses to participate in such trading programs may also adopt provisions, consistent with such trading programs, for a geographic enhancement to the program to address the requirement under §51.302(c) related to BART for reasonably attributable impairment from the pollutants covered by the CAIR cap-and-trade programs.").

At least one of the five BART eligible EGUs in Minnesota, Xcel Energy's Sherco facility, has been certified as RAVI and thus must be subject to BART. On October 21, 2009, the United States Department of the Interior certified that "a portion of the existing visibility impairment in Voyageurs and Isle Royale [National Parks] is reasonably attributable to pollution emissions from [Xcel Energy's] Sherco Units 1 and 2." Letter from Thomas L. Strickland, Assistant Secretary for Fish and Wildlife and Parks, U.S. Department of the Interior, to Mr. Bharat Mathur, Acting Regional Administrator, EPA Region 5 at 2 (Oct. 21, 2009). Because of this RAVI certification, the Regional Haze SIP for Minnesota must include BART emissions limits for the Xcel Energy Sherco facility. *See* 40 C.F.R. § 51.302(c)(2)(iii), (c)(4).

C. Minnesota failed to analyze whether CSAPR will achieve more visibility improvement at Minnesota's Class I Areas than source-specific BART and analysis by the FLMs shows it will not.

For at least one Minnesota EGU, the CSAPR allocations far exceed the emissions that would be allowed under BART. The Xcel Energy Sherco facility in Becker, Minnesota is the largest single source of pollutants damaging these Class I areas. This is shown by MPCA's own modeling performed as part of the development of its initial haze SIP as well as the RAVI certification by the Department of Interior. *See* MPCA, Results of Best Available Retrofit Technology (BART) Modeling to Determine Sources Subject-to-BART in the State of Minnesota at 19 (2006). Assuming CSAPR goes into effect, it would allow Sherco unit 2 to emit 5789 tons of sulfur dioxide ("SO_2") for 2012 and 2014.[1] Sherco unit 2 emitted less than that—5250 tons of SO_2—in 2010.[2] The CSAPR allowance would thus allow Sherco—perhaps the worst polluter in the region for Class I areas—to ***increase*** its SO_2 pollution emissions. Instead of making reasonable progress toward eliminating haze, as the Clean Air Act requires, Minnesota is proposing to make progress toward allowing more haze, by authorizing Sherco to increase emissions. Plainly, for Sherco unit 2, CSAPR is not better than BART.

Thus far, the Forest Service has conducted the only study that quantifies and compares the emissions reductions anticipated under CSAPR, the 2009 SIP's proposed BART determinations, presumptive BART, and BART as determined by the FLMs. The Forest Service informed MPCA that USFS does "not agree that CSAPR is better than source-specific BART in Minnesota." Letter from Timothy A. Dabney, Acting Forest Supervisor, Superior National Forest, to David Thornton, Assistant Commissioner, MPCA at Attachment, p.1 (Jan. 13, 2012). The Forest Service reached this conclusion after calculating that the 2014 CSAPR allocations authorize SO_2 emissions which exceed the SO_2 emissions that would be authorized under source-specific BART, as determined by the Forest Service. *Id.* at Attachment, Figure 1, p.2. Moreover, the Forest Service analysis indicates that the 2014 CSAPR allocations for SO_2 exceed the SO_2 emissions under MPCA's 2009 BART determination, and the 2014 CSAPR allocations for NO_x is only slightly below MPCAs 2009 BART determination for NO_x. *Id.*

Simply put, the only study on the record concludes that CSAPR will result in higher emissions than would source-specific BART if BART were properly determined. By authorizing higher emissions levels, CSAPR will result in less visibility improvement than would source-specific BART. In order to meet the requirements of the CAA, Minnesota must impose BART on all five EGUs.

III. Conclusion

The SIP Supplement proposes to substitute CSAPR allocations for source-specific BART limits. This is unlawful under the CAA because a.) CSAPR is subject to a stay and thus is unenforceable; b.) RAVI-certified facilities, such as the SherCo facility, are not eligible for alternatives to BART emissions limits; and c.) CSAPR, even if the DC Circuit lifts the stay, will not result in visibility improvements equivalent to those attained by BART limits.

The Sierra Club urges the MPCA to revise its SIP submittal to propose source-specific BART emissions limits for EGUs that fully comply with the Clean Air Act.

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[1] EPA, Final CSAPR Unit Level Allocations under the FIP at 44, *available at* http://www.epa.gov/crossstaterule/pdfs/UnitLevelAlloc.pdf.

[2] EPA, Clean Air Markets Database, *available at* http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard.

Sincerely,

Robb Kapla | *Michelle Rosier*

Robb Kapla, Staff Attorney	Michelle Rosier
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cc: EPA, Region 5

Xcel Energy®
RESPONSIBLE BY NATURE™

414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

February 3, 2012

Submitted via Electronic Mail

Catherine Neuschler
Environmental Analysis and Outcomes Division
Minnesota Pollution Control Agency
520 Lafayette Road North
Saint, Paul, MN 55155-4194

Re: MPCA's Supplemental Notice on BART Determination for Units 1 and 2 at the Sherburne County Generating Station, Minnesota Regional Haze State Implementation Plan

Dear Ms. Neuschler:

Northern States Power Company-Minnesota d/b/a Xcel Energy ("NSPM") is providing these comments on the Minnesota Pollution Control Agency's ("MPCA") December 2011 draft "Regional Haze State Implementation Plan Supplement" ("SIP Supplement") to address best available retrofit technology ("BART") requirements for electric generating units ("EGUs"), which was submitted in advance of MPCA final action to U.S. EPA Region 5 on January 5, 2012. The MPCA proposed in the SIP Supplement that "[r]ather than complying with the specific BART determinations made in the initial SIP submittal, Minnesota's subject-to-BART power plants simply need to comply with their obligations under the Transport Rule in order to meet the BART obligations." SIP Supplement, p. 2.

NSPM generally supports the SIP Supplement as an appropriate approach to streamline air quality regulation in the State of Minnesota. We concur with MPCA that, if implemented, the Transport Rule (also known as the Cross-State Air Pollution Rule, or "CSAPR") will achieve greater environmental improvement than BART. In fact, through partnership with MPCA, the Minnesota Public Utilities Commission, and community, advocacy and business representatives on state-led initiatives such as the Metropolitan Emission Reduction Program ("MERP"), NSPM has achieved far greater emission reductions across its system than any visibility program could require. Our customers are paying for these reductions, and they are key to environmental progress in Minnesota. They should be recognized in CSAPR, Regional Haze, and other programs.

Based on the emission reductions already achieved on NSPM's units, including emission controls installed on Units 1 and 2 at the Sherburne County Generating Station ("Sherco") and the broad reductions that will be achieved if CSAPR is implemented in Minnesota, we think it makes sense to conclude that compliance with CSAPR is superior to unit specific requirements under Section 169A. Nonetheless, because of the uncertain status of EPA's rule makings and challenges to the CSAPR, we believe it is premature to rely solely on CSAPR for meeting BART requirements in Minnesota. First, the SIP Supplement is based on EPA's *proposal* that CSAPR can satisfy BART. EPA published its proposed determination on December 30, 2011. *Regional Haze: Revisions to Provisions Governing Alternatives to Source-Specific Best Available Retrofit Technology (BART) Determinations, Limited SIP Disapprovals, and Federal Implementation Plan*, 76 Fed. Reg. 82219 (Dec. 30, 2011) (the "BART Alternative Compliance determination"). The proposal has not yet been finalized and therefore should not serve as the sole basis for the Minnesota Regional Haze SIP's BART determinations for EGUs.

Second, it is unclear when or even if EPA will finalize its BART Alternative Compliance determination. One day after EPA issued its proposal, the U.S. Court of Appeals for the District of Columbia Circuit stayed CSAPR pending resolution of legal challenges to the rule. *EME Homer City Generation, L.P., v. Environmental Protection Agency*, Case No. 11-1302. Therefore, MPCA's SIP Supplement is based on a rule that is not currently legally in effect and may not go into effect if the court challenges are successful. Third, even if CSAPR is upheld and EPA finalizes its BART Alternative Compliance determination, that action would itself be subject to legal challenges. If EPA's determination were ultimately vacated, that would simultaneously vacate MPCA's Regional Haze SIP with respect to BART for EGUs.

All of these contingencies threaten the viability of the SIP Supplement. MPCA could eliminate the risks associated with one or more of these rules not proceeding by retaining in its Regional Haze SIP both its source-specific BART determinations and the BART Alternative Compliance option. If the latter could not go forward for any reason, MPCA's Regional Haze SIP would still contain the source-specific BART determinations that sources such as Sherco Units 1 and 2 could use to satisfy their BART obligations without requiring MPCA to undertake further SIP revisions.

Fortunately, MPCA already has taken measures to protect itself against the risk that one or more of these EPA rules is struck down or withdrawn. MPCA's December 2009 BART determination for Units 1 and 2 at Sherco fully satisfies all applicable BART requirements, as mandated by Congress under Section 169A of the Clean Air Act, 42 U.S.C. § 7491, and as promulgated by EPA in its BART Guidelines, and should be retained as the BART determination for these units. *See* MPCA, *Regional Haze State Implementation Plan, December 2009* ("MPCA BART Analysis"). Accordingly, the MPCA should clarify to EPA that the SIP Supplement is intended as a supplement to, and not a substitute for, its 2009 SIP submittal and that the MPCA intends to retain the source-specific BART determination for Sherco Units 1 and 2 in the Minnesota Regional Haze SIP. If the uncertainties surrounding CSAPR are resolved and CSAPR is implemented in Minnesota, it would have no impact on the SIP. Yet, if CSAPR is vacated or remanded, or if EPA fails to finalize the BART Alternative Compliance option, MPCA will have submitted a complete and approvable Regional Haze SIP.

The MPCA BART Analysis is the product of countless hours of analysis and years of public proceedings to determine how best to control Sherco Units 1 and 2 to improve visibility. Consequently, the MPCA should not abandon its source-specific BART determination for Sherco Units 1 and 2, which already has been shown will result in measurable improvements in visibility in Minnesota's Class I areas, to instead rely solely on CSAPR to satisfy BART for EGUs.

NSPM has installed the pollution controls for nitrogen oxides indicated by the MPCA's BART determination on Sherco Units 1 and 2. Furthermore, NSPM is moving forward with the upgrades to its scrubbers to reduce sulfur dioxide emissions, the project indicated by the MPCA's BART determination. MPCA further determined that the particulate emission controls on Sherco Units 1 and 2 already meet BART requirements. These emission reductions achieve substantial improvements in visibility, as documented in the MPCA's December 2009 SIP.

The attachment to this letter provides further support for the MPCA's BART determination for Sherco Units 1 and 2, including cost information updated from when NSPM last provided information in the regional haze proceeding in December 2009. This analysis confirms that the MPCA's 2009 decision was appropriate and that its BART determination is approvable under EPA's regulations and guidelines.

Please do not hesitate to contact if me if you would like to discuss any of these matters in greater detail. I can be reached at 612-330-7879 or at richard.a.rosvold@xcelenergy.com.

Sincerely,

Richard A. Rosvold

Richard A. Rosvold
Air Quality Manager

Attachment and Associated Exhibits

cc: Environmental Policy & Services Record Center

ATTACHMENT A

MPCA'S BART DETERMINATION FOR SHERCO UNITS 1 AND 2 FULLY IMPLEMENTS THE BART REQUIREMENT UNDER THE CLEAN AIR ACT AND THE REGIONAL HAZE RULE

This attachment is in response to the preliminary review comments that the U.S. Environmental Protection Agency ("EPA") provided to the Minnesota Pollution Control Agency ("MPCA") on MPCA's analysis of how Units 1 and 2 at the Sherburne County Generating Station ("Sherco") should comply with the Clean Air Act's Best Available Retrofit Technology ("BART") requirements for NOx (the "Sherco NOx Proposal") to address regional haze. In its comments, EPA states that the NOx BART requirements for Sherco should include the installation of selective catalytic reduction ("SCR") at both Sherco Units 1 and 2, a technology that MPCA analyzed and eliminated as BART.

Northern States Power Company-Minnesota d/b/a Xcel Energy ("NSPM") believes the Sherco NOx Proposal fully satisfies all applicable BART requirements, as mandated by Congress under Section 169A of the Clean Air Act ("CAA"), 42 U.S.C. § 7491, and as promulgated by EPA in its BART Guidelines. Accordingly, NSPM supports MPCA's BART determination and encourages MPCA to continue to work with EPA to address their comments regarding the installation of SCR at Sherco Units 1 and 2. To that end, NSPM has included supplemental cost information in this Attachment and its Exhibits that confirm the appropriateness of MPCA's BART determination. NSPM has already substantially completed implementation of the Sherco NOx Proposal as approved by MPCA in its Regional Haze State Implementation Plan ("Regional Haze SIP").

The MPCA submitted its Regional Haze SIP to EPA in December 2009. The proposed Regional Haze SIP includes determinations for BART pursuant to Section 169A of the CAA for applicable stationary sources in Minnesota, including Sherco Units 1 and 2. Based on the five factors identified in Section 169A, MPCA determined that BART for Sherco Units 1 and 2 is a 30-day rolling average NOx limit of 0.15 lbs/MMBtu, which could be achieved with the addition of new low NOx burners, overfire air, and computerized combustion controls on Unit 1 and performance improvements to the existing low NOx burners and overfire air systems with new computerized combustion controls on Unit 2. For SO_2, MPCA determined that BART is a 30-day rolling average limit of 0.12 lbs/MMBtu, which could be met by retrofitting the existing wet scrubbers with sparger tubes and also using lime injection, if necessary. MPCA concluded that the existing controls represent BART for PM_{10}, with the addition of a permit limit of 0.09 lbs/MMBtu for Units 1 and 2, which is a tightening of the existing limit in that it would limit PM_{10} instead of filterable particulate matter only.

EPA provided comments on MPCA's Regional Haze SIP in a letter dated June 6, 2011.[1] Although EPA did not take issue with MPCA's determination of BART for SO_2 and PM_{10} at Sherco Units 1 and 2, the EPA stated that SCR should be included as BART for Sherco Units 1 and 2 to reduce NOx emissions. In reaching this conclusion, EPA relied on information from its

[1] Letter from Doug Aburano, Chief, Control Strategies Section, EPA Region 5, to John Seltz, Chief, Air Assessment Section, MPCA (June 6, 2011).

Control Cost Manual and an evaluation of emission limits of 0.05 lb/MMBtu and 0.08 lb/MMBtu. The Agency also claimed that the visibility benefit analysis for the controls should include the benefits at the most impacted Class I area as well as the cumulative benefit across all impacted areas.

EPA's comments are not in conformance with the CAA or its own BART Guidelines. MPCA has full authority under the CAA to determine what controls constitute BART for the sources in Minnesota and has done so with respect to the NOx BART requirements for Sherco Units 1 and 2 after a thorough consideration of the factors mandated by Congress. If MPCA were to revise its BART determination for Sherco Units 1 and 2 as suggested by EPA, NSPM would be required to make investments in NOx controls that go well beyond the levels both the CAA and EPA's own Guidelines require for BART. As such, MPCA should implement the Sherco NOx BART Proposal as approved by MPCA in its Regional Haze SIP.

In this Attachment, NSPM discusses the requirements of the CAA and the Regional Haze Rule, and how the MPCA's BART determination for Sherco Units 1 and 2 adopting the Sherco NOx Proposal fully implements the requirements of the regional haze program. In particular, NSPM discusses in detail the cost analysis EPA offered in its preliminary comments, and demonstrates why the NSPM cost analysis, which MPCA reviewed and included in Minnesota's Regional Haze SIP, is more appropriate and more closely reflects the cost of various levels of NOx control for Sherco Units 1 and 2. Finally, this Attachment updates comments submitted by NSPM on December 21, 2009 (included as Exhibit 1), which demonstrated that SCR installation would cost dramatically more than the cost reflected in either the NSPM, MPCA or EPA cost analyses.

I. ANALYSIS OF SHERCO NOx PROPOSAL

Under the CAA, Congress delegated to the states the responsibility for determining the appropriate BART for "BART-eligible" sources such as Sherco Units 1 and 2, with the requirement that states do so only after taking into account five essential source-specific factors:

1. The costs of compliance;
2. The energy and non-air quality environmental impacts of compliance;
3. Any existing pollution control technology in use at the source;
4. The remaining useful life of the source; and
5. The degree of improvement in visibility that may reasonably be anticipated to result from the use of such technology.

42 U.S.C. § 7491(g)(2); *see also* 40 C.F.R. § 51.308(e)(1)(ii)(B). None of these factors has precedence over the others – "All five § 169A(g)(2) factors inform the states' inquiries into what BART controls are appropriate for particular sources. Although no weights were assigned, the factors were meant to be considered together by the states." *American Corn Growers Ass'n v. E.P.A.*, 291 F.3d 1, 6 (D.C. Cir. 2002).

That the states and not EPA have the authority to determine BART for individual sources is clearly established in the CAA.[2] *See* 42 U.S.C. § 7491(B)(2)(A) (requiring installation of BART, "as determined by the state . . ."). Congress did, however, order EPA to develop guidelines to provide technical assistance to the states in applying the five statutory factors to establish BART limits. EPA's latest guidelines were published in 2005. *See Regional Haze Regulations and Guidelines for Best Available Retrofit Technology (BART) Determinations*, 70 Fed. Reg. 39,104 (July 6, 2005) (the "Guidelines").

The Guidelines identify a six-step process for determining BART control technology: (1) identify the available retrofit control options; (2) identify any pollution control equipment in use at the source (which affects the availability of options and their impacts); (3) calculate the costs of compliance with control options; (4) incorporate into the review the remaining useful life of the facility; (5) analyze the energy and non-air quality environmental impacts of control options; and (6) calculate the degree of impact on visibility. 70 Fed. Reg. 39,163; 40 C.F.R. Part 51, App. Y. Importantly, the Guidelines must be used to determine BART for power plants that have the capacity to generate 750 megawatts ("MW") or more. 40 C.F.R. Sec. 51.302 (c)(4)(iii). This includes Sherco Units 1 and 2.

MPCA appropriately considered all five statutory factors and followed the Guidelines in determining the NOx BART limits for Sherco Units 1 and 2. EPA's comments are not persuasive and do not provide a basis for rejecting MPCA's more thorough analysis.

A. Cost of Compliance

EPA's comments focus on the average costs of controls in determining what constitutes BART for Sherco Units 1 and 2. However, cost-effectiveness is only one of the five factors MPCA must consider and it does not take precedence over any of the other factors. *See American Corn Growers Ass'n*, 291 F.3d at 6. MPCA is not obligated to re-evaluate its holistic evaluation of the five factors simply because EPA disputes some of MPCA's cost numbers. MPCA thoroughly analyzed both the average and incremental cost of control devices, as indicated in the Guidelines,[3] and evaluated controls based on the presumptive limits and costs in the Guidelines. 70 Fed. Reg. 39,127. EPA's analysis fails to do either.

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[2] In addition to the state-operated BART program, the states are required to demonstrate to EPA that their regional haze programs are making "reasonable progress" towards meeting visibility goals. 42 U.S.C. § 7491(b)(2). As part of this requirement, the states must include in their SIP a BART determination for each existing source subject to BART. 42 U.S.C. § 7491(b)(2); 40 C.F.R. § 51.308. Although Congress did not grant EPA authority to approve the states' BART determinations, EPA does review and approve their SIPs. Thus, EPA retains a role in reviewing a state's overall regional haze SIP, although that authority does not allow EPA to substitute its own judgment for the state in determining what constitutes BART.

[3] The average cost is the total annual cost of the control equipment divided by the resulting annual emissions reductions. 70 Fed. Reg. 39,127. The incremental cost is the difference in the cost of two control devices divided by the difference in the reduced emissions due to the devices. Even though each device might separately be considered reasonable, the more expensive device may be inappropriate due to a high incremental cost. 70 Fed. Reg. 39,127.

To assist states in performing cost analyses, EPA provided presumptive cost-effectiveness thresholds in its Guidelines for reducing NOx from large, coal-fired electric generating units that do not already have post-combustion controls. The Guidelines conclude that technologies achieving an emissions rate of 0.15 lbs/MMBtu are generally highly cost-effective for tangentially-fired subbituminous coal-fired units, such as those at Sherco Units 1 and 2. According to the Guidelines, such technologies typically cost less than $1,500 per ton of NOx removed and result in a significant degree of visibility improvement. 70 Fed. Reg. 39,135. NSPM's analysis of the cost of the Sherco NOx Proposal, which MPCA reviewed and adopted in its Regional Haze SIP, found that an emission rate of 0.15 lbs/MMBtu could be met with technology costing $430/ton at Unit 1 and $360/ton at Unit 2. The Sherco NOx Proposal consists of adding combustion optimization controls ("CC") on both units, and installing low NOx burners ("LNB") and separated overfire air ("SOFA") on Unit 1.

Consistent with EPA's Guidelines, MPCA also considered both the average costs and the incremental costs of other NOx control devices. 70 Fed. Reg. 39,127. The primary technologies considered, SCR and Selective Non-Catalytic Reduction ("SNCR"), had incremental costs of anywhere between $7,600 and $15,500 per ton.[4] MPCA BART Analysis at 902. The average cost effectiveness for SCR ranged from $1,700 to $4,600. *Id.* Having fully considered the matter, the MPCA was well within the discretion afforded to it by Congress when it concluded that such NOx control technologies were simply too expensive to constitute BART given the marginal improvement in emission reduction and visibility they would provide. *Id.* at 8, 906. It also is worth noting that EPA's proposed BART Alternative Compliance proposal suggests that participation in CSAPR would satisfy a source's BART obligations; however, CSAPR establishes a NOx emission reduction cost-effectiveness threshold at $500 per ton. It is difficult to square that position with a suggestion that BART should require reductions costing many thousands of dollars per ton.

1. Use of the CUECost Workbook is more reasonable than use of the Control Cost Manual.

In calculating the costs of NOx controls for Sherco, MPCA required the use of EPA's CUECost Workbook, which is dedicated to calculating the cost of installing pollution control equipment at coal-fired power plants. Use of the CUECost Workbook is consistent with MPCA's March 2006 BART guidance, which specifically requests that parties use EPA's CUECost Workbook to perform cost calculations for electric generating units of greater than 100 MW.

In contrast, according to its comments, EPA developed its NOx control costs for Sherco based upon the Control Cost Manual; an older, generic publication that was not developed for electric generating units and that does not take site-specific factors into account. EPA's insistence that the MPCA use EPA's Control Cost Manual to determine the cost of various control technologies is without merit. MPCA has no legal obligation to rely upon EPA's Control Cost Manual to determine the cost of control technology. EPA states in its letter that the Control

[4] Memorandum from Anne Jackson, P.E., MPCA, to file, regarding BART Determination for Sherco Units 1 and 2, at 4 (Oct. 26, 2009). This memorandum is included in the Minnesota Regional Haze SIP at 899-906.

Cost Manual is "the preferred reference tool for cost calculations," which oversimplifies and distorts what EPA stated in its Guidelines:

> *States have flexibility in how they calculate costs.* We believe that the Control Cost Manual provides a good reference tool for cost calculations, but if there are elements or sources that are not addressed by the Control Cost Manual *or there are additional cost methods that could be used, we believe that these could serve as useful supplemental information.*

70 Fed. Reg. 39,127 (emphases added).

EPA's Control Cost Manual specifically acknowledges that electrical utilities utilize different cost estimation methodology than that cited in the Control Cost Manual. In section 1.1, EPA states that:

> ...this Manual does not directly address the controls needed to control air pollution at electrical generating units (EGUs) because of the differences in accounting for utility sources. Electrical utilities generally employ the EPRI technical Assistance Guidance (TAG) as the basis for their cost estimation processes.

The footnote to this statement is:

> This does not mean that this Manual is an inappropriate resource for utilities. In fact, many power plant permit applications use the Manual to develop their costs. However, comparisons between utilities and across the industry generally employ a process called "levelized costing" that is different from the methodology used here.

EPA's focus on use of the Control Cost Manual over other methodologies is inconsistent with efforts to consider the real cost to utilities, ratepayers and citizens for implementing new environmental control equipment. Nothing in the Guidelines suggests that states must use the Control Cost Manual or even that its use is preferred. As acknowledged by EPA, MPCA has "flexibility in how they calculate costs," and the MPCA was well within the discretion afforded to it by Congress in doing so in the Sherco NOx Proposal.

2. EPA's use of the Control Cost Manual results in control costs that are artificially low and significantly underestimate the actual estimated costs of installing NOx controls at Sherco Units 1 and 2.

Nowhere in EPA's letter does the Agency suggest that its own CUECost Workbook is not a valid reference tool or generates inaccurate numbers. In fact, as demonstrated by vendor estimates that NSPM has received for the installation of SCR at Sherco Units 1 and 2, it is clear that EPA's Control Cost Manual generates highly inaccurate numbers.[5]

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[5] EPA's generic approach also ignores the highly-respected ASTM International's preference for vendor quoted prices over relying upon historical data (such as data from the Control Cost Manual). *See* ASTM International, *Standard Guide for Estimating Monetary Costs and Liabilities for Environmental Matters*, E 2137-06, § 5.4.1

The EPA Control Cost Manual provides some insights into how EPA originally intended for it to be used in regulatory processes. For evaluation of SCRs in particular, EPA states that

> SCR system design is a proprietary technology … Furthermore, the design is highly site-specific. In light of these complexities, SCR system design is generally undertaken by providing all of the plant- and boiler-specific data to the SCR system supplier, who specifies the required catalyst volume and other design parameters based on prior experience and computational fluid dynamics and chemical kinetic modeling.

Control Cost Manual at 2-30.

Furthermore, EPA goes on to state on page 2-42 that

> The cost-estimating methodology presented here provides a tool to estimate study-level costs for high-dust SCR systems. Actual selection of the most cost-effective option should be based on a detailed engineering study and cost quotations from the system suppliers. The costs presented here are expressed in 1998 dollars.

Id. At 2-42. Based on EPA's statements, ASTM's cost estimating guidance and general industry standards for estimating cost, NSPM contracted with Sargent & Lundy ("S&L") in 2007 to develop a site-specific vendor cost quote to be used for actual selection of the most cost-effective option for NOx BART, which was summarized in NSPM's December 21, 2009 letter. *See* Exhibit 1.

There are multiple reasons why the Control Cost Manual generates unrealistically low cost numbers. For example, the Control Cost Manual does not account for site-specific issues such as significant and costly space constraints to install SCR equipment at Sherco Units 1 and 2. The Control Cost Manual also gives large space velocities, or shorter gas residence times, in the SCR. The shorter the residence time, the shorter the length of time for the necessary reactions to take place. Furthermore, the Control Cost Manual estimates a catalyst life of 24,000 hours when a minimum catalyst life of 16,000 hours is more reasonable based on our operation experience at the King Plant and published literature[6]. Finally, the Control Cost Manual dramatically underestimates the catalyst volume required as compared to the CUECost Workbook and vendor specific data. The cost of SCR increases significantly with the volume of catalyst required to operate the SCR. These are just a few of the many technical reasons why EPA's cost numbers are too low. The MPCA was reasonable in electing to continue its practice of using EPA's CUECost Workbook and EPA's comments offer no compelling reason why the Control Cost Manual should be used instead.

We also note that vendor estimates show that SCR costs are significantly higher than either the Control Cost Manual or the CUECost methodology. This should not be unexpected as the vendor estimate provides for all activities necessary to actually construct the SCRs to within

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("ASTM E 2137-06"). ASTM acknowledges EPA's approach of relying upon historical data, but ASTM does not consider it as reliable as the use of more specific estimates. ASTM E 2137-06, § 5.4.2.4.

[6] See discussion in Exhibit 3, page 6-7.

plus or minus 20 to 25 percent. The Control Cost Manual and the CUECost methodologies are used to provide an initial, study level cost estimate to within plus or minus 30 percent. Vendor estimates look at details such as overtime costs for labor to complete the project in the needed timeframe, cost escalation to place the SCRs in service by 2018 and 2019 for Units 1 and 2, respectively, costs associated with site-specific constraints, and contractor's profit. NSPM is confident that the values generated by vendor estimates are closer to the real costs of installation than those generated by either the Control Cost Manual or the CUECost methodology.

In fact, EPA's cost analysis for the Cross-State Air Pollution Rule ("CSAPR") utilizes a cost calculation methodology developed by its contractor (S&L) for use in developing SCR installation costs as part of the IPM modeling effort. S&L's IPM cost calculation methodology includes many of the items that EPA specifically calls out as inappropriate for use in justifying its use of the Control Cost Manual. The S&L IPM methodology ends up yielding SCR costs estimates that are closer to our vendor estimates than they are to the Control Cost Manual on a dollar per kilowatt ("$/kW") installed basis. A brief description of this methodology is shown in Exhibit 2. As shown in this attachment, S&L showed the cost of installing an SCR in 2010 on a 600 megawatt ("MW") unit using an average difficulty factor of 1 for bituminous coal would have a total project cost of $105,757,000 or $176/kW (per unit). This value developed for EPA's CSAPR program is well above EPA's cost methodology using the Control Cost Manual for the BART process.

Beyond these cost methodologies, we searched for published data on the actual cost to construct recently installed SCRs and found a January 2010 paper presented by JE Cichanowicz. This paper included a graph with construction costs in $/kW for SCR projects in the 2008-2010 timeframe. An interpolation of the data shows that the capital cost to install SCR on a 750 MW unit would be on the order of $190/kW. This calculates to a total capital cost of $142,500,000 per unit, again well above EPA's cost estimate using the Control Cost Manual for the BART process. This paper is provided in Exhibit 3.

Table 1 shows summaries of cost comparisons between the calculation methodologies. The site specific cost estimate information provided by S&L in 2007 is clearly higher than the estimates generated using either the Control Cost Manual or CUECost. It is important for both MPCA and EPA to recognize that the real cost of constructing a SCR is critical for consideration of whether a technology is truly cost effective. It is also necessary to consider the real cost of construction for purposes of determining whether these costs should be imposed on utility ratepayers.

Table 1. Per Unit Cost Estimates for SCR for Sherco Unit 1 or Unit 2

Basis	Control Cost Manual	CUECost [a]	S&L's IPM Methodology for CSAPR	JE Cichanowicz's Paper Methodology	S&L(2007)
2006 NSPM BART Submittal	-	$86,500,000	-	-	-
2011 Cost Calculations	$56,700,000	$84,700,000	$128,200,000	$142,500,000	$120,900,000[b]
$/kW	$76/kW	$113/kW	$141/kW	$190/kW	$161/kW

[a] - CUECost estimate includes a retrofit difficulty factor of 1.6.
[b] – Unit 1 cost in 2007 dollars. The Unit 2 was calculated to be $122.6 million in 2007 dollars.

Table 2 shows the cost comparisons between the calculation methodologies for the 2007 SCR installation at the NSPM Allen S. King Plant. The site-specific actual costs are clearly higher than the estimates generated using either the Control Cost Manual or CUECost. This comparison shows that the real cost of constructing an SCR is truly higher than the cost estimates from the other methodologies. The King Plant is a single unit facility which was a relatively easy retrofit situation. This was previously presented to the MPCA in the December 21, 2009 Letter (Exhibit 1).

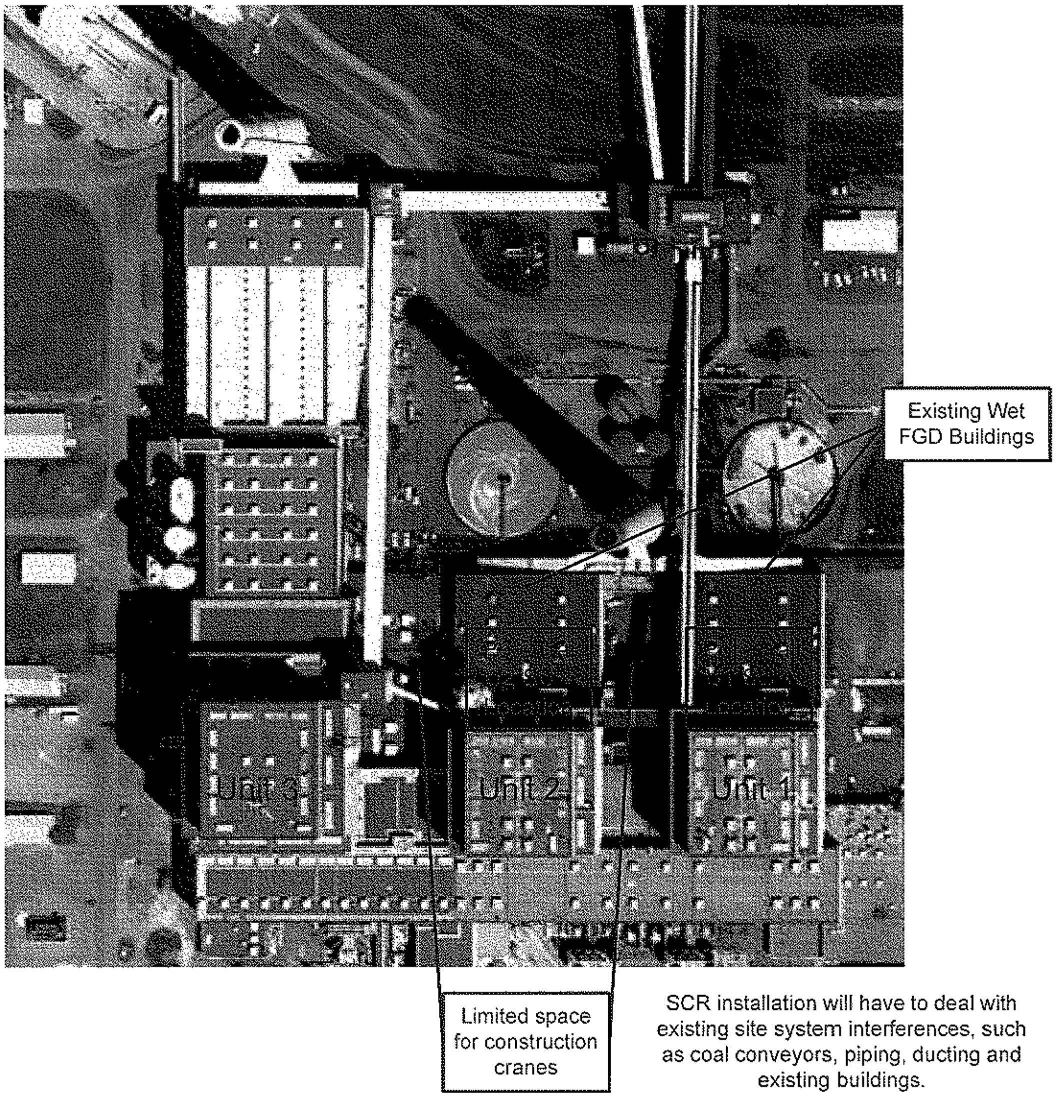
Table 2. Actual and Estimated Cost Estimates for SCR for King Unit 1.

Basis	Control Cost Manual	CUECost [a]	Actual Costs
2011 Cost Calculations	$35,300,000	$33,400,000	$60,100,000

[a] - CUECost estimate includes a retrofit difficulty factor of 1.0.

In contrast to the King Plant, the Sherco Plant has three units in close proximity to one another which will result in an increased level of retrofit difficulty. Figure 1 shows the three Sherco units in alignment, which clearly shows the difficulty in locating the equipment needed to construct SCRs on units 1 and 2. It would be especially difficult to locate cranes for site construction for Unit 2. Neither the Control Cost Manual nor the CueCost Workbook adequately account for these site-specific costs.

Figure 2. Sherco Plant Site Photo



B. Degree of Improvement in Visibility

The overarching goal of Section 169A of the CAA and the Regional Haze program is to improve visibility in Class I areas and, ultimately, to eliminate anthropogenic impairment of visibility. 42 U.S.C. § 7491(a)(1). The Sherco NOx Proposal meets these objectives. It will produce significant, permanent improvements in visibility. Sherco Unit 1 and 2's emissions have the highest modeled impact on the Boundary Waters Canoe Area ("BWCAW") where the modeled Sherco Unit 1 and 2's baseline impacts in 2002-2005 at 2.68 deciviews ("dvs").[7] The modeling showed that the technology proposed for BART at Sherco would reduce those visibility impacts by 41%, or 1.11 dvs, which should result in a perceptible improvement in visibility in the most affected Class I area.

MPCA gave full consideration to the visibility improvements in the BWCAW that would result from other control technologies. For example, MPCA noted that installing SCR on Units 1 and 2 to obtain additional NOx emissions reductions would result in only 0.31 dvs of additional improvement over the BART that was selected. MPCA BART Analysis at 904. Thus, the MPCA was aware of the degree of visibility improvement available from various control technologies, and EPA cannot take issue with MPCA's determination so long as it was informed by the relevant facts.

EPA's comments state that MPCA should have considered "the cumulative benefit across all impacted area [sic] to give a fair picture of the benefit from emission reductions." However, EPA's recommendation would arbitrarily distort the MPCA's analysis and is inconsistent with EPA's own guidance. EPA's position in its comments improperly skews the calculated benefit associated with emission limitations at a single source based on how surrounding Class I boundaries are drawn rather than by actual improvements in visibility. For example, if a given Class I area were subdivided into two or more areas, then EPA's approach would double the benefit of the controls under consideration despite there being no additional improvement in visibility. The arbitrary nature of this approach is apparent when the same logic is applied in reverse. If multiple Class I areas were merged or treated as one, then EPA's approach would conclude that potential BART controls under consideration provide less benefit even though, again, there has been no resulting change in visibility anywhere. This approach would justify less restrictive BART controls in areas with only one Class I area (i.e., no cumulative benefits). Thus, this approach does not create a more "fair" picture of the benefit of emissions reductions; rather, it creates a more arbitrary one.

EPA's position in its comments also is inconsistent with EPA's own guidance, which expressly allows states to focus only on the visibility changes in the most affected Class I area. *See* 70 Fed. Reg. 39,170. As EPA (addressing states as "you") explains:

[7] A "deciview" is a measure of visibility impairment. A deciview is a haze index derived from calculated light extinction, such that uniform changes in haziness correspond to uniform incremental changes in perception across the entire range of conditions, from pristine to highly impaired.

> One important element of the [visibility modeling] protocol is in establishing the receptors that will be used in the model. The receptors that you use should be located in the nearest Class I area with sufficient density to identify the likely visibility effects of the source. For other Class I areas in relatively close proximity to a BART-eligible source, you may model a few strategic receptors *to determine whether effects at those areas may be greater than at the nearest Class I area. . . . If the highest modeled effects are observed at the nearest Class I area, you may choose not to analyze the other Class I areas any further* as additional analyses might be unwarranted.

70 Fed. Reg. at 39,170 (emphasis added). Although this guidance pertains to impacts modeling, an agency cannot consider impacts it does not analyze. EPA's instruction that no further modeling need occur means, as a practical matter, that impacts on other Class I areas do not need to be considered. Consistent with the guidance, the MPCA focused upon the modeled impacts in the BWCAW. Therefore, the MPCA is not obligated to adopt EPA's suggestion that the MPCA consider the cumulative visibility benefit at additional Class I areas.

C. Energy and Non-Air Quality Environmental Impacts of Compliance

The CAA requires consideration of the energy and non-air quality environmental impacts resulting from the use of relevant control technologies. This includes the energy requirements of the technology, the local availability of necessary fuels, impacts on local water supplies, and the generation of solid wastes. 70 Fed. Reg. 39,169. These impacts allow "any important relative environmental impacts (both positive and negative) of alternatives" to "be compared with each other." 70 Fed. Reg. 39,169. The MPCA examined NSPM's October 25, 2006 BART Analysis for Sherco Units 1 and 2 ("Xcel Energy's BART Analysis") and concluded that no "energy or non-air quality impacts were identified as barriers to the use of any of the identified technologies." Regional Haze SIP at 902. Thus, the MPCA appropriately considered the energy and non-air quality impacts in its Sherco NOx Proposal. EPA's comments do not address this factor in its comments on the installation of SCRs at Sherco Units 1 and 2.

D. Any Existing Control Technology In Use

Sherco Units 1 and 2 currently employ several control technologies to reduce emissions of pollutants that impair visibility, including venturi spray towers (wet scrubbers) and high-efficiency wet electrostatic precipitators. In addition Unit 2 was equipped with low NOx burners and separated/close coupled overfire air systems at the time of the analysis. The MPCA took these existing controls into account when evaluating control technologies for use at Sherco Units 1 and 2 and in the cost-effectiveness and visibility impact analyses as well. Although not required to do so, the MPCA went a step further and expressly noted that the existing technologies, when combined with the new BART controls, would not prohibit or prevent the future installation of additional control technologies if they were needed to satisfy future reasonable progress requirements or other regulatory efforts. MPCA BART Analysis at 905. Again, EPA failed to consider this factor in its comments.

NSPM also notes that two years have passed since the MPCA made its BART determination, and over five years have passed since the NSPM BART study was submitted to

MPCA in 2006. NSPM has installed the equipment listed in its Sherco NOx Proposal and needs additional tuning outages to achieve the proposed BART emission rates.

E. Remaining Useful Life of Sherco Units 1 and 2

The remaining useful life of a facility is a stand-alone component of the BART analysis. 70 Fed. Reg. 39,127. The lives of Sherco Units 1 and 2 are expected to exceed the study period and were projected to have no effect on the costing analyses. *See* Xcel Energy's BART Analysis at 23, 47. Therefore, this factor should have no impact on the BART analysis, and the MPCA properly disregarded it.

II. CONCLUSION

Based on the CAA, EPA's BART Guidelines and related guidance, the MPCA properly determined the NOx BART requirements for Sherco Units 1 and 2 as part of its broader Regional Haze SIP and EPA has offered no legally justified basis for objecting to the state's decision. EPA's conclusion that NOx BART for Sherco should include the installation of SCR is inadequate for a variety of reasons including the Agency's failure to explain how its analysis meets the five statutory BART factors. Cost effectiveness and visibility improvement are only two of the five factors MPCA must consider and they do not take precedence over any of the other factors. EPA's analysis also is flawed because EPA relied on cost numbers generated by its generic Control Cost Manual even though better and more current cost information is available from EPA's own CUECost Workbook that is designed for the electric power industry, and which clearly demonstrates that EPA's cost control numbers substantially underestimate the cost of installing SCR on Sherco Units 1 and 2. Beyond that, EPA states in its Control Cost Manual that actual selection of the most cost-effective option should be based on a detailed engineering study and cost quotations from the system suppliers. NSPM commissioned a detailed engineering study with supplier quotes which shows costs that are much higher than those derived from using the Control Cost Manual or CUECost Workbook.

MPCA has the ultimate authority over BART determinations for sources in Minnesota and it appropriately considered the cost of different NOx controls for Sherco Units 1 and 2, the relatively insignificant visibility improvement that expensive controls, such as SCR, would achieve in the most impacted Class I area, as well as the other statutory factors, in developing the Sherco NOx Proposal. Accordingly, NSPM urges MPCA to retain the Sherco BART Determination as approved by MPCA in its Regional Haze State Implementation Plan in addition to adopting the EPA's proposed BART Alternative Compliance option.

EXHIBIT 1 TO ATTACHMENT A

XCEL ENERGY'S LETTER TO MPCA OF DECEMBER 21, 2009

BEST AVAILABLE CONTROL TECHNOLOGY ("BART") DETERMINATION FOR SHERBURNE COUNTY GENERATING PLANT ("SHERCO") UNITS 1 AND 2

PREPARED BY RICHARD ROSVOLD

Xcel Energy®
RESPONSIBLE BY NATURE™

414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

December 21, 2009

Ms. Catherine Neuschler
Environmental Analysis and Outcomes
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Re: **Best Available Retrofit Technology ("BART") Determination for Sherburne County Generating Plant ("Sherco") Units 1 and 2**

Dear Ms. Neuschler:

On October 21, 2009, the United States Department of Interior certified that a portion of the visibility impairment in Voyageurs and Isle Royale National Parks is reasonably attributable to pollution emissions from Xcel Energy's Sherco Plant (Units 1 and 2). The United States Environmental Protection Agency ("EPA") currently administers the 1980 Visibility Protection Rules for the State of Minnesota through a Federal Implementation Plan. As such, EPA Region 5 is required to make its own determination as to whether Sherco Units 1 and 2 cause or contribute to visibility impairment and if so, to determine the appropriate BART levels of control. As EPA begins asking the Minnesota Pollution Control Agency ("MPCA") questions regarding BART for Sherco Units 1 and 2, please keep in mind not only our willingness to provide additional information to the MPCA but also our hope for an opportunity to explain certain aspects directly to the EPA in a conference call or a meeting that includes MPCA. The following discussions address claims made by citizen groups, the federal land managers, or EPA regarding the Sherco BART analysis and Selective Catalytic Reduction ("SCR") technology.

1. Comment: Xcel Energy overestimated the cost for SCR:

Xcel Energy response: The SCR costs were not overestimated. The initial BART estimate, which was part of the BART analysis submitted to MPCA in October of 2006, was $86 million per unit. The estimates were based on EPA CUECost data with allowances for some site-specific aspects and retrofit factors, and should be considered as having initial conceptual level accuracy. The MPCA compared that estimated cost for installing SCR at Sherco to actual costs for the SCR at the Allen S. King plant. The Sherco estimate of $86 million in 2006 dollars lines up with the actual cost for the SCR at the King plant, which was $64 million for 2004-2005 contracts. Sherco Units 1 and 2 are each around 20 percent larger than the King plant unit. Actual reported escalation from 2004 to 2006 per the Chemical Engineering Plant Cost Index was 12.5 percent. On this basis, increasing the King cost of $64 million by 20 percent results in $76.8 million. Then adding the escalation of 12.5 percent results in $86.4 million.

SCR costs usually are much higher at existing units as compared to new construction. As EPA states in its "Guidelines for BART Determinations Under the Regional Haze Rule" (40 CFR 51, Appendix Y), "Physical modifications needed to resolve technical obstacles do not, in and of themselves, provide a justification for eliminating the control technique on the basis of technical infeasibility. However, you may consider the cost of such modifications in estimating costs. This, in turn, may form the basis for eliminating a control technology..."

Xcel Energy in late 2007 commissioned Sargent & Lundy, which provides engineering and design services to the power industry, to conduct an engineering study to further develop the overall scope, schedule, performance, and cost for a capacity increase and environmental emissions reduction program it proposed to the Minnesota Public Utilities Commission.. As a part of that study effort Sargent & Lundy determined that installation of SCRs would be difficult due to space constraints from existing ductwork, coal handling conveyors, and wet scrubber facilities. Factors at Sherco that would add to SCR costs are: complications with structural support, interference with existing control equipment, staging installation on two units, and interference with other plant systems. The cost estimations from Sargent & Lundy were $100 million for Unit 1 and $105 million for Unit 2, in 2007 dollars.

Escalation of costs should be considered for SCR installations meeting commercial operation dates in the 2014-2015 timeframe. When the estimate was completed in late 2007 significant forward escalation in the industry was anticipated and a 5 percent per year rate was used. This resulted in the retrofit estimates being approximately $120 million per unit. Since then, major utility construction costs escalated upward from late 2007 through 2008 and went down in 2009, with the net result of nearly flat overall escalation from late 2007 to mid-2009 per the Chemical Engineering Plant Cost Index. Anticipated escalation from mid-2009 forward is now in the 2-3 percent per year range, so that the current capital cost estimate for SCR is approximately $110 to $122 million per unit.

The estimates developed in 2007 with Sargent & Lundy involved a significant amount of time and effort at the plant, and were developed with a much better level of detail than can occur with tools such as EPA's Control Cost Manual and CUECost. No design, however, was completed as part of this effort and the estimates should still be considered conceptual with regard to accuracy, likely in the $\pm$ 25 percent range.

2. Comment: MPCA has provided no rationale for allowing Xcel to avoid SCR installation at Sherco while requiring Minnesota Power to install SCR at its Boswell Unit 3.

Xcel Energy response: Minnesota Power volunteered to install an SCR for reasons beyond BART. The SCR is part of its Environmental Improvement Plan, which qualified for special rate recovery treatment. Minnesota Power's business decision to install SCR voluntarily does not mean SCR must be installed at Sherco.

3. Comment: Sherco can achieve 0.05 lb/mmBtu or lower with SCR.

Xcel Energy response: When comparing emission limits between different units, it is imperative to remember that each emissions unit is unique. Two tangentially fired boilers burning sub-bituminous coal and employing the same design of SCR will not necessarily have equal emissions rates. If emission limits are set without accounting for the emission rate variability that occurs when the unit and control equipment are properly run, then limits will not be met. Since BART limits are effective during all times of operation, higher emissions during lower load operation and times of unit startup and shutdown are counted.

How a unit is operated, whether at steady state or continuously changing load to meet system demands, will also impact the performance of an SCR and the ability to meet permit limits. On a unit with SCR, it is very likely that the unit will be able to achieve relatively low NOx emissions if it operates at a steady load and is able to maintain optimal flue gas temperatures through an SCR. However, when a unit is called on to continuously change load to meet system demands, NOx emissions will be higher than at steady state operation. The cyclic operation brings a unit's flue gas out of the optimal temperature range of 700-780°F for SCR operation, significantly reducing NOx removal efficiency.

In 2009, Sherco Units 1 and 2 already cycle load many times each day to meet constantly changing customer demand and in response to wind variability. The available power from wind fluctuates greatly and Sherco is required to cycle up or down depending on the amount of wind on the system. Minnesota currently ranks first in the country with more than 7 percent of the state's power coming from wind energy. Minnesota statutes require Xcel Energy to further increase renewable energy on the system by generating 25 percent of its energy by wind energy conversion systems. Cycling therefore will increase substantially in the future, which will increase the difficulty in achieving low NOx emission rates. This operational reality drives the NOx emission rate higher as compared to a unit able to operate without cycling. NOx limits need to allow for how a unit must be operated to respond to continuous changes in electricity demand throughout the day and in available power from renewable energy, because electricity supply and demand must be balanced continuously.

4. Comment: Visibility impacts from Sherco on the Class I areas justify requiring SCR on these units.

Xcel Energy response: Xcel Energy performed visibility impact modeling for the proposed BART controls as well as for the SCR scenario. In this modeling, it was shown that at each Class I area the addition of SCR on both Units 1 and 2 would result in a visibility change of 0.16 to 0.28 deciviews ("dv") (defined as the 98th percentile delta dv). By definition, 1 dv is usually visually perceptible. Therefore a change of 0.16 to 0.28 dv is typically not perceptible, and spending hundreds of millions of dollars to achieve this level of visibility improvement does not make economic sense. EPA itself has recognized that where the reductions achievable by the best available technology are not sufficient to achieve any perceptible improvement in visibility, the State is not obligated to require such controls. *See* 45 Fed. Reg. 80084, 80087 (Dec. 2, 1980).

5. Comment: Xcel provided no reason why the technologies of Mobotec's Rotamix, LoTOx and ECOTUBE could not be transferred from similar, but smaller applications.

Xcel Energy response: Xcel Energy reviewed these technologies and determined that they had not yet been proven to be commercially available and not proven on Sherco-sized units. These technologies have not been successfully scaled up to 700+ MW units. Xcel Energy is committed to using commercially available, proven control technologies to maximize the investments made for our customers and shareholders. Xcel Energy's customers and shareholders should not be required to pay the development costs to scale up these technologies while other cost-effective, commercially proven technologies exist. In general, Xcel Energy considers scale-up of any technology more than two to three times what has achieved proven operation capability to be imprudent and very risky.

Please contact either me at 612-330-7879 or Nancy Glass of my staff at 612-330-5520 with any questions you have on our comments. Xcel Energy looks forward to the opportunity for further participation in the BART process with EPA, MPCA and the Federal Land Managers.

Sincerely,

Richard Rosvold

Richard Rosvold
Manager, Air Quality

C: Mary Dieltz
Nancy Glass
Environmental Services Record Center

EXHIBIT 2 TO ATTACHMENT A

IPM MODEL – REVISIONS TO COST AND PERFORMANCE FOR APC TECHNOLOGIES

SCR COST DEVELOPMENT METHODOLOGY

FINAL

AUGUST 2010

PREPARED BY SARGENT & LUNDY

IPM Model – Revisions to Cost and Performance for APC Technologies

SCR Cost Development Methodology

FINAL

August 2010

Project 12301-007

Perrin Quarles Associates, Inc.

Prepared by

Sargent & Lundy LLC

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LEGAL NOTICE

This work was funded and reviewed by the U.S. Environmental Protection Agency under the supervision of William A. Stevens, Senior Advisor – Power Technologies. Additional input and review was provided by Dr. Jim Staudt, President of Andover Technology Partners.

SCR Cost Development Methodology – Final

Establishment of Cost Basis

The formulation of the SCR cost estimating model is based upon two data bases of actual SCR projects. The data bases used were those of the 2004 to 2006 industry cost estimates for SCR units published in the "ANALYSIS OF MOG AND LADCO'S FGD AND SCR CAPACITY AND COST ASSUMPTIONS IN THE EVALUATION OF PROPOSED EGU 1 AND EGU 2 EMISSION CONTROLS" report prepared for Midwest Ozone Group (MOG) and a Sargent & Lundy LLC (S&L) proprietary in-house database. The available data was analyzed in detail regarding project specifics such as coal type, NOx reduction efficiency and air pre-heater requirements, and updated to include the cost of SCR projects available with both data sets.

The data sets were escalated to update the MOG information to 2009 and all of the data was cross referenced with current 2009 projects. The MOG and S&L cost data were updated to reflect the changes in equipment and labor rates. The CEPCI index for power plants was used to escalate the costs. The Handy-Witman index was also used to escalate the project costs to account for regional effects; the results were compared with the CEPCI index and were within 2% for total project costs.

The comparison between the two sets of data was refined by fitting each data set with a least squares curve to obtain an average $/kW project cost as a function of unit size. The data set was then collectively used to generate an average least-squares curve fit. The curve fit indicated that both sets of data produced similar average costs (within 4%) at the 200 MW range, but deviate as the unit size increases to approximately 11% at 600 MW and 13% at 900MW. The costs for retrofitting a plant smaller than 100 MW increase rapidly due to the economy of size. The older units which comprise a large proportion of the plants in this range generally have more compact sites with very short flue gas ducts running from the boiler house to the chimney. Because of the limited space, the SCR reactor and new duct work can be expensive to design and install. Additionally, the plants might not have enough margins in the fans to overcome the pressure drop due to the duct work configuration and SCR reactor and therefore new fans may be required.

The least squares curve fit was based upon an average of the SCR retrofit projects. Retrofit difficulties associated with an SCR may result in capital cost increases of 30 to 50% over the base model. The least squares curve fits were based upon the following assumptions:

- Retrofit Factor =1
- Gross Heat Rate = 9880
- SO_2 Rate = < 3 lb/MMBtu
- Type of Coal = Bituminous
- Project Execution = Multiple lump sum contracts

SCR Cost Development Methodology – Final

Methodology

Inputs

To predict future SCR retrofit costs several input variables are required. The unit size in MW is the major variable for the capital cost estimation followed by the type of fuel (Bituminous, PRB, or Lignite) which will influence the flue gas quantities as a result of the moisture content. The fuel type also affects the air pre-heater costs if ammonium bisulfate or sulfuric acid deposition poses a problem. The unit heat rate factors into the amount of flue gas generated and ultimately the size of the SCR reactor and reagent preparation. A retrofit factor that equates to difficulty in construction of the system must be defined. The NO_x rate and removal efficiency will impact the amount of catalyst required and size of the reagent handling equipment. The elevation of the site must be considered separately and factored into the unit MW size accordingly due to its effects on the flue gas volume.

The inputs that impact the variable O&M costs are based primarily on the plant capacity factor and the removal efficiency. The NOx removal efficiency specifically affects the SCR catalyst, reagent and steam costs. The lower level of NOx removal is recommended as:

- 0.07 NOx lb/mmBtu – Bituminous
- 0.05 NOx lb/mmBtu – PRB
- 0.05 NOx lb/mmBtu – Lignite

Outputs

Total Project Costs (TPC)

First the bare costs are calculated for each required module (BM). The bare module costs include:

- Equipment
- Installation
- Buildings
- Foundations
- Electrical
- Retrofit factor

The bare module costs do not include:

- Engineering and Construction Management
- Owner's cost
- AFUDC

The modules are:

BMR = Base module SCR cost

BMF = Base module reagent preparation cost

BMA = Base module air pre-heater cost

BMB = Base module balance of plan costs including: ID or booster fans, piping, etc…

BM = BMR + BMF + BMA + BMB

The total bare module cost (BM) is then increased by:

- Engineering and construction management costs at 10% of the BM cost.
- Labor adjustment for 6 x 10 hour shift premium, per diem, etc., at 10% of the BM cost.
- Contractor profit and fees at 10% of the BM cost.

A capital, engineering, and construction cost subtotal (CECC) is established as the sum of the BM and the additional engineering and construction fees.

Additional costs and financing expenditures for the project are computed based on the CECC. Financing and additional project costs include:

- Owner's home office costs (owner's engineering, management, and procurement) at 5% of the CECC; and
- Allowance for Funds Used During Construction (AFUDC) at 6% of the CECC and owner's costs. The AFUDC is based on a two-year engineering and construction cycle.

The total project cost is based on a multiple lump sum contract approach. Should a turnkey engineering procurement construction (EPC) contract be executed, the total project cost could be 10 to 15% higher than what is currently estimated.

Escalation is not included in the estimate. The total project cost (TPC) is the sum of the CECC and the additional costs and financing expenditures. Table 1 contains an example of the capital cost estimation.

Fixed O&M (FOM)

The fixed operating and maintenance cost is a function of the additional operations staff (FOMO) and maintenance labor and materials (FOMM) associated with the SCR installation. The FOM is the sum of the FOMO and the FOMM.

In general, 1 additional operator is required for all installations. The FOMO is based on the number of additional operations staff required.

The fixed maintenance materials and labor is a direct function of the bare module cost (BM) at a retrofit factor of 1.0.

Variable O&M (VOM)

Variable O&M is a function of catalyst required and disposal costs, reagent consumption, and steam consumption. All of the VOM costs must be adjusted for plant capacity factor.

The reagent consumption rate is a function of unit size, NO_x feed rate and removal efficiency. The steam usage is based upon reagent consumption rate.

The power required for the SCR system was not included in the variable O&M costs. The power requirements include increased fan power to overcome the added pressure drop across the catalyst and ductwork and the reagent supply system.

The variables that contribute to the overall VOM are:

VOMR = Variable O&M costs for urea reagent

VOMW = Variable O&M costs for catalyst replacement & disposal

VOMM = Variable O&M costs for steam

VOM = VOMR + VOMW + VOMM.

Table 1. Example of the Capital Cost Estimate Work Sheet.

Variable	Designation	Units	Value	Calculation
Unit Size	A	(MW)	600	<--- User Input
Retrofit Factor	B		1	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	9880	<--- User Input
NOx Rate	D	(lb/MMBtu)	0.21	<--- User Input
SO2 Rate	E	(lb/MMBtu)	1.71	
Type of Coal	F		PRB	<--- User Input
Coal Factor	G		1.05	Bit=1.0, PRB=1.05, Lig=1.07
Heat Rate Factor	H		0.988	C/10000
Heat Input	I	(Btu/hr)	5.93E+09	A*C*1000
Capacity Factor	J	(%)	85	<--- User Input
Nox Removal Efficiency	K	%	70	
Nox Removal Factor	L		0.875	K/J
Nox Removed	M	lb/h	8.71E+02	D*I/10^6*K/100
Urea Rate (100%)	N	(lb/hr)	609	M*0.525*60/46*1.01/0.99
Steam Required	O	(lb/hr)	689	N*1.13
Aux Power	P	(%)	0.67	0.56*(G*H)^0.43; Auxiliary Power is not used in the Variable O&M Costs
Urea Cost 50% wt solution	R	($/ton)	310	
Catalyst Cost	S	($/m3)	8000	
Aux Power Cost	T	($/kWh)	0.06	
Steam Cost	U	($/klb)	4	
Operating Labor Rate	V	($/hr)	60	Labor cost including all benefits

Costs are all based on 2009 dollars

Capital Cost Calculation		Example		Comments
Includes - Equipment, installation, buildings, foundations, electrical, and retrofit difficulty.				
BMR ($) =	160000*(B)*(L)^0.2*(A*G*H)^0.92	$	65,199,000	SCR (Inlet Ductwork, Reactor, Bypass) Island Cost
BMF ($) =	410000*(M)^0.25	$	2,228,000	Base Reagent Preparation Cost
BMA ($) =	IF E ≥ 3 THEN 65000*(B)*(A*G*H)^0.78; ELSE 0	$	-	Air Heater Modification / SO3 Control (Bituminous only & > 3lb/mmBtu)
BMB ($) =	380000*(B)*(A*G*H)^0.42	$	5,666,000	ID or booster fans & Auxiliary Power Modification Costs
BM ($) =	BMR + BMF + BMA + BMB	$	73,093,000	Total bare module cost including retrofit factor
BM ($/KW) =			122	Base cost per kW
Total Project Cost				
A1 = 10% of BM		$	7,309,000	Engineering and Construction Management costs
A2 = 10% of BM		$	7,309,000	Labor adjustment for 6 x 10 hour shift premium, per diem, etc...
A3 = 10% of BM		$	7,309,000	Contractor profit and fees
CECC ($) = BM+A1+A2+A3		$	95,020,000	Capital, engineering and construciton cost subtotal
CECC ($/kW) =			158	Capital, engineering and construciton cost subtotal per kW
B1 = 5% of CECC		$	4,751,000	Owners costs including all "home office" costs (owners engineering, management, and procurement activities)
B2 = 6% of CECC + B1		$	5,986,000	AFUDC (Based on approximately 3% per year for a 2 year engineering and construction cycle)
TPC ($) = CECC + B1 + B2		$	105,757,000	Total project cost
TPC ($/kW) =			176	Total project cost per kW

Table 2. Example of the Fixed and Variable O&M Estimate Work Sheet.

Variable	Designation	Units	Value	Calculation
Unit Size	A	(MW)	600	<--- User Input
Retrofit Factor	B		1	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	9880	<--- User Input
NOx Rate	D	(lb/MMBtu)	0.21	<--- User Input
SO2 Rate	E	(lb/MMBtu)	1.71	
Type of Coal	F		PRB	<--- User Input
Coal Factor	G		1.05	Bit=1.0, PRB=1.05, Lig=1.07
Heat Rate Factor	H		0.988	C/10000
Heat Input	I	(Btu/hr)	5.93E+09	A*C*1000
Capacity Factor	J	(%)	85	<--- User Input
Nox Removal Efficiency	K	%	70	
Nox Removal Factor	L		0.875	K/J
Nox Removed	M	lb/h	8.71E+02	D*I/10^6*K/100
Urea Rate (100%)	N	(lb/hr)	609	M*0.525*60/46*1.01/0.99
Steam Required	O	(lb/hr)	689	N*1.13
Aux Power	P	(%)	0.57	0.56*(G*H)^0.43; Auxiliary Power is not used in the Variable O&M Costs.
Urea Cost 50% wt solution	R	($/ton)	310	
Catalyst Cost	S	($/m3)	8000	
Aux Power Cost	T	($/kWh)	0.06	
Steam Cost	U	($/klb)	4	
Operating Labor Rate	V	($/hr)	60	Labor cost including all benefits

Costs are all based on 2009 dollars

Fixed O&M Cost			
FOMO ($/kW yr) = (1/2 operator time assumed)*2080**V/(A*1000)	$	0.10	Fixed O&M additional operating labor costs
FOMM ($/kW yr) = IF A < 500 then $200,00 ELSE $300,000	$	0.50	Fixed O&M additional maintenance material and labor costs
FOM ($/kW yr) = FOMO + FOMM	**$**	0.60	Total Fixed O&M costs
Variable O&M Cost			
VOMR ($/MWh) = N*R/A/1000	$	0.31	Variable O&M costs for Urea
VOMW ($/MWh) = discrete function of A, G, J, K, S	$	0.35	Variable O&M costs for catalyst: replacement & disposal
VOMM ($/MWh) = O*U/A/1000	$	0.01	Variable O&M costs for steam
VOM ($/MWh) = VOMR + VOMW + VOMM	**$**	0.66	

EXHIBIT 3 TO ATTACHMENT A

CURRENT CAPITAL COST AND COST-EFFECTIVENESS OF POWER PLANT EMISSION CONTROL TECHNOLOGIES

PREPARED BY J. EDWARD CICHANOWICZ

JANUARY 2010

CURRENT CAPITAL COST AND COST-EFFECTIVENESS OF POWER PLANT EMISSIONS CONTROL TECHNOLOGIES

Prepared by
J. Edward Cichanowicz

Prepared for
Utility Air Regulatory Group

January 2010

CURRENT CAPITAL COST AND COST-EFFECTIVENESS
OF POWER PLANT EMISSIONS CONTROL TECHNOLOGIES

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SECTION 1

SUMMARY

The utility industry faces numerous mandates to retrofit flue gas emission controls to existing power plants. For example, the Clean Air Interstate Rule (CAIR), Clean Air Visibility Rule (CAVR), and settlements with the Department of Justice over alleged NSR violations all require retrofit of control technology. In addition, the Hazardous Air Pollutant Maximum Achievable Control Technology (HAPs MACT) rule, and the increasingly stringent National Air Quality Standards (NAAQS) are anticipated to promote control technology application. Some of these mandates and consent decrees required equipment installation and operation before 2010, with provisions for additional controls. These additional control requirements could be for the second phase of CAIR – or the equivalent program that replaces it. The HAPs MACT rule could also require reductions of NO_x and SO_2 in the 2015 timeframe.

The demand for control equipment strained international and domestic supply chains until early 2008. Robust demand through 2007 for materials and labor to support expansion of petrochemical industries, urban infrastructure, and power generation in developing countries consumed much of the international supply. Exotic corrosion-resistant metals (such as C276 Hastolloy) were simply not available from many suppliers, almost regardless of price. As a consequence, capital cost escalated from approximately the time frame of 2000 through 2008 for flue gas desulfurization (FGD) and selective catalytic reduction (SCR) equipment, and shortages in material and labor forced construction delays. Some owners of small generating units – less than 250 MW – issued requests-for-proposals for FGD equipment for which no bids were offered – or limited bids received at a premium price. Even major utilities encountered limits, as some reported it was not possible to secure fixed price contracts on construction projects, assigning all risk to owners.

The recent moderation in the world economy has removed many of the supply barriers and eased cost escalation. The cost to retrofit FGD and SCR equipment is expected to moderate from peak levels observed in the last 24 months, but may not significantly decline. A key reason is the ever-increasing complexity of the host sites. As host units are older and of smaller generating capacity, there is less available space for control equipment. Frequently, convoluted and complex ductwork is required, increasing retrofit difficulty.

Capital cost for FGD escalated significantly from the 2004-2006 timeframe to the 2008-2010 timeframe. Over the four-year period between the approximate mid-point of these intervals (e.g., 2005 vs. 2009), FGD cost escalated at 19% above the inflation rate. Specifically, on an average basis, retrofit of wet FGD to a 500 MW in the 2004-2007 timeframe required $342/kW (2008 dollars). A unit of the same capacity retrofit with FGD in the 2008-2010 timeframe required $407/kW (2008 dollars). The difference equates to an escalation of approximately $16/kW per year. At this rate of escalation, an FGD process installed for a 2015 startup on a 500 MW unit will require about $470/kW (in 2008 dollars).

For a coal with sulfur content of 4 lbs/SO_2/MBtu, each increase in capital cost for wet FGD by $100/kW can increase the cost effectiveness of SO_2 removal by several hundred dollars per ton. At $400/kW, a typical 500 MW unit will expend about $600 to remove a ton of SO_2 from this coal. For PRB coal with 0.9 lbs SO_2/MBtu, each increase in FGD capital cost by $100/kW will increase SO_2 removal cost effectiveness by $500/ton. For this PRB coal, an SO_2 removal cost of up to $2,300/ton will be incurred for a $400/kW FGD capital cost.

Capital cost for SCR NO_x control has similarly escalated over the same time period. Data obtained for this paper show a large number of units that recently retrofit SCR incurred capital cost between $300-350/kW (in 2008 dollars). Catalyst unit price has remained low in the last 4-5 years, with new catalyst requiring a cost between $4,000-5,000/cubic meter. The cost of ammonia-based reagent, after peaking in 2007 at over $600/ton, is predicted to average about $400/ton through early 2010. Reagent cost after that time is uncertain, and historically linked to natural gas prices. For most applications, reagent has replaced catalyst supply as the largest SCR operating cost component.

For a typical 500 MW unit firing an eastern bituminous coal and producing NO_x at a rate of 0.38 lbs/MBtu, each $100/kW increase in SCR capital cost increases NO_x removal cost effectiveness by about $1,000/ton. The same unit equipped with a $300/kW SCR process would incur a NO_x removal cost-effectiveness of $3,500/ton. For a 500 MW unit firing PRB and producing NO_x at a rate of 0.20 lbs/MBtu, each $100/kW increase in SCR capital cost elevates NO_x removal cost effectiveness by $2,000/ton. A PRB-fired unit with a $300/kW SCR process would incur a NO_x removal cost-effectiveness of $6,500/ton.

In summary, the material and labor shortages witnessed during the 2007 and 2008 timeframe have abated. However, the cost to retrofit FGD and SCR equipment is anticipated to escalate, over the long-term, at about the same rate since the year 2000. The cost will be driven by the increasing complexity of smaller sites, at generally older units. Typically, large units with accessible, open sites have already been retrofit, as the most cost effective projects were first sought. These site–specific factors are anticipated to supersede the cost and availability of labor and components in determining installed equipment cost.

SECTION 2

BACKGROUND

INTRODUCTION

The cost to retrofit capital-intensive environmental controls to power stations rapidly escalated from the year 2000 through the end of 2009. In the U.S., several environmental mandates that stem from the 1990 Clean Air Act Amendments (CAAA) converged within the time span of only a few years. Since that time, the general slowdown in world-wide demand for chemical processing facilities, transportation, and urban infrastructure has diminished cost pressures for material and specialized construction labor. The relaxation in cost pressure was too late to moderate the installed FGD and SCR cost for units that planned to start-up in 2008 and 2009. Further contributing to the escalated cost for these units is an increase in the complexity of sites within which to retrofit equipment, as the units most amenable to retrofit were equipped first. As a consequence, although the price shocks of material and equipment observed in 2006 and 2007 have diminished, capital cost will continue to escalate due to more difficult retrofits.

On the supply side, the limit to construction schedule imposed by components such as rubber-lined slurry pumps, pulverization and reagent grinding equipment, and flue gas emission stacks has abated. Access to these components can still determine the schedule of a project, but availability is considerably improved since 2007.

RETROFIT OF CONTROL TECHNOLOGY

Retrofit of control technology to existing plants is mandated by several actions subsequent to the 1990 Clean Air Act Amendment: the Clean Air Interstate Rule (CAIR), regional haze initiatives such as the Clean Air Visibility Rule (CAVR), and increasingly stringent National Ambient Air Quality Standards (NAAQS). Further, settlements with EPA and the Department of Justice (DOJ) over alleged New Source Review (NSR) violations may affect plans for SO_2 and NO_x reduction, as well as the Hazardous Air Pollutant Maximum Achievable Control Technology (HAPs MACT) rule that is being developed. Each of these is further described as follows.

<u>Clean Air Interstate Rule (CAIR).</u> As initially promulgated, this two-phase program mandated reducing NO_x and SO_2 in an initial Phase 1 (2009 for NO_x and 2010 for SO_2), and a Phase 2 (2015 for both SO_2 and NO_x). The CAIR program was remanded but not vacated by the D.C. Circuit in December of 2008. However, the eventuality of more strict limits for SO_2 and NO_x emissions did not alter actions by most utility owners to install FGD and SCR.

<u>National Ambient Air Quality Standards (NAAQS).</u> Under the Clean Air Act, NAAQS are to be reviewed every 5 years. Recently those reviews have lead to more stringent standards. As EPA continues to review and revise the NAAQS, States with areas exceeding the standards are required to

develop State Implementation Plans (SIPs) to achieve compliance. In those SIPs, States have looked to power plants for further emission reductions.

Best Available Retrofit Technology (BART). BART requirements are part of the Clean Air Visibility Rule (CAVR). These federal regulations require all states to revise their State Implementation Plans (SIPs) to address visibility impairment in Mandatory Class I Federal Areas, which are specific national parks and wilderness areas across the country. Consequently, states may require retrofit of emissions controls to achieve "reasonable progress" toward eliminating manmade impairment of visibility in Mandatory Class I Federal Areas.

For example, the states of Illinois, Indiana, Michigan, and Wisconsin, through the Lake Michigan Air Directors Consortium are considering additional control measures for SO_2 and NO_x beyond CAIR. Regulatory agencies in other regions in the country such as the southeast (VISTAS) and far west (WRAP) are considering similar mandates. The extent and timing of these mandates is uncertain, but most proposed initiatives will require control equipment by the 2014 to 2018 time period.

Settlements Regarding Alleged NSR Violations. Allegations by the U.S. EPA that provisions of the CAAA regarding NSR were violated prompted several owners to agree to the installation of FGD and SCR controls on schedules that differ from those required to meet CAIR.

Retrofit of FGD and SCR to many coal-fired boilers is required to meet these existing and proposed mandates. Figures 2-1 to 2-6 depict the inventory of wet and dry FGD and SCR process equipment that has been either installed or announced to meet various regulatory mandates. Figure 2-1 shows the incremental annual addition of both wet and dry FGD in terms of generating capacity (MW) through 2012. The annual capacity added reaches about 20,000 MW in 2008, 2009, and 2010. Figure 2-2 presents the cumulative total installed since 2001, reaching almost 100,000 MW by the end of 2012. Cumulatively with the 95,000 MW installed prior to the year 2000, almost 200,000 MW of the U.S. coal-fired fleet will be equipped with FGD by 2012. All new units treat 100% of flue gas. Estimates for equipment installed beyond 2012 are uncertain and thus not shown.

Figure 2-3 shows the incremental generating capacity retrofit with SCR over the same time period. Since the peaks in 2002 to 2004, the capacity retrofit with SCR in each year has ranged between almost 4,000 and 10,000 MW. Figure 2-4 shows the cumulative capacity retrofit with SCR approaches 130,000 MW by 2012.

The ability of SCR and FGD to remove mercury (Hg) and other HAPs may also prompt their installation. Specifically, the "co-benefit" of Hg control, where oxidized Hg is removed as a consequence of SCR and wet FGD, is relevant to the anticipated HAPs MACT rule. This rule is expected to be proposed in 2011. The capacity projected to be equipped with both SCR and FGD is shown in Figures 2-5 and 2-6, showing the annual and cumulative totals, as designated by the first year of operation. Figure 2-6 shows almost 70,000 MW of capacity will be equipped with both SCR and FGD by 2012.

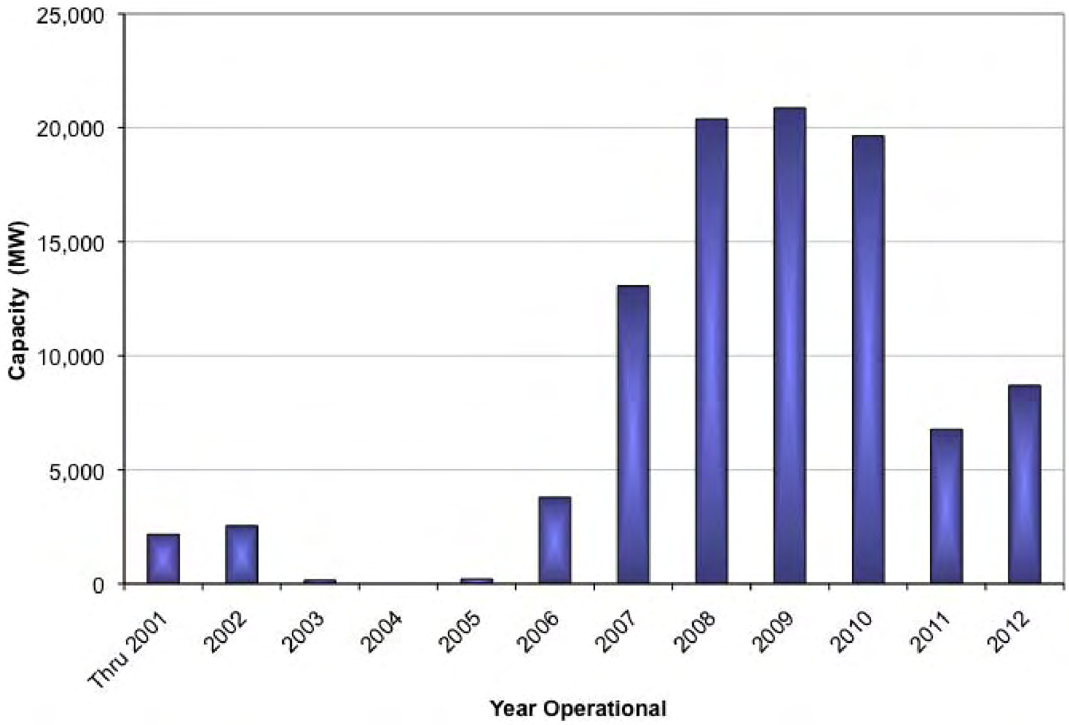

Figure 2-1. Historical and Projected Wet, Dry FGD Capacity: Installed MW by Year

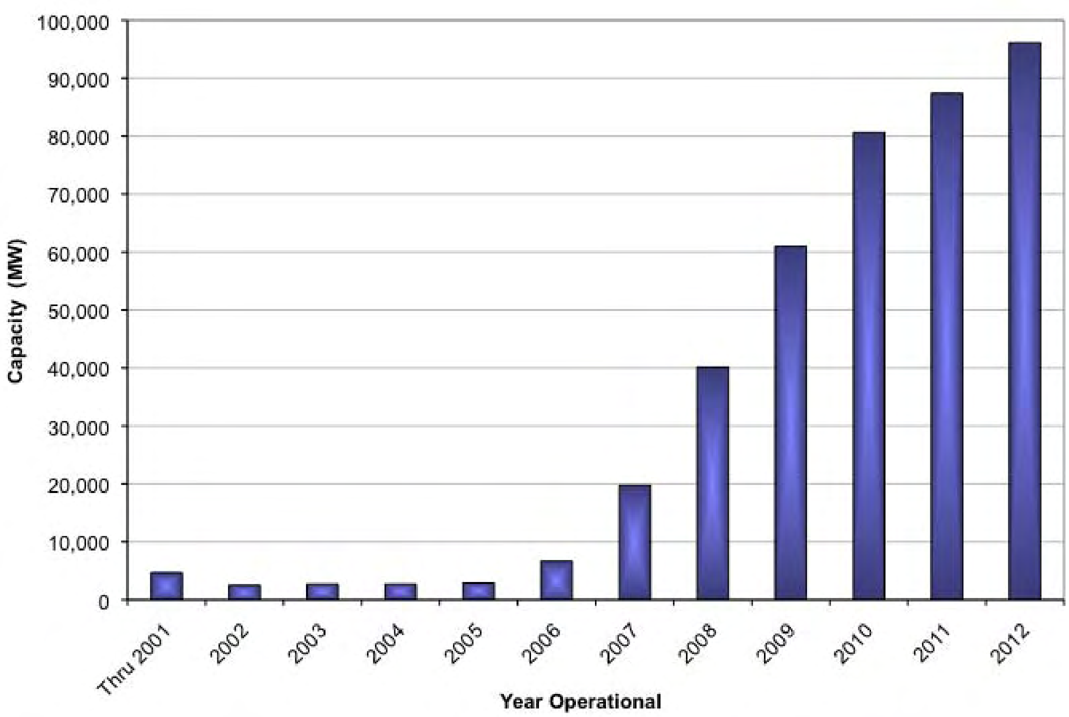

Figure 2-2. Historical and Projected Wet, Dry FGD Capacity: Cumulative MW by Year

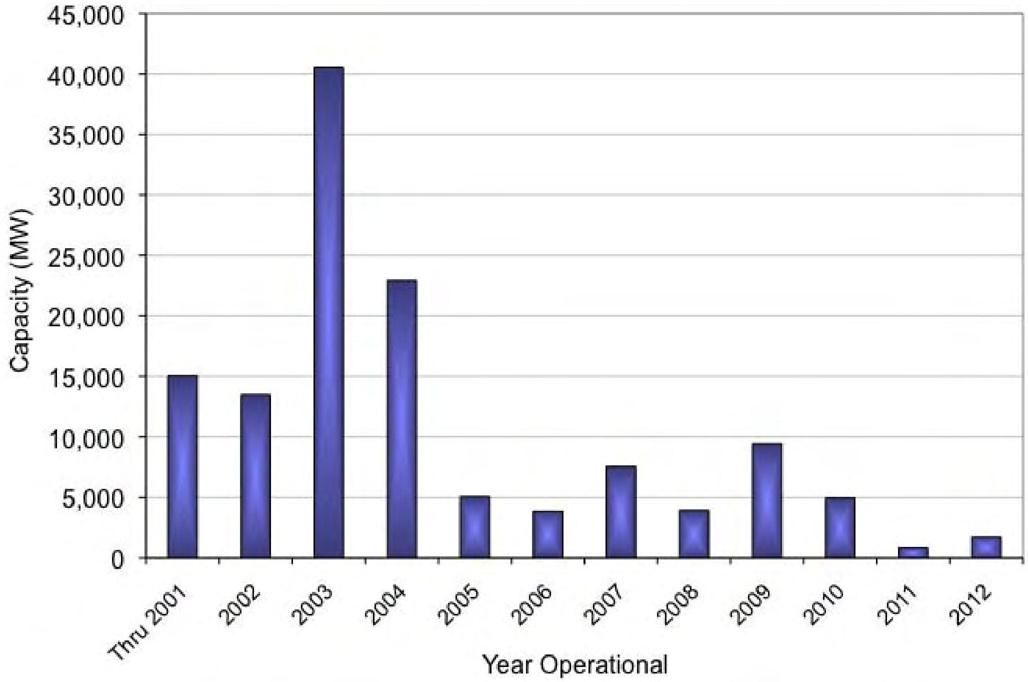

Figure 2-3. Historical and Projected SCR Capacity: Annual Installed Capacity (MW)

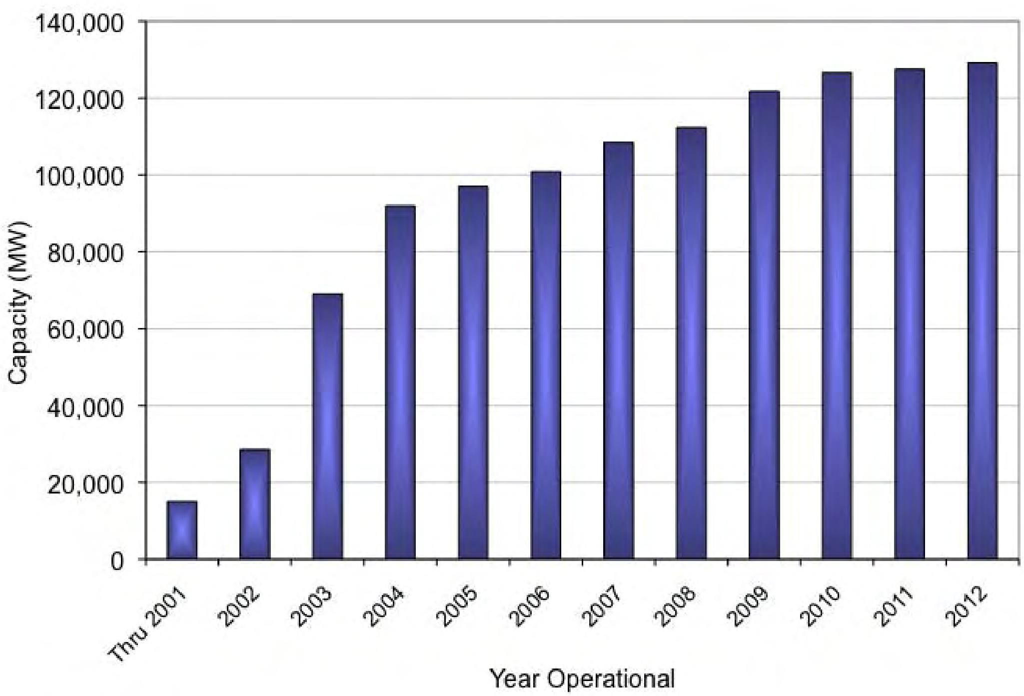

Figure 2-4. Historical and Projected SCR Capacity: Cumulative Installed SCR Capacity (MW)

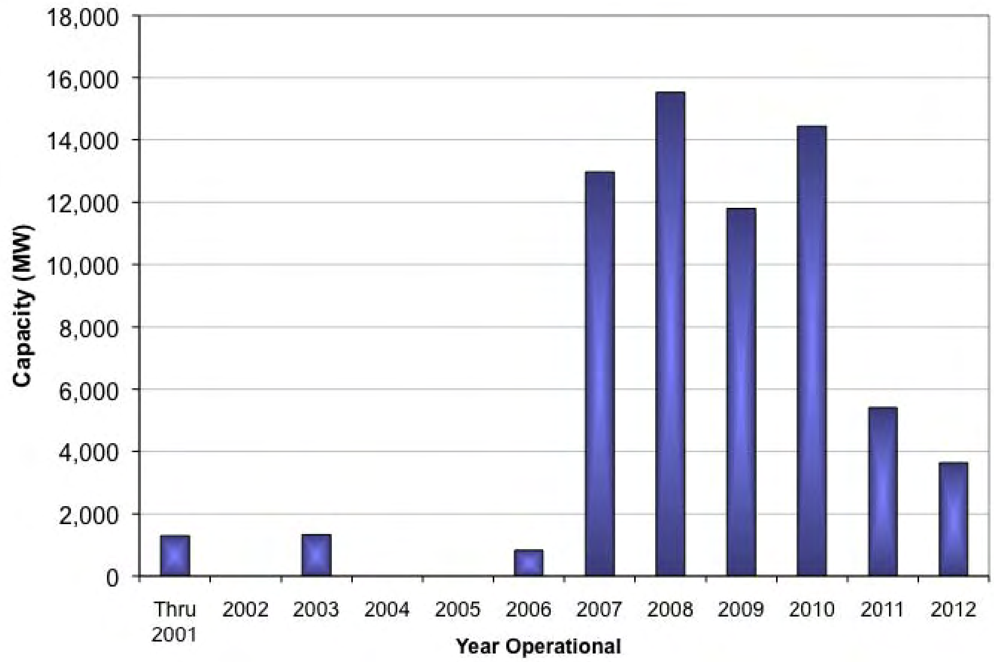

Figure 2-5. Historical, Projected FGD and SCR Annual Capacity (MW)

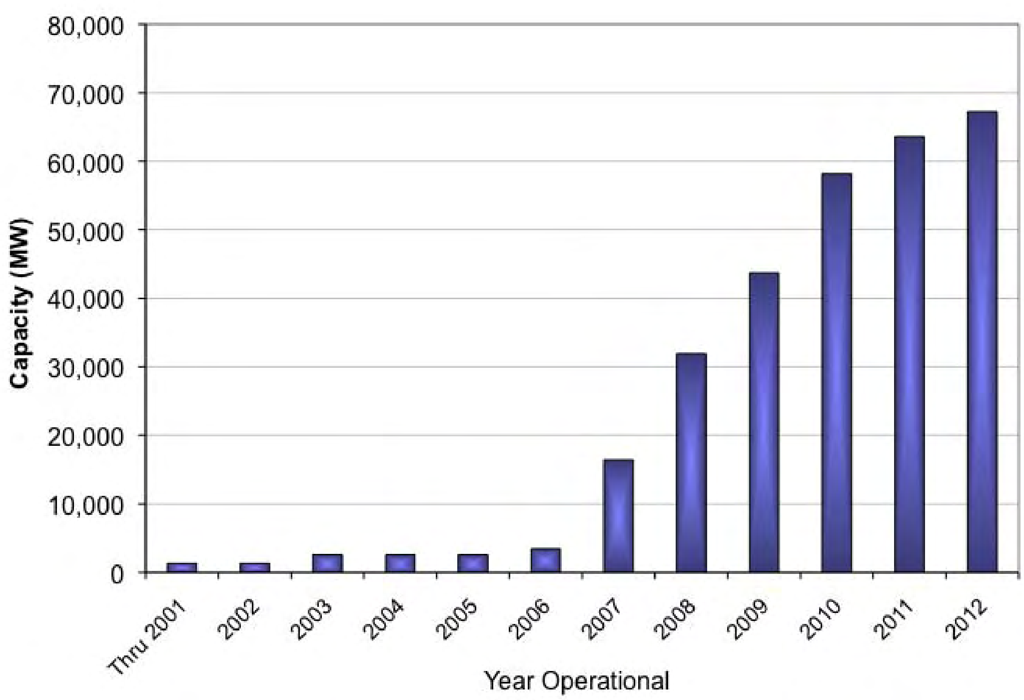

Figure 2-6. Historical, Projected FGD and SCR Cumulative Capacity (MW)

NEW GENERATING STATIONS

The number of new coal-fired units planned for operation between 2009 and 2020 has decreased notably in recent years. For example, in 2002 over 36,000 MW of capacity were scheduled to be installed by 2007, whereas only 12% of that amount (~4,500 MW) were actually completed (DOE, 2009). As of late 2009, approximately 15,000 MW of coal-fired capacity is under construction, with more than another 4,000 MW of capacity permitted. An additional 27,000 MW of new coal-fired generating capacity has been proposed for installation by 2018 (DOE, 2009). It is not clear how many of the proposed units will actually be built, as investment plans are subject to revision given the present economic climate and regulatory uncertainty regarding CO_2 regulation.

SECTION 3

MATERIAL AND LABOR ESCALATION

This section addresses the escalation of material and labor costs through 2008, the relaxation or normalization in prices since that time, and discusses possible impacts on equipment cost and construction schedule.

BASIC MATERIALS

Among the basic materials required for installation of environmental control technology and new generating equipment are iron ore, structural steel, copper for wire and cable, and elements such as nickel and molybdenum for exotic processed metals. These inputs, along with other construction materials and the cost and productivity of labor, determine the price of finished capital equipment. These materials are broadly available in the U.S. and throughout the world, but until mid-2008 experienced strong demand due to world-wide construction in process industries and infrastructure. Specifically, exotic corrosion-resistant metals (such as C276 Hastolloy) were simply not available from many suppliers, regardless of price. Further, several cases of substandard manufacturing quality were documented with certain international suppliers, ranging from failure of high pressure piping to poor castings that lead to catastrophic failures. The demand for these materials has relaxed, as have prices, mitigating but not completely eliminating both cost and quality concerns.

Figures 3-1 to 3-4 present price escalation data for selected materials over the last 10 years (with the exception of iron ore, for which data is only available over a three year period). These data, accessed either from the U.S. Bureau of Economic Analysis[1] (BEA) or a commercial source[2], reflect pricing from 1999 to present. These data show that prices for key commodities have relaxed from the 2008-era high marks, reverting for many materials to 2007 levels. Consequently, all commodity prices are lower than their 2008 peaks but most are not depressed.

Figure 3-1 presents BEA data for steel products, using 1982 prices as a base case. Figure 3-1 shows 2009 steel mill prices to be 60-70% of peak prices reported in the mid-2008, and at year-end returning to early 2007 and 2008 levels. Similarly, the price for iron ore (as traded at Hamersley, Australia) has relaxed from 2008 highs, and at the year-end of 2009, exceeds early 2008 levels (Figure 3-2).

The cost for special alloys used for wet FGD reaction vessels, and for high pressure, high temperature boiler components, has also relaxed from peak 2008 values. Specifically, key ingredients to corrosion-resistant and high-strength materials – nickel, molybdenum, and chromium – all experienced increased

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[1] See U.S. Bureau of Economic Analysis, “Price Indices for Gross Domestic Product by Major Type of Product”, revised December, 2009, http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=Y

[2] See www.Infomine.com

demand and higher prices up to 2008. Figure 3-3a presents price trends for molybdenum and nickel, showing that prices after escalating by a factor of 3 to 5, respectively, have relaxed to 2006 levels for nickel and to early 2004 levels for molybdenum. Figure 3-3b depicts a similar price trend for copper and chromium. Although the content of nickel, molybdenum, and chromium in finished steel products is small, cost escalation of this magnitude will affect final product cost.

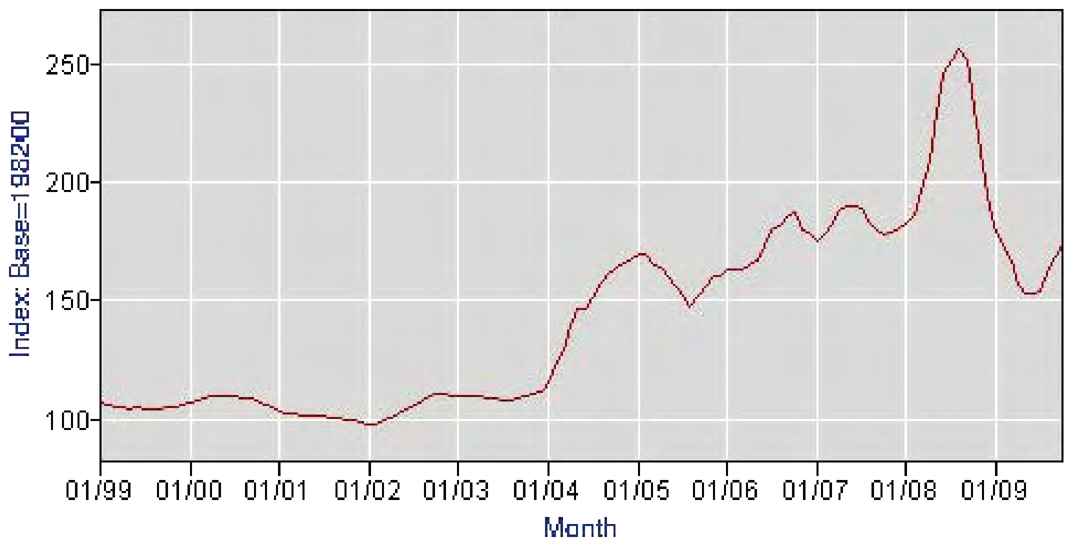


Figure 3-1. Steel Mill Products Cost History

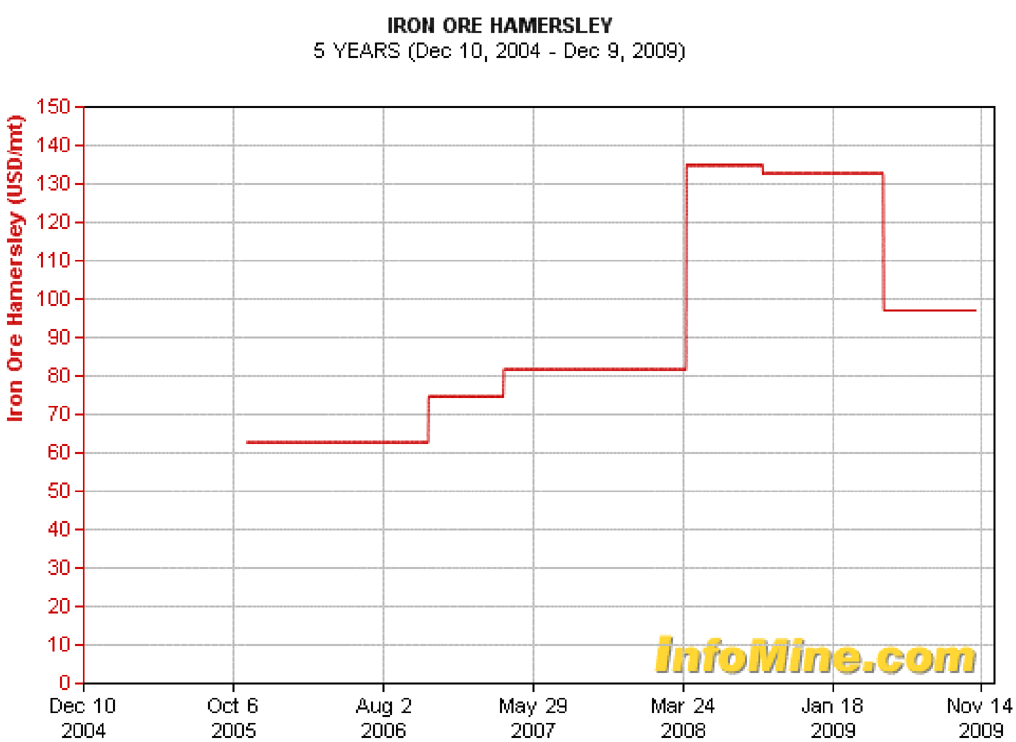
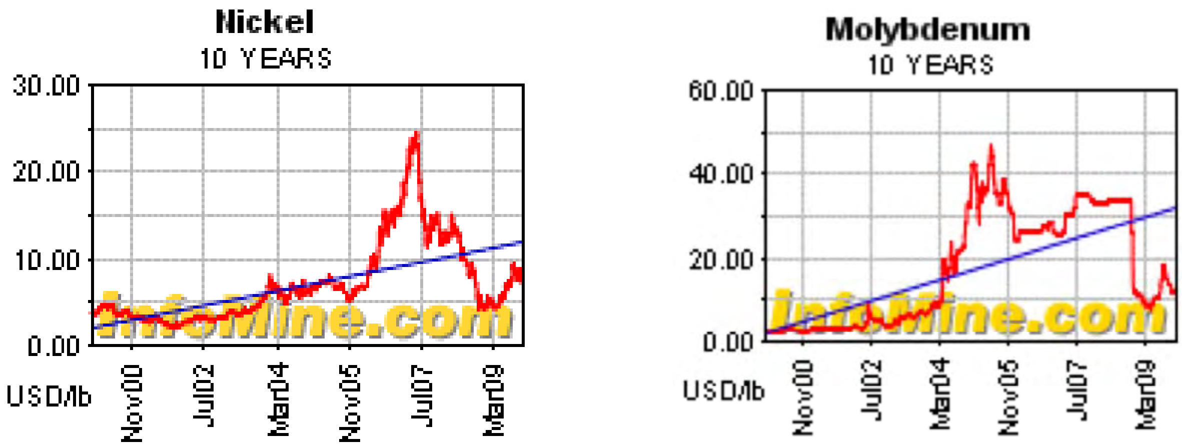
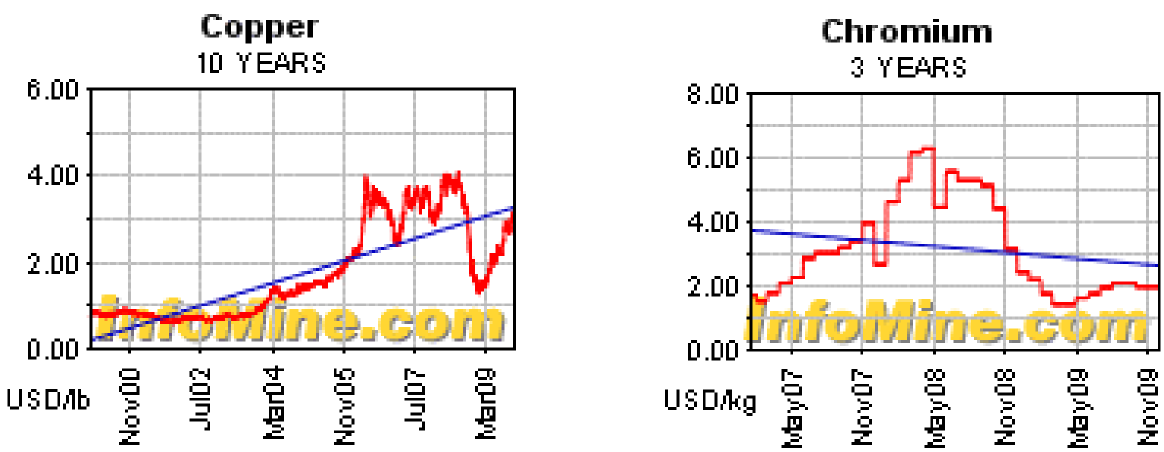


Figure 3-2. Iron Ore Cost Escalation



a. Molybdenum and Nickel Price History Escalation



b. Copper and Chromium Price History

Figure 3-3. Price History Escalation: Nickel, Molybdenum, Copper, and Chromium

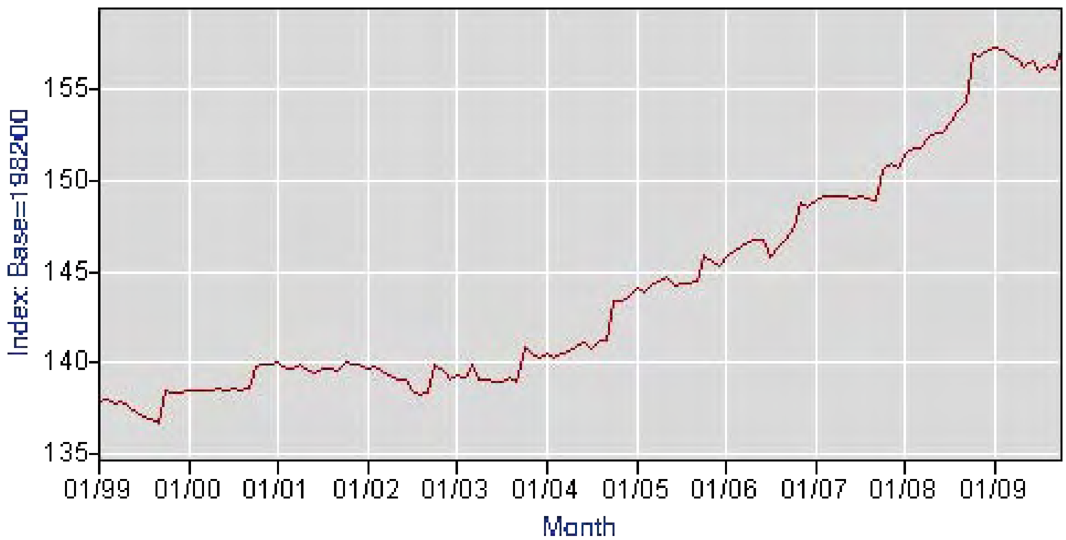


Figure 3-4. U.S. Bureau of Economic Analysis Finished Goods Capital Price Index

The delivered price of key finished goods and materials has also declined. However, finished equipment price declines are moderated because many inputs are manufactured goods, which require labor. These include components such as pumps, gas fans, valves, and steel plate fabricated from alloys. The delivered prices of these key components are reported to be lower by 10-20% compared to the peak 2007 and 2008 values (Gaikwaid, 2009; Erickson, 2009).

One indicator of the cost of industrial components is the BEA cost index of finished products. This index, as exhibited in Figure 3-4, shows that prices have relaxed only moderately from the 2008 highs.

Several key components or services no longer limit impose rate-limiting steps on project schedule. These include reagent preparation equipment, slurry recirculating pumps, agitator pumps, certain categories of forced and induced draft fans, and the stack. Perhaps most notable is the availability of material and personnel resources to fabricate and erect a stack. The limited number of stack erectors world-wide, coupled with the demand for new stacks for both retrofit of wet FGD and new generating units, has significantly elevated costs.

LABOR

The present cost trends and availability for qualified field labor are discussed in this section.

Labor Cost Escalation

Labor cost escalation experienced by the industry through 2007 was summarized by an architect/engineering firm involved in the construction of several new Midwestern plants (Black & Veatch, 2007). Through 2007, annual labor escalation was observed to be between 5.2 and 7.4% per year, averaging 6.2%.

Discussions with representatives of architectural/engineering firms and equipment suppliers, and public reports of pay scales indicate that despite the economic slowdown, labor rates are little changed since 2007. Modest increases (~2% annually) are noted in most but not all trades. This trend is consistent with labor costs for general construction personnel increasing 2.1% from September 2008 to September 2009.[3] Labor rates are largely unchanged for the crafts with the most lengthy apprenticeship programs such as boilermakers, who are required for the heavy metal bending, forming, and erection duties required for SCR and FGD equipment. Labor rates for some crafts with less restrictive training (pipefitters, electricians) have slightly declined. Consequently, labor rates in 2007 and 2008 are likely representative of present-day costs, and modest escalation of nominally 2% annually can be anticipated.

The contribution of labor cost to future FGD or SCR retrofit projects is anticipated to increase due to greater site complexity which will require more skilled personnel. For example, early SCR retrofits required installation cost of 40-50% of the total project – with the remaining cost for process equipment acquisition and design. Not all installation cost is devoted to labor – cranes and other heavy equipment are required – but the labor component is large. Inevitably, escalating labor cost will translate into higher installed emission control equipment cost.

Labor Pool Availability

The availability of specialized labor required for SCR and FGD retrofit has modestly improved since the 2008 timeframe. Perhaps the most critical craft is "boilermakers" – the highly skilled metalworkers needed to fabricate the high pressure, high temperature steam piping and supply casings. Historically, this labor pool is restricted due to a lengthy apprenticeship that is necessary to assure quality fabrication.

The severe restrictions to the boilermaker labor pool incurred in 2007 and 2008 that limited SCR and FGD installation have subsided. The moderated demand allows project planners to construct a more productive schedule. For example, the ability to assign a work schedule of a "6 10's" (6 workdays per week, each 10 hours) is more feasible than in the 2007/2008 timeframe.

As noted previously, labor requirements for retrofit projects are anticipated to increase with greater complexity of host sites. Historically, wet FGD installation for a 500 MW unit requires from 600,000 to 900,000 man-hours of labor, depending on the design and site-specific conditions. The average value of 750,000 man-hours equates to 1,500 man-hours per MW of generating capacity. For SCR, an average of 500,000 hours is required for a 500 MW unit, which equates to 1,000 man-hours per MW of capacity.

In terms of construction schedule, installing FGD and SCR at a given site is assumed to require 36 and 28 months, respectively. It should be noted this schedule applies to the installation of a single control device at one unit; executing several of these projects in parallel can complicate logistics and significantly extend project duration. Although the demand for boilermaker man-hours required over the project duration is concentrated on the latter 2/3 of the schedule, key labor sources for all skill crafts must be arranged for well in advance of commencing construction.

<u>Labor Required for New Plant Construction</u>. In 2006, Black & Veatch estimated labor demand to construct the 80 GW of new plant capacity that at the time was either in construction, design, or permitting (Black & Veatch, 2006). In October of 2009, the Department of Energy National Energy

[3] See Table 5, "Natural Resources, Construction, and Maintenance", change registered in September 2009 versus September 2008, U.S. Bureau of Labor Statistics, www.bls.gov/news.release/eci.t05.htm

Technology Laboratory (NETL) revised the projected status of new coal-fired power plants either in construction, design, or permitting to be approximately 49 GW (NETL, 2009). From 2013 through 2016, the NETL predicts 21 GW of new coal-fired capacity will be installed. The revised workforce duty to support this construction, if executed in the field as projected, represents a large decrease from the 2006 projections. Given the uncertainty of new coal-fired plants in the "proposed" or "permitted" status, and the possibility of CO_2 limits, the workforce demand due to new coal-fired generation is anticipated to be slight.

Separate from coal-fired power stations, skilled craft labor will still be in demand, although not in short supply as in 2006 and 2007. The NETL projected 37 and 48 GW of natural gas-fired and wind generating capacity, respectively, to be installed between 2012 and 2016. The field labor to install these generating units is less than for coal-fired generation, but still expected to contribute to demand. Finally, many of these skilled labor trades will be in demand due to present economic stimulus actions.

In summary, the supply of skilled labor is not anticipated to limit project schedules, or excessively escalate cost to retrofit FGD and SCR NO_x control equipment. However, competition for skilled craft labor with other power generating projects and infrastructure improvements will exist, thus labor rates are not expected to change much from present values.

SECTION 4

FACTORS AFFECTING CAPITAL COST ESTIMATES

A review of factors affecting capital cost estimates is presented in this section. These involve the costing methodology and site-specific and engineering decisions.

CAPITAL COST ESTIMATING METHODOLOGY

Evaluating the capital cost of environmental controls requires a consistent accounting of costs. Both the costs directly incurred due to process equipment, and indirect costs imposed on plant and operations, must be accounted for. EPRI's Technical Assessment Guide (EPRI, 1993) provides a consistent methodology, and has served as a model by which DOE, EPA, and other organizations assess costs.

Figure 4-1 schematically depicts the key components of a capital cost estimate. The capital equipment directly purchased from the supplier, and installed by a construction contractor comprises the Total Process Capital. Several indirect charges consequential to these direct charges are incurred: (a) engineering design, (b) general facilities, (c) owners' costs, and (d) contingencies (usually both a process and a project). Contingencies are key planning cost elements that are usually absorbed as a project evolves. Indirect fees should be consistent when comparing costs from various suppliers. Table 4-1 presents typical ranges of values historically used by EPRI, DOE, and EPA. Together with the Total Process Capital, these indirect charges comprise the Total Plant Cost.

A second series of indirect charges is incurred based on project execution: fees for the prime contractor, and financing for the construction period. Adding these costs to the Total Plant Cost determines the Total Plant Investment.

Finally, the equipment and site must be equipped with spare parts, and a supply of reagents, chemicals, or fuels, prior to operation. These pre-production charges and inventory capital complete the Total Capital Requirement.

Ideally, evaluating capital costs would utilize similar charges as defined in Figure 4-1 and Table 4-1. Some but not all data presented in Section 6 have been developed on a consistent basis. However, most reported costs are derived from the same suppliers and A/E's that use similar assumptions. These costs are inevitably scrutinized by the public utilities commissions and thus eventually tested for reasonableness. Accordingly, comparing lump-sum costs has limits but can identify trends.

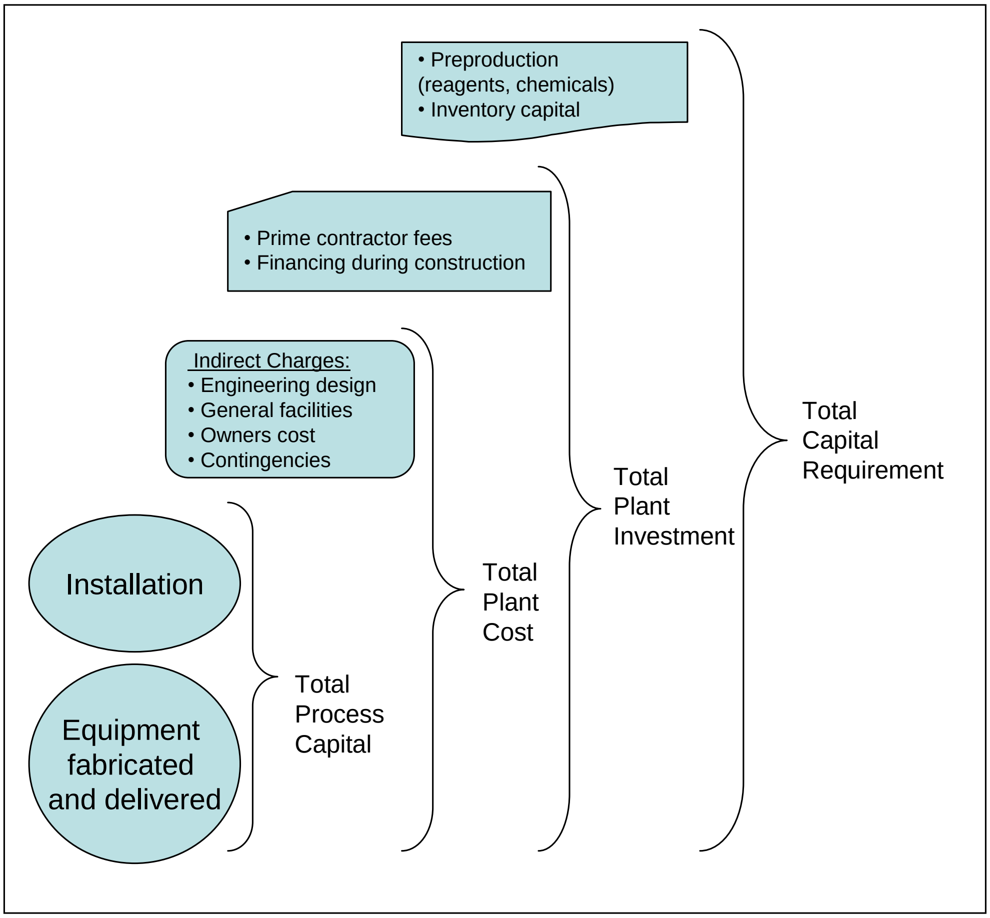


Figure 4-1. Graphic Depiction of Cost Elements

Table 4-1. Examples of Indirect Charges, Assumptions

Cost Element	Purpose	Range, % of Project Cost
Engineering	Establish design	7-15
General Facilities	Roads, buildings, shops, laboratories	2-5, based on process capital
Owner's Cost	Staff, management	5-10
Process Contingency	Uncertainty in process operation	5-10, for a mature process
Project Contingency	Uncertainty in site installation	5-10, if detailed engineering initially completed
Prime Contractor Fees	Business cost	2-8
AFDC	Financing during construction	5-10
Preproduction	Supply of parts, consumables	2, based on total process investment, plus 30 days fixed, variable O&M
Inventory Capital	Supply of consumables	Based on 30 day reagent, chemicals storage

SITE AND DESIGN FACTORS

Site characteristics and the operating philosophy, particularly the owner's tolerance for equipment outages, affect capital cost. These and other factors are responsible for variations in estimates of capital cost among projects.

The key site-specific factors that define capital cost are:

Fuel Composition. The fuel defines the volume of combustion products, content of particulates, SO_2, and NO_x production rates, and composition of fly ash. These characteristics drive process equipment cost. Most important is the volume of flue gas produced by fuel combustion. For example, PRB or other sub-bituminous coals can generate up to 30% greater volume flue gas to be treated, compared to an eastern bituminous coal, per unit generating capacity. For FGD, the amount of sulfur to be processed and the ultimate fate of the byproduct are factors. For SCR, the flue gas volume, the content and composition of ash, and trace elements in the fuel such as arsenic and phosphorous can determine reactor volume and catalyst layout.

Site Congestion and Retrofit Difficulty. Limited space for equipment location, access for construction, and access for labor will extend installation time. Generally, older units of smaller generating capacity will incur high costs due to limited access (as well as penalties due to economies-of-scale). Large generating units do not necessarily guarantee adequate space for equipment installation. Specifically, even though the area occupied by the plant will be larger, the opportunities for obstruction are greater.

Existing Site Auxiliary and Support Facilities. FGD and SCR process equipment demand auxiliary power, steam, and compressed air. The availability of these consumables at a site varies, and additional infrastructure to supply and distribute these consumables may be necessary. The most costly of these can be the requirement to provide new power distribution infrastructure including transformers, switchgear and/or "motor control centers". The escalation in price until 2008 of copper-derived electrical subsystems has contributed to cost increases; during periods of peak copper pricing electrical infrastructure escalated from 5-6% of an FGD budget to more than 10%.

Flue Gas Draft System Upgrades. The retrofit of environmental controls will change the static pressure within the ductwork, which may require upgrades to fans, new fan motors, upgraded electrical systems, and strengthening of ductwork, ESPs, and boiler walls. The upgrade and strengthening of ductwork and boiler walls is necessary to prevent collapse or implosion.

Waste Water Treatment Requirements. For wet FGD, the need to treat process discharge water varies depending on permitted limits. Zero-water discharge requirements can impose large costs on the entire FGD slurry treatment and dewatering systems, and may possibly interfere with FGD chemistry. For a suite of wet FGD process equipment installed in North Carolina, wastewater treatment facilities comprised a total of between 9 and 14% of the total capital cost.

Stack Rebuild or Replacement. Retrofit of wet FGD process equipment can require replacement or major rebuild of the stack. Flue gas treated by wet FGD poses corrosion and deposition potential, due to relatively low saturation temperature and content of SO_3. If space on-site is available, the least cost solution sometimes involves a new stack rather than retrofitting corrosion-resistant liners to an existing stack. FGD installation can be limited by the availability of expertise and resources to erect a new stack.

Equipment Sparing and Redundancy Philosophy. The operating strategy of the owner, and the cost incurred for an FGD outage in terms of compliance margin and SO_2 allowances, determines the equipment sparing and redundancy strategy. General convention defines equipment that is "spare" as that stored in a warehouse and ready to install; equipment that is redundant is installed and ready to run. Operators with sufficient margin in meeting the SO_2 or NO_x cap, or for whom SO_2 or NO_x "allowances" are available, may choose to lower capital cost by minimizing redundant equipment. Conversely, operators for whom access to SO_2 or NO_x allowances is limited or costly may elect to invest in more spare equipment. Sparing philosophy can affect capital cost by 10-20%.

Materials of Construction. The materials required to resist corrosion and erosion, in an effort to obtain high reliability, elevate capital cost. Specifically, high alloy containing steels or rubber-lined absorber vessels or pumps are needed to increase reliability. Although lower grade materials can sometimes be used for certain piping applications, the ability of a fluid to corrode, erode, or otherwise compromise the reliability of piping must be considered when selecting construction materials. For wet FGD, the need to use higher alloy and lined equipment adds 10-20% to the project capital cost.

Capital versus Operating Cost. Many decisions revert to a tradeoff between capital and operating cost; capital savings derived can be at the expense of higher operating cost. For SCR, a key example is the catalyst layout – the number of initial and final layers of catalyst utilized. For example, a reactor layout of 2 initial layers and 1 spare layer (i.e., 2+1) will result in a lower capital but higher operating cost, compared to utilizing 3 initial layers and 1 spare layers (i.e., 3+1). The key difference is higher catalyst consumption over a long-term period.

Of these factors, perhaps the most important is site complexity. Plant sites where FGD and SCR are to be retrofit have become more complex for several reasons. First, the largest generating capacity, highest capacity factor units have already been equipped with FGD and SCR, leaving smaller and older units for future retrofit. The incurred capital cost per unit of generator output ($/kW basis) is disproportionately higher on these smaller units. Second, these units – being older – are located on sites of limited area and restricted access. Consequently, these sites may not be amenable to retrofit of control equipment, without relocating other components. The limited space also restricts labor productivity and extends construction time. As a consequence, for FGD, the absorber towers are located further from the unit, requiring longer ductwork runs.

SECTION 5

FLUE GAS DESULFURIZATION COSTS

This section presents capital and operating costs for wet and dry FGD process equipment.

FGD CAPITAL COST

The capital costs for both wet and dry FGD process equipment are discussed in this section.

Wet FGD

Figure 5-1 depicts installed capital cost as a function of generating capacity for wet limestone-based FGD. The units depicted all employ limestone reagent, forced oxidation treatment of byproduct, deliver at least 97% SO_2 removal, and are equipped with mist eliminators. The influence of design or operating conditions different from those stated will impact cost, especially due to variations in inlet SO_2 and the subsequent impact on solids byproduct handling equipment. In addition, some of the cost data are derived from two or more identical units installed at one site, and thus reflect an economy-of-scale for engineering and procurement. The cost reported in Figure 5-1 includes both contracted and staff engineering charges, and financing of construction.

Figure 5-1 depicts two curves, based on when the FGD process started commercial service. All costs are reported on a 2008-dollar basis. One curve (Curve A) represents units starting commercial operation after January 2008, and includes several units scheduled for a 2010 startup. This curve, based on 20 data points for the 2008-2010 startup dates, suggests a modest economy of scale with larger generating capacities, enabling lower unit cost. Figure 5-1 also shows a cost curve (Curve B) similarly based on 20 data points (not shown for simplicity) for units that began commercial operation between 2004-2007, relating capital cost and generating capacity. The “midpoint” of these latter cost data is 2005.

Comparing the two curves in Figure 5-1 shows capital cost increased from the 2004-2006 to the 2008-2010 timeframe. Specifically, Curve B shows wet FGD capital cost for a 500 MW unit retrofit in the 2004-2006 timeframe escalated from $342/kW to $407/kW – an increase of $65/kW over a mean time period of 4 years. The difference equates to an escalation of approximately $16/kW per year. At this rate of escalation, an FGD process installed for a 2015 startup on a 500 MW unit will require about $470/kW (in 2008 dollars).

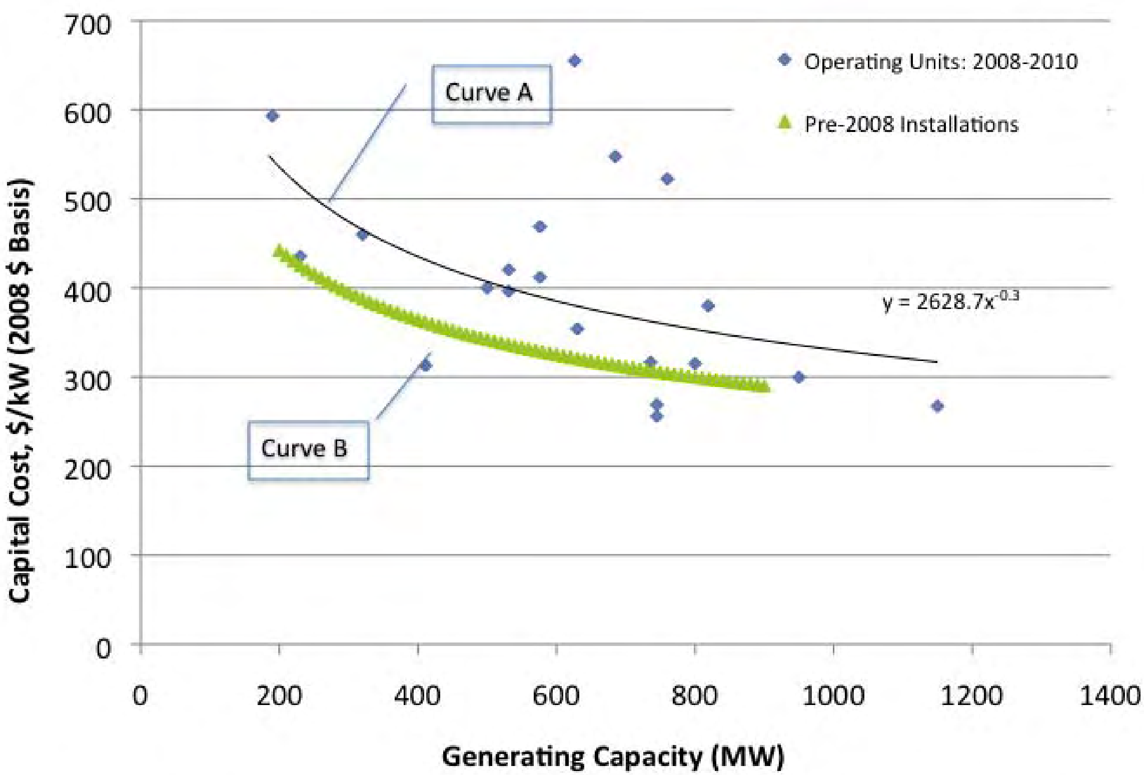


Figure 5-1. Wet FGD Process Equipment Cost: Various Sources

Dry FGD

Figure 5-2 depicts installed capital cost presented as a function of generating capacity, for dry lime-based FGD. The costs for all units with a lime-based spray dryer absorber (SDA) include a secondary fabric filter particulate collector. Most SDA equipment is designed for 93-95% SO_2 removal. For these designs, fly ash is removed in the existing particulate control device (an ESP in all cases), so ash handling and disposition is the same as prior to retrofit.

Figure 5-2 shows the estimated capital costs for eleven units evaluated for retrofit to a Midwestern utility operator. Similar to the case for wet FGD, these costs are expressed in 2008 dollars, and reflect a ready-to-operate FGD process accounting for all direct and indirect charges. For three dry FGD units that were actually constructed, the incurred costs are reported.

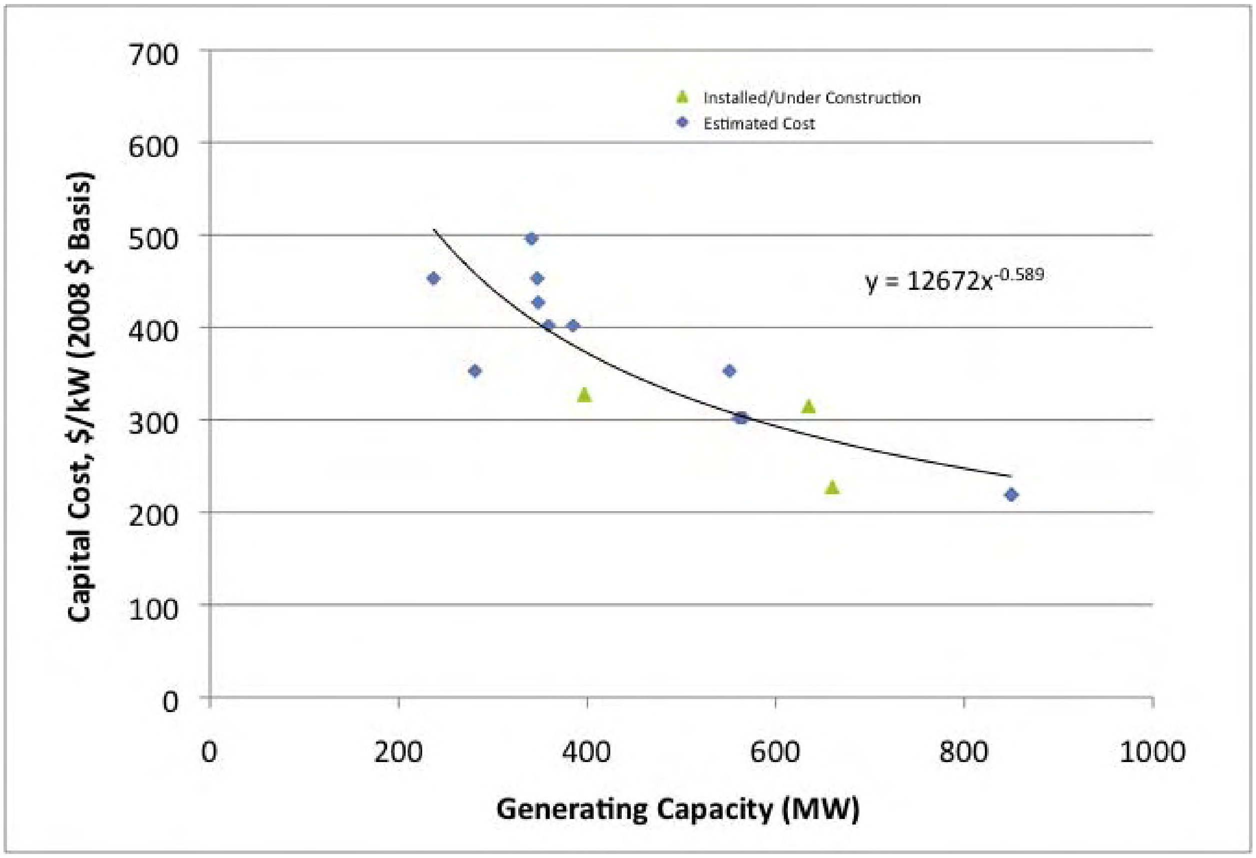


Figure 5-2. Dry FGD Process Equipment Cost: Various Sources

The dry FGD equipment costs reported do not suggest increases with time. However, the basic process equipment is the same as required for wet FGD, and escalation forces should be the same. Consequently, the same escalation rate of 19% over four years is assumed for dry FGD. These data suggest the capital cost of a 500 MW unit completed in late 2014 for process startup in 2015 would be approximately $385/kW.

Small units are particularly prone to escalated FGD cost, as fixed costs for items such as engineering and reagent preparation equipment are disproportionately borne by the limited plant output. An example of how capacity and market timing affects cost is presented by the case for PSHN Merrimack Units 1 and 2, where about $1,000/kW is projected for FGD to treat flue gas from both units. The site and market conditions are unique; so much that this value is not included in Figure 6-1. The small size of Units 1 and 2 (115 and 320 MW, respectively), the extensive ductwork to service both units, gas fan upgrades, enclosures for cold-weather maintenance, waste water treatment system, restricted site for equipment installation and construction, and strong market forces are responsible for the high cost. Notably, in 1993 Unit 2 was the first coal-fired generator in the U.S. retrofit with SCR. The conditions in 1993 under which the SCR reactor for Unit 2 was designed and installed featured aggressive pricing by early entrant suppliers, available materials and labor, and an accessible site. These conditions, which enabled Merrimack Unit 2 to acquire SCR for the lowest cost reported in the U.S., are the complete opposite for the acquisition of wet FGD.

OPERATING COST

Operating cost is defined in several ways – total operating cost per unit of capacity per year, normalized to power generated, or per unit of emission species removed.

Figure 5-3 is a reproduction of a graphic describing the range of various FGD operating cost components as presented at the November 2006 PowerGen conference (Sargent & Lundy, 2006). Figure 5-3 compares (for a 500 MW plant) the various contributors to total operating cost for a limestone-based wet FGD process, designed for 95-97% SO_2. Total O&M ranges from approximately $15 to $38/kW/yr, and is almost equally comprised of fixed and variable components. As noted in Figure 5-3, limestone reagent cost for this size of unit varies in direct proportion to the amount of sulfur in the coal. Other operating cost components directly related to sulfur content include operating and maintenance labor, and byproduct management.

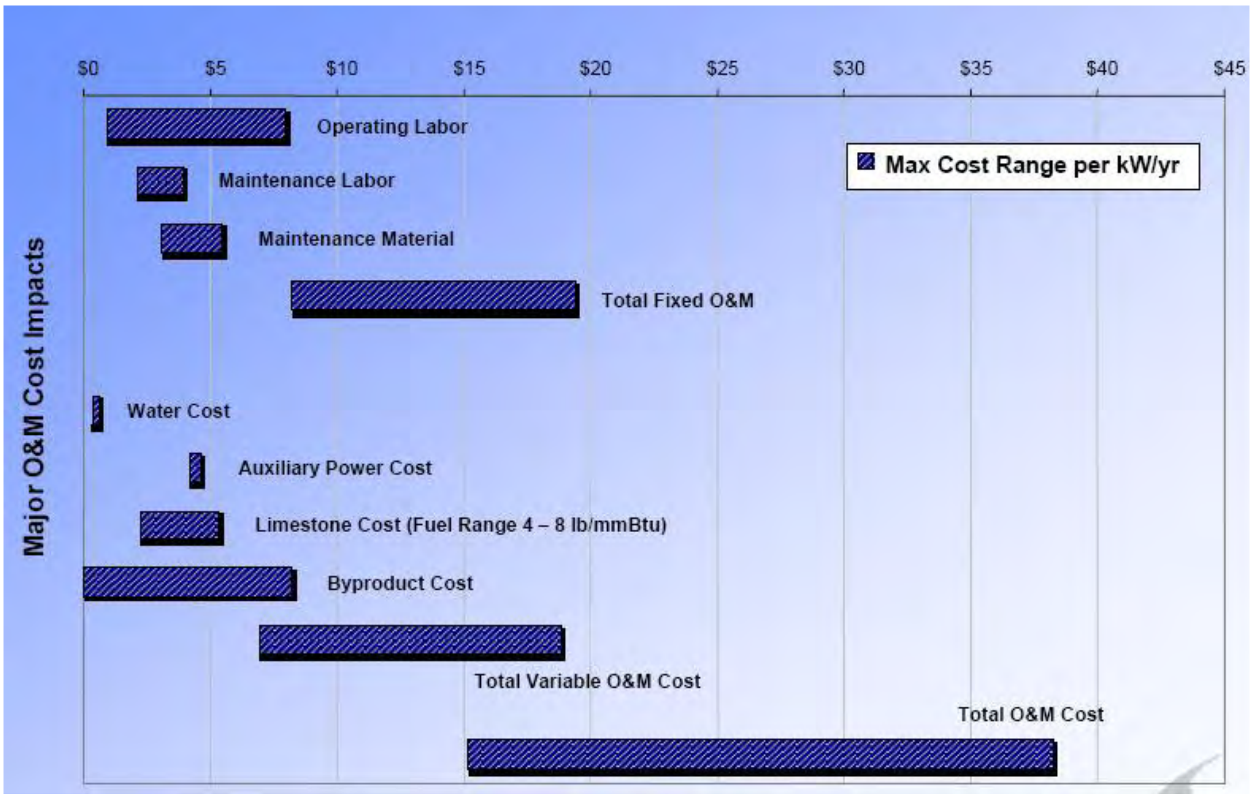


Figure 5-3. Range of Wet FGD Operating Costs for 500 MW Units (after Sargent & Lundy, 2006)

The capital cost ranges in Figures 5-1 and 5-2, when combined with operating costs escalated to a 2008 year basis, provide an indicator of FGD cost-effectiveness, or the cost per ton of SO_2 removed. Figure 5-4 presents the cost per ton of SO_2 removal for a hypothetical 500 MW unit, utilizing a limestone based forced oxidation process. Calculations are reported for coals such as PRB, with low sulfur content, and include Pennsylvania and Ohio coals with 2.6% and 3.4% sulfur content, respectively. These coals present an uncontrolled sulfur content of 0.90, 4.0, and 5.8 lbs SO_2/MBtu. Figure 5-4 presents results based operating costs similar to Figure 5-3, and calculated for the specific coal composition. It is possible that higher operating costs may be incurred that reflect higher labor rates and other site-specific factors, such as reagent transportation. Figure 5-4 results also assume a 15-year book life (i.e., cost recovery period) and thus a capital recovery factor of 0.12.

For the Pennsylvania and Ohio coals, the unit cost of SO_2 removal is generally between $250 and $600/ton, exceeding $500/ton for the Pennsylvania coal when capital cost reaches $375/kW. Unit SO_2 removal cost approaches $500/ton for the Ohio coal as the capital cost exceeds $450/kW. For PRB coal, the same capital cost increase will elevate SO_2 removal cost from approximately $1,600 to $2,500/ton. The costs will change in proportion to the sulfur content of the fuel.

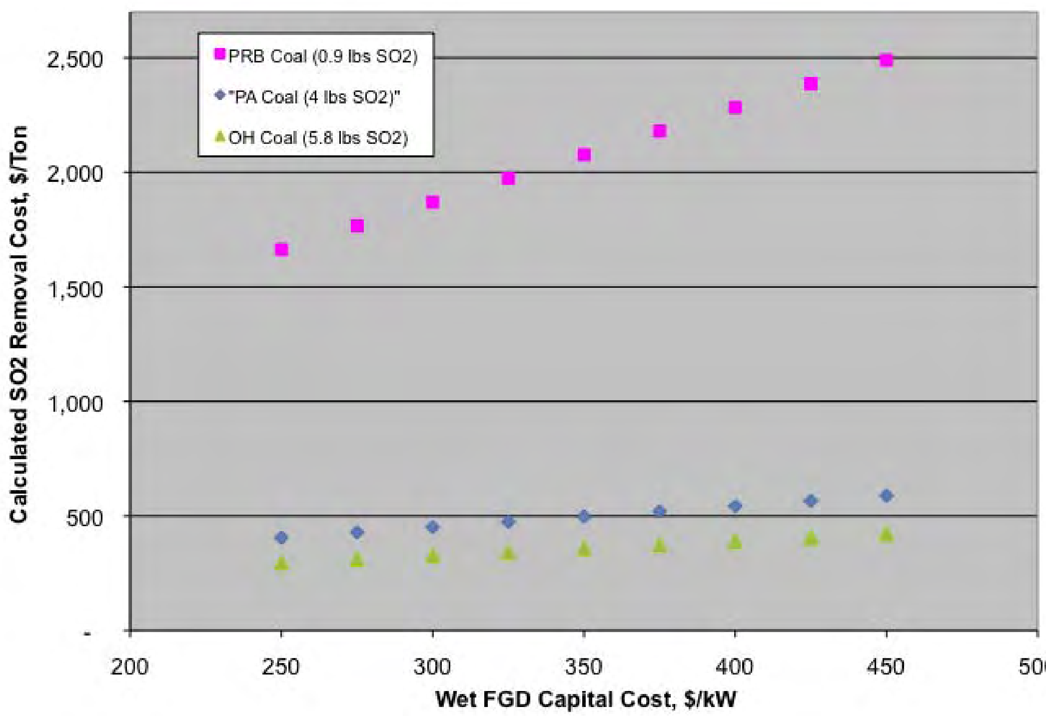


Figure 5-4. SO_2 Removal Cost per Ton ($/Ton), Year 2008 Basis

SECTION 6

SCR NO_x COST

This section presents capital and operating costs for SCR NO_x control.

SCR CAPITAL COST

Figure 6-1 summarizes the reported capital cost for over fifty SCR installations, some installed as early as 2000, and includes estimates for process equipment presently under construction. All costs are reported on the basis of 2008 dollars, include both staff engineering and owners' engineering charges, and financing charges (AFDC). Regarding process design, it should be cautioned that not all data represent comparable cases – the inlet NO_x removal, fuel type, outlet NO_x design level, number of catalyst layers, and reactor arrangement differ for most of the installations represented. However, the general trend in cost is believed to be an accurate reflection of the industry average.

Figure 6-1 reports cost incurred over four discrete time periods. These include the time periods for the years (a) pre-2000, reflecting the most early projects, (b) 2000-2002, reflecting the initial class of units installed prior to broad SIP-Call compliance, (c) 2003-2004, reflecting units installed during the height of the SIP-Call compliance, and (d) 2008-2010, reflecting units recently installed or presently under construction. A polynomial curve is fit to all data except that for the 2000-2002 timeframe, the latter excluded for graph clarity.

The data in Figure 6-1 reveal the cost penalty incurred by the smaller generating units is more acute for SCR retrofit to the most recent units; specifically, retrofitting SCR to the smallest units (<300 MW) compared to the largest units (>500 MW) incurs a relatively large cost penalty.

COST ESCALATION

The data presented in Figure 6-1 can be used to infer the escalation in cost experienced for the installed SCR process equipment over time. For each of the four time periods presented in Figure 6-1, the average installed capital cost was determined. Specifically, the average capital cost was determined for the units within each group. The difference in the average cost – all corrected to a 2008-dollar basis – suggests the cost escalation.

Figure 6-2 presents the difference in costs for the four periods, suggesting an escalation of $140/kW over the 12 year period, or about $12/kW per year. This trend can be anticipated to continue in to 2015, as the evolution to installing SCR at smaller, more complex sites continues.

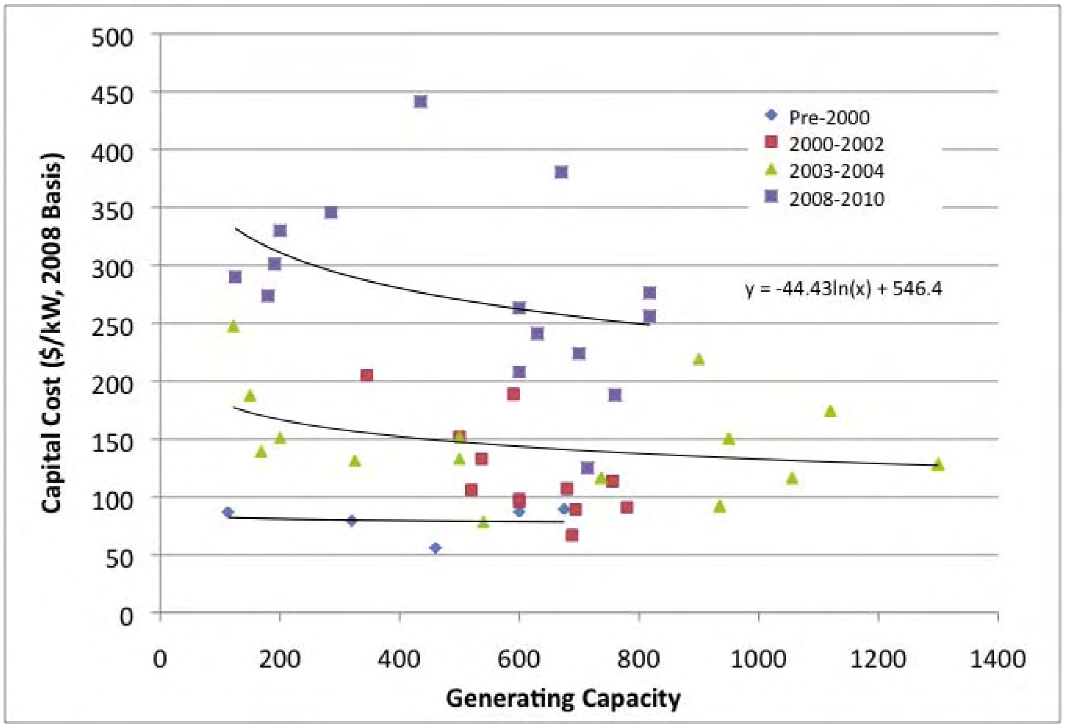


Figure 6-1. Capital Cost of SCR Process Equipment vs. Generating Capacity: Four Time Periods

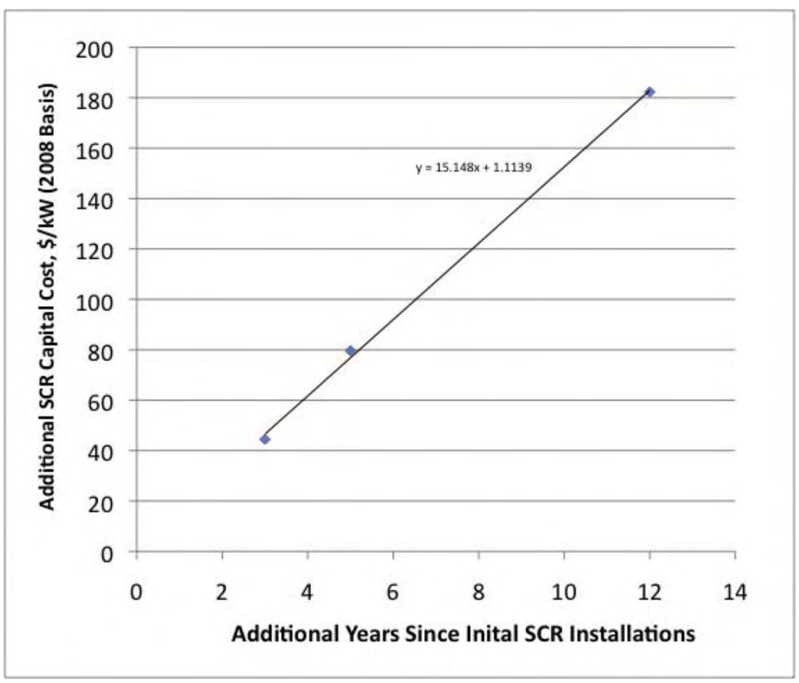


Figure 6-2. Increase in SCR Capital Cost Based on Four Time Periods (Three Increments)

Capital cost escalation of approximately \$12/kW per year is apparent with SCR process equipment installed since 2000. In addition to the escalation in the basic cost of materials and labor, the complexity of the sites to which equipment is retrofit is believed to have increased. Although there is no index of site complexity that can be referenced, the average size of the generating unit retrofit has decreased. Specifically, Figure 6-3 presents the average generating capacity of the unit retrofit versus the startup year and shows a small but consistent decrease in the average generating capacity. This average capacity of units retrofit with SCR decreased from approximately 600 MW for the first wave of retrofits, to approximately 450 MW for those units deploying SCR in 2012.

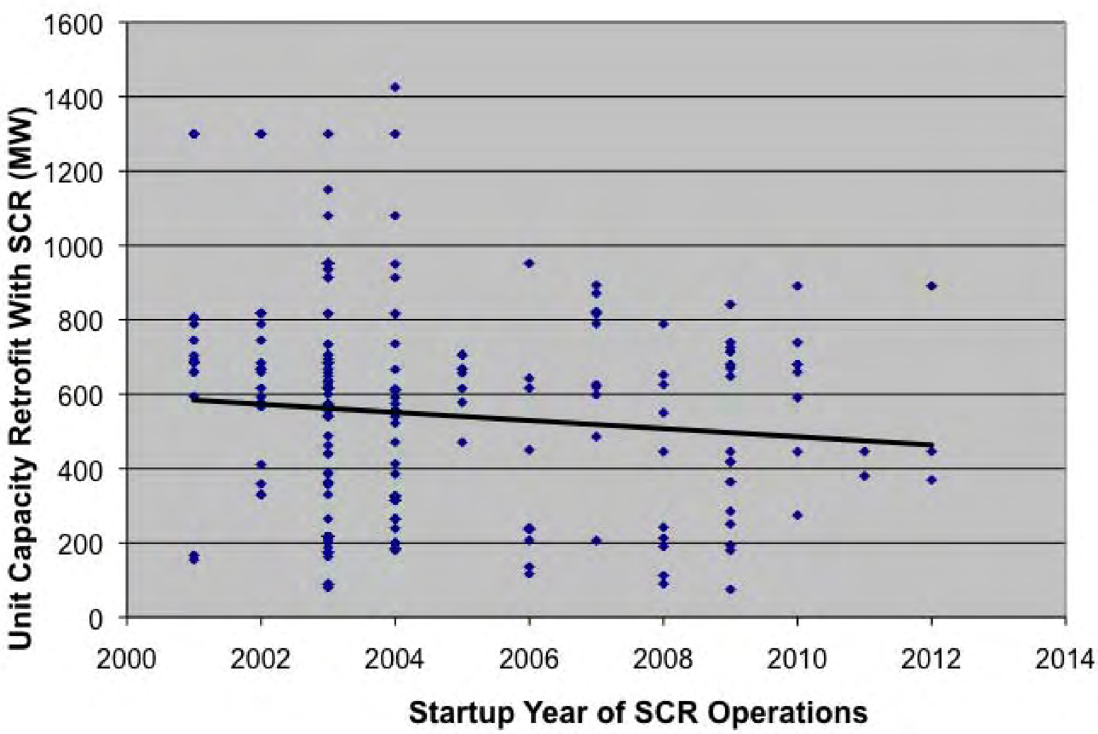


Figure 6-3. Average Generating Capacity of Unit Retrofit with SCR vs. Installation Date

An example of how the role of market forces and site characteristics affect SCR cost is demonstrated by the case of the Associated Electric Cooperative (AEC) SCR installations at the New Madrid and Thomas Hill generating stations.

AEC was as an early adopter of SCR in the U.S., specifically to the challenging case of cyclone boilers, fired by PRB coal. Units 1 and 2 of the New Madrid station retrofit SCR in 2001 and 2002, respectively. These units were designed and constructed by a leading engineering firm, and have proved to be capable designs. AEC was able to exploit market forces at the time – an evolving SCR market, with strong competition from numerous suppliers and service providers – and retrofit each 680 MW unit for less than \$100/kW (2008 dollar basis). Figure 6-4 depicts the site and layout of the New Madrid SCR-equipped units, showing the available space for the SCR reactors.

Figure 6-4. Site Layout for Associated Electric Cooperative's New Madrid Station, Units 1 and 2. (SCR reactors denoted within red circle)

In 2008, AEC completed construction of three SCR reactors for each of Thomas Hill Units 1-3. Units 1 and 2 are cyclone boilers, fired by PRB, similar to New Madrid. The small generating capacity of these units (180 and 285 MW for Units 1 and 2, respectively), the limited space to locate the reactors, and restricted access all serve to elevate construction cost. Figure 6-5 depicts the site and layout of the Thomas Hill station, identifying the SCR reactors for Units 1 and 2.

AEC was not able to replicate the favorable market conditions encountered when the New Madrid units were built; notably the process supplier that provided attractive terms for New Madrid has withdrawn from the market. The demand for components, materials, and construction labor incurred during 2007 and 2008 timeframe exceeded that for the timeframe when the New Madrid units were constructed. As a consequence of these conditions, the capital cost to retrofit SCR for these units averages $300/kW – essentially three times the cost of New Madrid units. That an SCR-experienced owner such as AEC incurred these costs at Thomas Hill – while expending the same diligent effort as at New Madrid – demonstrates the strong role of market forces and site conditions in controlling technology costs.

Figure 6-5. Site Layout for Associated Electric Cooperative's Thomas Hill Station, Units 1 and 2. (SCR reactors denoted within red circle)

OPERATING COST

Operating costs for SCR processes consist mostly of replacement catalyst and ammonia-based reagent. Each of these cost components has increased significantly in the last 10 years. In the early stages of SCR operation, catalyst replacement was the dominant component of operating cost. In the last ten years, a decrease in catalyst cost and escalating natural gas (and thus ammonia) prices have inverted this relationship, so that for most units reagent supply dominants operating cost. Fixed operating and maintenance costs are generally small compared to these two components, and typically are less than 1% of total capital, incurred annually.

Factors affecting catalyst and reagent supply and reagent cost are discussed subsequently.

SCR Catalyst

Historically, supply of catalyst comprised the largest operating component of SCR NO_x control. The unit cost of catalyst has greatly decreased since the early 1980s. Further, the ability to regenerate or rejuvenate catalyst for approximately 50% of new product price restrains price.

Figure 6-6 presents the unit price of catalyst since the early 1980s, corrected to a 2008-dollar basis, showing a decrease in unit price by a factor of five since the earliest commercial bids. The minimum price of near $4,000/m^3$ first occurred in 2005, and prices approximating this level continue today.

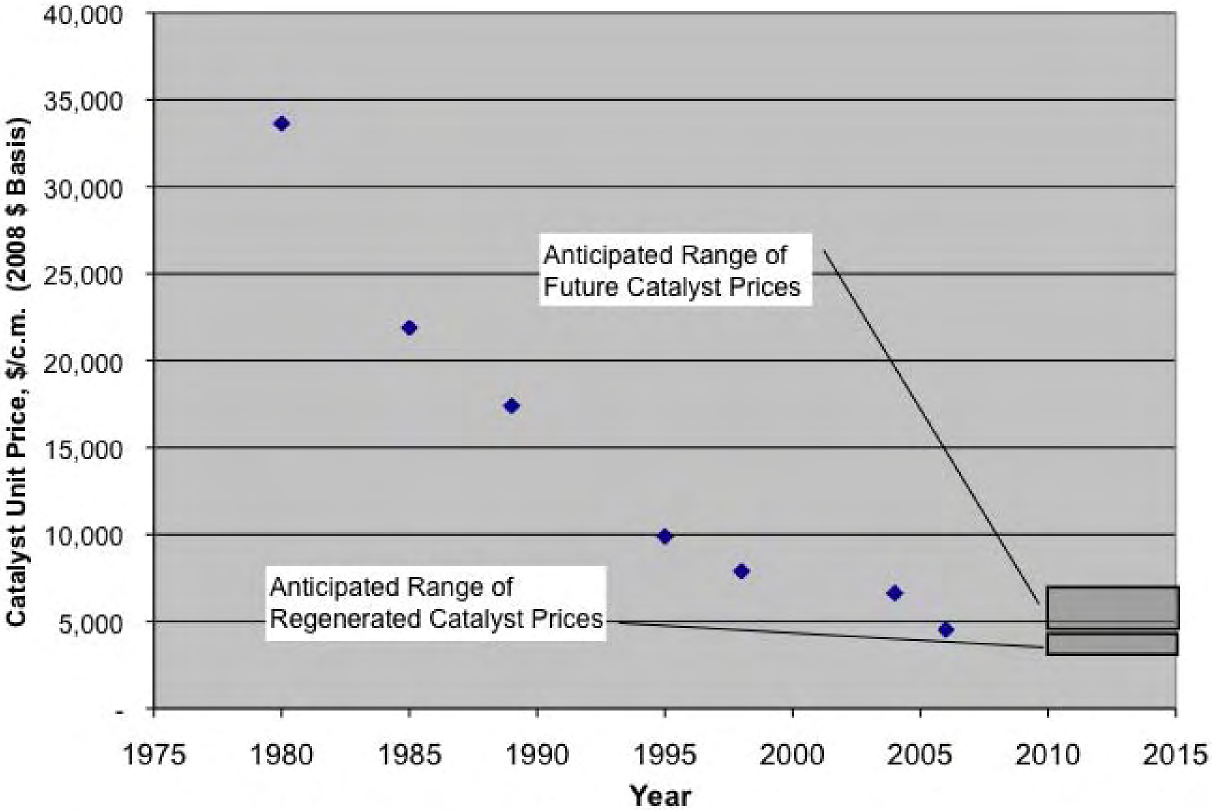


Figure 6-6. History of SCR Catalyst Prices: 1980- 2008 (2008 Dollar Basis)

Limited catalyst availability, requiring orders to be placed almost one year in advance, was observed in recent years as many operators prepared seasonal SCR reactors for annual operation, which included supplementing or replacing existing catalyst layer. However, catalyst prices remain in the approximate range of $5,000-6,000/m^3 and are anticipated to remain in this range during the next 5 years.

The consequence of the catalyst price decrease is that catalyst procurement no longer dictates SCR cost as it has in the past. In fact, catalyst management decisions at present can exploit low prices to insure the reactor has adequate catalyst activity, to confine catalyst replacement to major outages, avoiding unit shutdown for the purpose of catalyst addition or exchange.

Reagent

Any savings in SCR operating cost due to catalyst price decreases have been offset by escalation in delivered price of ammonia-based reagent. SCR operators can choose from four types of ammonia-based reagent: anhydrous ammonia, aqueous ammonia of 19.5% NH_3 content or 29% NH_3 content, or urea. For the purposes of this discussion, anhydrous ammonia will be discussed as an example, recognizing that the alternative reagent forms are equally viable.

The cost of anhydrous ammonia is as much as 80-90% determined by the cost of natural gas feedstock. In late 2008, the cost for anhydrous ammonia for both agricultural and industrial uses jumped to well in excess of $600/ton for many suppliers. The moderation in natural gas prices and muted demand in the global economy has allowed ammonia reagent prices to relax from these 2008 highs. An industry report (CRU, 2009) predicts the price of anhydrous ammonia as-delivered to Tampa, Florida, to be approximately $300-350/ton for the early portion of 2010. This cost is consistent with a delivered cost to generating stations for anhydrous ammonia of $400/ton, the same as the level experienced in 2007.

Example Operating Cost

The operating and maintenance cost for an SCR process can be developed (for a hypothetical 500 MW unit), based on assumptions in Table 6-1 that define the conditions of operation. These are:

Fixed O&M. Spare parts and support for miscellaneous duties that must be executed regardless of unit operation are assumed to require 0.50% of process capital.

Catalyst Supply. Catalyst supply cost is determined by long-term purchases from which an annual-equivalent average can be calculated. The long-term purchases are dictated by catalyst addition to the empty spare layer, and replacement of existing layers. For an SCR reactor employing a 2+1 catalyst arrangement, an initial space velocity of 3,200 1/h, and a 16,000 hour period for an initial operating guarantee, the purchase of one layer for every 16,000-20,000 operating hours may be required, depending on the process design and fuel type. Operating experience through 2009 suggests this catalyst management strategy, typical of initial assumptions adopted by many operators, is proving to be a best-case scenario, and that greater volumes of catalyst are required, or more frequent catalyst changeout is needed.

Reagent Cost. The purchase of anhydrous ammonia for 90% NO_x removal from 0.35 lbs/MBtu, at 85% capacity factor, defines the reagent cost. A delivered price of $400/ton is assumed.

Auxiliary Power. Auxiliary power for an additional 6 inch water gauge (w.g.) flue gas pressure drop is assumed – 5 inch w.g. for the process flange-to-flange, and an additional 1 inch w.g. across the air heater.

Catalyst Cleaning. Sootblower consumption of 0.2% of the plant steam output is adopted; this steam is assigned a cost of $1/MBtu. Many new SCR installations employ acoustic horns for cleaning, which require less auxiliary power.

Operating Staff. The addition of one operator is assumed for maintenance of the above components. Also, a part time (25%) engineer to assess operation and evaluate data is assumed. The need to account for additional staff due to SCR is highly variable; some owners report additional operating or engineering staff is not added for these purposes. However, these assumptions are adopted to account for operations and staff duties that did not exist prior to SCR.

The capital cost observed in Figure 6-1, when combined with updated operating costs in Table 6-1, provides an indicator of SCR cost-effectiveness, or the cost per ton of NO_x removed. Figure 6-7 presents the cost per ton of NO_x removal for a hypothetical 500 MW unit, utilizing a 2+1 catalyst arrangement, with an initial NO_x input of 0.38 lbs/MBtu, as a function of SCR capital cost.

Calculations are reported for an eastern bituminous coal with approximately 0.38 lb/MBtu furnace NO_x exit, and a PRB-fired unit assumed to produce 0.20 lb/MBtu. Results presented in Figure 6-7 for the eastern bituminous coal employ operating cost in Table 6-1, while calculations for PRB coal employ lower cost for reagent use and catalyst consistent with lower inlet NO_x. Figure 6-7 results also assume a 15-year book life (i.e., cost recovery period) and thus a capital recovery factor of 0.12.

Table 6-1. Key SCR Operating Cost Components: 500 MW Reference Plant ($150/kW Capital, 2008 Dollar Basis)

Operating Cost Component	Basis	Annual Cost for 500 MW ($/yr)	Annual Cost for 500 MW (mills/kWh)
Fixed O&M	0.5% of Process Capital	150,000	0.04
Labor	Operators/Part-time Engineer	125,000	0.03
Fuel Cost	Auxiliary Steam	100,000	0.02
Reagent	90% NO_x removal (from 0.38 lb/MBtu)	885,000	0.25
Auxiliary power	6 in. w.g. total @ $20/MWh	265,000	0.07
Catalyst Supply	16,000 hr guarantee for 2+1 reactor	675,000	0.15
Total		2,200,000	0.59

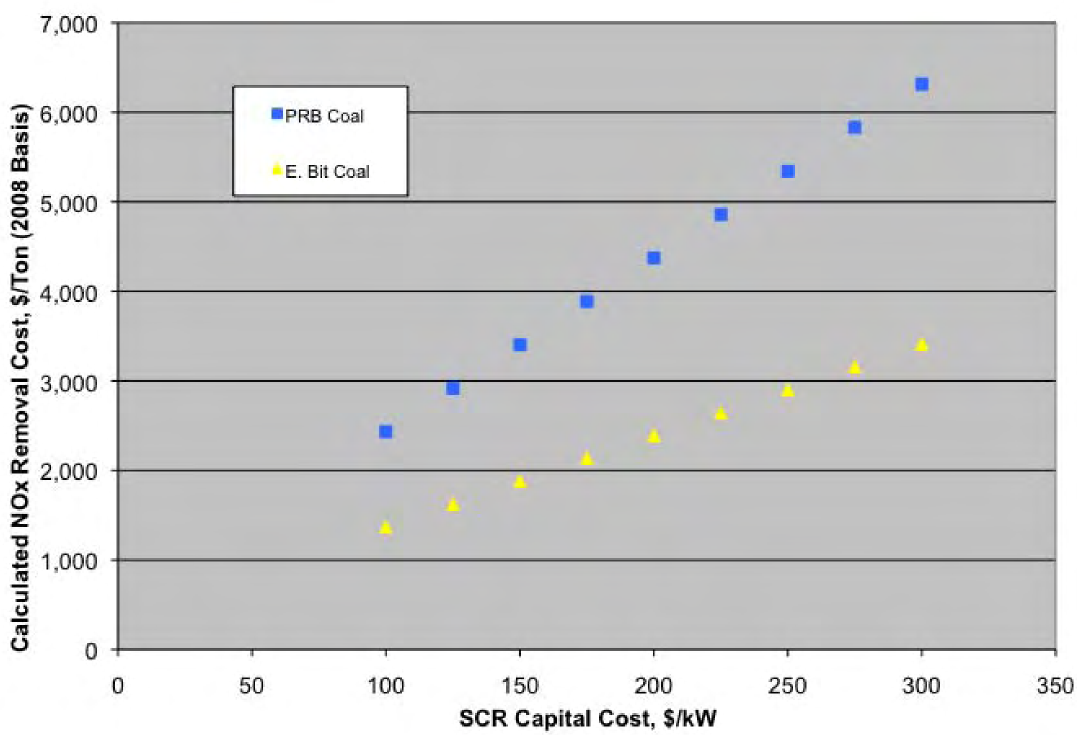


Figure 6-7. NO_x Removal Cost per Ton ($/ton), Year 2008 Basis.

For the eastern bituminous coal, an increase in capital cost from \$100/kW to \$300/kW elevates the cost of NO_x removal from \$1,200 to more than \$3,200/ton. For the PRB coal, with lower inlet NO_x rate and lower operating costs, the same capital cost increase elevates NO_x removal cost from approximately \$2,300 to more than \$6,000/ton. The costs will change in proportion to the boiler NO_x generated.

SECTION 7

CONCLUSIONS

The escalation in cost to acquire and retrofit environmental control equipment has moderated from the rates in 2007 and 2008. Two factors are responsible for this outcome. First, the moderated demand for goods in response to a slower world-wide economy has lowered prices for most components of finished goods. Delivered prices for some goods are unchanged, while others are reduced by 10-20% from the 2007 and 2008 highs.

Second, the skilled labor pool for which shortages in 2007 and 2008 limited the rate of project completion is in less demand. For most skilled trades, labor prices have not decreased, but continue to escalate at modest rates of 1-2% annually. The productivity in deploying this labor will likely be higher, due to the improved skill and experience of the average available worker.

The capital cost of retrofitting either wet FGD or SCR increased over the recent 4-year period, from about 2005 through 2009, and specifically for a 500 MW plant, by approximately $50-65/kW. This same rate of cost escalation is anticipated to continue for the next 4-6 years, elevating the cost of equipment installed in 2014 and 2015 for a CAIR Phase 2 mandate and the anticipated HAPs MACT rule.

Two reasons suggest why installed cost will continue to escalate despite the world-wide economic slowdown. First, the $50-65/kW increase represents an average since approximately 2005; price and schedule pressures existed prior to the 2007 and 2008 increases. In 2009, material prices have moderated but not significantly, while labor escalation continues.

Second, the remaining units to be retrofit feature more complicated sites. These units are smaller in generating capacity, and frequently represent single-unit installations that cannot share common facilities, such as reagent preparation, byproduct handling and storage, and a wet stack. Further, the layout of the host sites will be more compact, with greater interference from existing equipment, requiring a more complex and labor-intensive design.

SECTION 8

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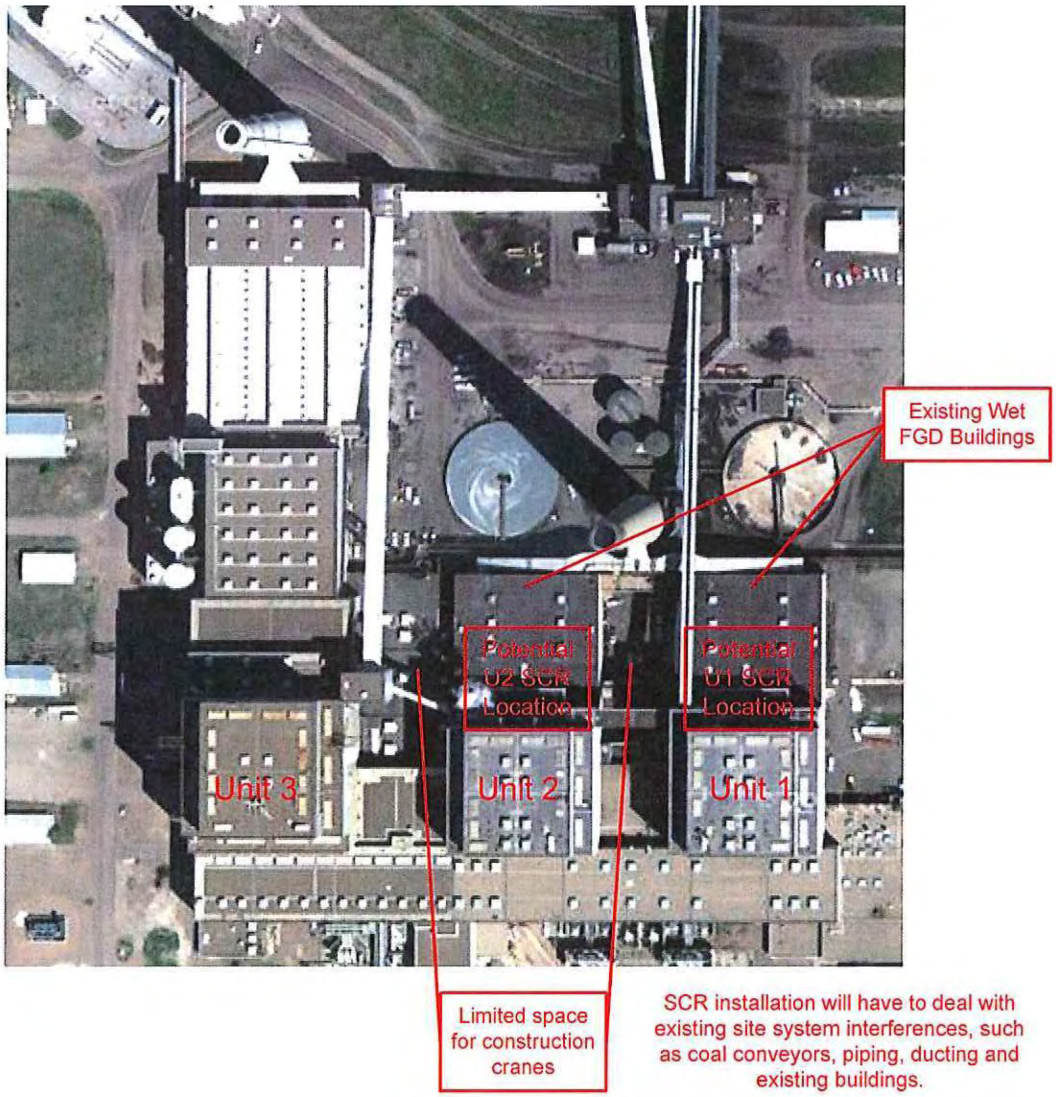
Figure 2. Sherco Plant Site Photo



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February 3, 2012

VIA EMAIL – catherine.neuschler@state.mn.us
and Facsimile – 651-297-8324

Ms. Catherine Neuschler
Minnesota Pollution Control Agency
Environmental Analysis and Outcomes Division
520 Lafayette Road North
St. Paul, MN 55155-4194

Re: United States Steel Corporation – Minnesota Ore Operations
Minntac and Keetac Plants
Comments on Draft Regional Haze State Implementation Plan Supplement

Dear Ms. Neuschler:

United States Steel Corporation (U. S. Steel) is pleased to submit comments on the subject Regional Haze State Implementation Plan Supplement. While the proposed revisions include some laudable provisions, we have significant concerns with the proposal as expressed herein. We believe the Minnesota Pollution Control Agency (MPCA) has not amply justified the need to impose the restrictions proposed on the U. S. Steel taconite facilities. We begin with general comments regarding the proposed revisions; and then provide specific comments as they are applied to Minntac and Keetac, respectively.

GENERAL COMMENTS

1. MPCA has proposed to use Administrative Orders and Administrative Orders "by Consent" as a means to establish enforceable limitations as MPCA has unilaterally deemed necessary to satisfy BART. First, U. S. Steel would like to point out that the MPCA has not adequately worked with U. S. Steel on the administrative orders and, despite the Keetac order being referenced "by consent," by no means does U. S. Steel consent to the order as drafted. While we would be receptive to entering into such orders with MPCA, as appropriate to satisfy MPCA's Regional Haze obligations, we believe the Orders require substantial revision. Furthermore, MPCA requires U. S. Steel's consent to use the Orders as part of the proposed SIP revisions, as the authority to impose the Order without consent, per 116.07 subd 9, is limited to enforce Chapters 116 and 114C of the Minnesota statutes, none of which includes

BART or regional haze.

2. With regards to the Administrative Orders, the MPCA regulations provide that BART determinations in Minnesota are to be made according to EPA's guidelines at Appendix Y of 40 CFR 51. Under Section V of Appendix Y, the guidelines state, "To complete the BART process, you must establish enforceable emission limits that reflect the BART requirements and require compliance within a given period of time. " Since the SIP plan as submitted must contain emission limitations that represent BART and the BART process, to be complete, must be enforceable, this again supports the argument that the BART limitations, and thus the Administrative Orders, must be final and enforceable at the time the State submits the SIP revisions. While MPCA may anticipate that the Orders will be enforceable, the Orders are not currently enforceable and are inappropriately included as a proposed SIP revision until such Orders are indeed enforceable.

3. The draft Administrative Orders contain a requirement for "permanent" recordkeeping, e.g., "Minntac shall permanently maintain the following information together with all amendments, revisions, and modifications to this information. Information on NO_X, SO_2, and PM emission limits and operational requirements imposed by this Order. These records include this Order. Such a requirement is unnecessary and onerous. Such records should only be required to be maintained until such limits and requirements are incorporated into a federally enforceable permit. In any case, a requirement to maintain records permanently, i.e., forever, is unreasonable.

4. The proposed revisions inappropriately rely on the Cross State Air Pollution Rule (CSAPR). As you are aware, on December 30, 2011 (albeit, after the draft revision was submitted for public comment), the Court of Appeals for the District of Columbia Circuit stayed CSAPR pending the Court's review of petitions filed with the Court in the matter. While the Court has obligated EPA to continue to work with the remanded Clean Air Interstate Rule, in the interim, it is inappropriate and illogical to assume that any reductions from EGUs would result from either rule, as one is stayed and the other is remanded. U. S. Steel specifically disagrees with MPCA's assertion that "it is reasonable to assume that EPA's [once anticipated] rulemaking will determine that the emission reductions from TR [Transport Rule, i.e., CSAPR] will be equivalent or better than those provided by source-specific BART." Furthermore, U. S. Steel disagrees with MPCA's reliance on CSAPR or CAIR, as CAIR is remanded and inappropriate for reliance; and CSAPR is stayed and subject to current litigation. MPCA's has not substantiated its claim that it is appropriate to rely on controls at EGUs that the EGUs were planning to install in order to comply with CAIR (or CSAPR} since EGUs have challenged these rules For these reasons, at this point, it is inappropriate to rely on CAIR, CSAPR, or any replacement or modified rule for BART. Because of the pending CSAPR litigation and remand of CAIR, U. S. Steel is

concerned that non-EGUs, like Keetac and Minntac, could bear a disproportionate burden to satisfy MPCA's BART obligations.

5. While MPCA has indicated that certain sources identified in the proposed SIP revisions are not included in the BART requirement, how MPCA came to such a conclusion is not clear in the proposed SIP revision. MPCA should provide its BART analysis in accordance with 40 CFR Part 51, Appendix Y.

6. The MPCA unnecessarily and inappropriately requires the sources to comply with the emission limits during periods of start-up, shutdown, and malfunction (SSM). First, as explained below, this is incorrect as to the derivation of the limits and confidence intervals, i.e., MPCA incorrectly assumed that the data included such events, as it is unclear how MPCA accounted for periods of SSM/bypass. Second, such a requirement and inclusion is inconsistent with EPA's BART Guidelines established at 40 CFR Part 51, Appendix Y, which clearly states, "[t]he emission estimates used in the models are intended to reflect steady-state operating conditions during periods of high capacity utilization. We do not generally recommend that emissions reflecting periods of start-up, shutdown, and malfunction be used, as such emission rates could produce higher than normal effects than would be typical of most facilities. We recommend that States use the 24-hour average actual emission rate from the highest emitting day of the meteorological period modeled, unless this rate reflects periods [of] start-up, shutdown, or malfunction." As explained below, MPCA incorrectly concluded that the data sets used in its analysis included such periods of start-up, shutdown, or malfunction. For this reason, U. S. Steel requests that the provision that the limits be met during periods of start-up, shutdown, or malfunction be removed from the proposed orders. In the alternative, U. S. Steel suggests that MCPA specifically include language in the Orders that would allow sources to assert the affirmative defense during such periods. The EPA's interpretation of the Act related to exclusions from emission limitations for sources in certain startup, shutdown, or malfunction situations was upheld by the United States Court of Appeals for the Sixth Circuit in Michigan Mfrs. Ass'n v. Browner, 230 F.3d 181 (6th Cir. 2000), upholding the 1982 and 1983 Bennet memos. USEPA has continued to use such an approach when reviewing SIPs. *See, e.g.*, approval of New Mexico SIP, 734 FR 46910, September 14, 2009, *Federal Register*.

7. MPCA has performed a statistical analysis on very limited data. Much of the CEMS data used to develop limits for the U. S. Steel facilities is based upon only six quarters of data during a time period that was not representative of optimum production. Due to economic conditions lines at Minntac were just restarting after idled periods and Keetac was not operating until January 2010. U. S. Steel is concerned that it could unreasonably be faced with non-compliance with the proposed Orders during periods of peak production since these periods are not represented in the data that MPCA used to develop the BART limits. U. S. Steel strongly believes that any emissions

limits must account for such peak production periods.

8. While U. S. Steel appreciates that MPCA is relying on current controls for non-EGUs to satisfy its BART requirements, the BART limits are inconsistent among similar operations (based upon existing equipment and practices at such sources), which results in an inequitable burden among sources to satisfy the BART requirements. While U. S. Steel is not suggesting that MPCA act contrary to anti-backsliding requirements, sources that have historically performed superiorly in the past, should be granted more flexibility in its options to satisfy BART.

KEETAC

9. As identified in the Consent Order, the MPCA's long term strategy determined that an appropriate mechanism for implementing the long term strategy for the taconite facilities is their demonstration that each facility is in attainment with the one-hour NAAQS for SO_2 and NO_x.

   U. S. Steel Comment:
   U. S. Steel - Keetac facility has already demonstrated compliance with the one-hour NAAQS for both the existing operations and permitted expansion at the facility and has enforceable limits associated with it. Therefore, U. S. Steel believes the Keetac facility has fulfilled its obligations associated with the SIP and no additional emission limits are necessary.

   Proposed Resolution
   Remove the draft Order pertaining to Keetac from the MPCA's draft Regional Haze SIP Supplement. There is already a federally enforceable permit with such limits and requirements.

   In the event that MPCA disagrees with the previous comments, and intends to keep the Keetac Order in the SIP and U. S. Steel consents to the Keetac Order, then the following comments apply:

10. The Administrative Order is drafted to United States Steel Corporation Keewatin Taconite.

   U. S. Steel Comment:
   The facility name is Keetac; and while U. S. Steel maintains that an order is not necessary or appropriate, any references to the facility should reflect the correct name of the source as Keetac.

   Proposed Resolution

Replace all references to "Keewatin Taconite" with Keetac.

11. The Order specifies, in paragraph 19, that Keetac must model compliance with the one-hour NAAQS. In paragraph 21.I.a.i of the Order, MPCA specifies the schedule for modeling and the compliance demonstration requirements. .

    U. S. Steel Comment:
    The Keetac facility has already demonstrated compliance with the one-hour NAAQS for NO_x and SO_2 during the Keetac Expansion permitting process. The permit was effective on October 19, 2011 and contains one-hour limits to ensure compliance with both standards.

    Proposed Resolution:
    Delete the requirements stated in 21.I.a.

12. In paragraph 20.I.c.ii, the Order incorrectly discusses the flow weighted mean concentration *of all stacks* for the furnace.

    U. S. Steel Comment:
    The Keetac furnace is constructed with one stack.

    Proposed Resolution:
    Correct the reference to reflect that the furnace is constructed with one stack.

MINNTAC

13. In paragraphs 20.I.a.6 and 20.I.b.6 of the Order, MPCA specifies that hours during which the subject emission unit does not operate are not included in the calculation of the rolling average. Periods of startup, shutdown and malfunction are included in the calculation of the rolling average.

    U. S. Steel Comment
    The analysis performed by the MPCA to determine appropriate limits utilized the 30 day rolling sum for SO_2 and NO_x which is supplied quarterly to the agency. These calculations include the periods in which the emission unit is not in operation, in addition to periods of startup, shutdown, and malfunction. Therefore, the emission limit should include all these periods to maintain consistency. (See, also, general comment 6 above.)

    Proposed Resolution
    The method of calculation to establish the NO_x and SO_2 limits should be in accordance with 40 CFR §75. U. S. Steel utilizes a Data Acquisition System and follows standard data substitution procedures outlined in that part. The emission limit

calculations should include periods of when the emission unit is not operating along with the data substitution method applied during periods of startup, shutdown and malfunction. U. S Steel has supplied this information in quarterly CEMS reports.

14. The Consent Order establishes limits for each emission unit (Agglomerating Lines 3-7).

    U. S. Steel Comment
    U. S. Steel requests rather than the agency imposing a limit on each line, instead establish a limit for the combination of the emission units for SO_2 and NO_x, respectively. A combined limit from all five lines provides operational flexibility for the facility without increasing overall emissions. This is necessary due to historical experience the facility has with Continuous Emissions Monitoring Systems (CEMS) and our commitment to future pollution reduction projects.

    Minntac has CEMS on all five indurating lines at Minntac. Although two units have been recently replaced, the possibility exists for an issue to occur with an individual unit. As the downtime increases, data substitution requires high values to be input, which could put an individual line in jeopardy for noncompliance. With a combined limit, the opportunity exists for the other lines to compensate for any individual CEMS issues.

    U. S. Steel has submitted an application for the installation of a dry scrubbing system on indurating line 6 which includes state of the art SO_2 controls which have not been installed on pelletizing lines in the US. In addition, U. S. Steel has installed Low NO_x Main Burners on two of its indurating lines and will be submitting an application to make installations on additional lines. Again, this was an innovative technology installed as a pilot testing requirement as this technology is not currently installed at other taconite facilities in the US. Based on our experiences a combined limit will allow U. S. Steel to install these controls, allow for a start up shakedown period, while ultimately reducing the facility's overall emissions.

    In summary, a combination limit would allow for operational flexibility due to potential monitoring issues and, more importantly, to optimize pollution reduction equipment as it is installed without violating an individual emissions limit, while still meeting the BART requirements.

    Proposed Resolution
    Establish a combined SO_2 limit for Lines 3-7 and establish a combined NO_x limit for Lines 3-7.

15. The Minntac Line 5 SO_2 limits in the Order are not consistent with what is provided in the text and the BART determination memo. In Paragraph 20.b..3. of the Minntac

Draft Order MPCA provides that , "*SO_2 emissions from Line 5, EU282, shall not exceed 1.19 tons per day at all times when EU282 is operating, measured on a 30-day rolling average. This limit applies only when the line is burning natural gas or wood;*"

U. S. Steel Comment

The SO_2 limit for Line 5 is listed as 1.10 tons/day on a 30 day rolling average basis in Section 2.4 (Minntac BART Determination memo section) and Table 1 of MPCA's Regional Haze State Implementation Plan Supplement. However this appears to be in error with the analysis performed and does not agree with the 1.19 tons/ per day as identified in the Order

Proposed Resolution

Section 2.4 (BART Determination memo - Minntac Section) and Table 1 of the MPCA's Regional Haze State Implementation Plan Supplement needs to be corrected to 1.19 tons/day on a 30 day rolling average basis.

16. In paragraph 20.I.c.ii of the Order, MPCA provides a reference to "the flow weighted mean concentration of all stacks for the furnace."

U. S. Steel Comment:

The Minntac lines are constructed with one stack.

Proposed Resolution:

Correct the reference to reflect that the Minntac lines are constructed with one stack.

Again, U. S. Steel appreciates the opportunity to provide these comments and would be pleased to meet with the MPCA to discuss our concerns. We look forward to working with the MPCA to develop a Regional Haze State Implementation Plan Supplement that complies with the Clean Air Act and is protective of air quality in Minnesota, especially its Class 1 areas, while not unnecessarily burdening our taconite operations. Should you have any questions regarding these comments, please contact me by phone at (218) 749-7364 or via email at clbartovich@uss.com.

Sincerely,

Chrissy Bartovich
Director, Environmental Control
Minnesota Ore Operations

February 3, 2012

ArcelorMittal

Catherine Neuschler
Minnesota Pollution Control Agency
Environmental Analysis and Outcomes Division
520 Lafayette Road North
St. Paul, MN 55155-4194

Re: Comment on Minnesota's Draft Regional Haze State Implementation Plan Supplement

ArcelorMittal Minorca Mine Inc. (ArcelorMittal) hereby submits its comments to the Minnesota Pollution Control Agency (MPCA) on its Draft Regional Haze State Implementation Plan (SIP) Supplement. These comments address five areas of interest and revisions that we ask MPCA to consider before it finalizes the SIP Supplement:

(1) MPCA Appropriately Recognizes Existing Federal NAAQS Obligations as Its Long-Term Strategy for the Taconite Industry But Should Proceed without an Expedited BART Schedule for Modeling.
(2) The Air Dispersion Modeling Schedule Should Be Delayed to Allow for Pending Model Improvements
(3) The Proposed NO_x Limitation is Inappropriate
(4) The Proposed SO_2 Limitation Should Accommodate Higher Sulfur Iron Ore Deposits
(5) The Compliance Testing and Monitoring Approach Is Unnecessarily Burdensome

Each of these issues is addressed in detail below and, where warranted, specific revisions to the SIP Supplement are proposed.

The Regional Haze Rule

In 1999, the U.S. Environmental Protection Agency ("U.S. EPA") published regulations to address visibility impairment in our nation's largest national parks and wilderness areas ("Class I areas"). This rule is commonly known as the "Regional Haze Rule" (the "Rule"). The Rule requires Minnesota to establish and achieve visibility goals for each of its Class I areas by regulating certain emissions believed to contribute to regional haze. The Rule requires that MPCA must submit to U.S. EPA a Regional Haze State Implementation Plan (SIP) that identifies sources that cause or contribute to visibility impairment in these areas. The Regional Haze SIP must also include a demonstration of reasonable progress toward reaching the 2018 visibility goal for each of the state's Class I areas.

One of the provisions of the Regional Haze Rule is that certain large stationary sources that were put in place between 1962 and 1977 and have modeled contributions to regional haze in Class I areas must conduct a Best Available Retrofit Technology (BART) analysis. The purpose of the BART analysis is to analyze available retrofit control technologies for these existing sources to determine if a technology meets the rule criteria and must be installed to improve visibility in Class I areas. The chosen technology

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is referred to as the BART controls, or simply BART. The SIP must require BART on all BART-eligible sources that are deemed "subject to BART."

The Minnesota State Implementation Plan – December 2009

Pursuant to the Rule, in December 2009 MPCA submitted a Regional Haze SIP to U.S. EPA identifying sources that cause or contribute to visibility impairment in its Class I areas. The SIP states that key haze causing emissions in Minnesota are sulfur dioxide (SO_2), nitrogen oxides (NO_X) and particulate matter (PM). As required by the Rule, the SIP documents the BART determinations for each subject-to-BART facility. In general, BART for the taconite facilities consisted of the following:

SO_2	Operation of existing scrubbers
NO_X	Good combustion practices
PM	Continued implementation of the Taconite Maximum Achievable Control Technology (MACT) standard

However, due to a lack of sufficient emissions data at the taconite facilities, the MPCA was unable to include numeric BART emission limits for NO_X for Taconite facilities and SO_2 for taconite facilities that burn higher sulfur fuels. Therefore, the MPCA entered into Administrative Orders (AOs) with each of the taconite facilities, including ArcelorMittal. The AOs required the taconite facilities to perform testing and monitoring and to report the results to MPCA.

The Draft Regional Haze State Implementation Plan Supplement – December 2011

In December 2011, the MPCA published a draft SIP Supplement which contains proposed numeric BART limits for NO_x and SO_2 for all taconite facilities, memos describing the process for setting the BART emission limits for each facility, and draft AOs designed to make the proposed BART limits enforceable. In addition, the draft SIP Supplement proposes changes to the strategy for the Northeast Minnesota Plan, which is part of the long term strategy to improve visibility in Class I areas.

The public comment period for the draft SIP Supplement runs through February 3, 2012.

ArcelorMittal Comments on the Draft Regional Haze State Implementation Plan Supplement

ArcelorMittal provides the following comments in regards to the draft SIP Supplement and the enclosed draft AOs as published by MPCA on December 19, 2011.

1. **MPCA Appropriately Recognizes Existing Federal NAAQS Obligations as Its Long-Term Strategy for the Taconite Industry But Should Proceed without an Expedited BART Schedule for Modeling.**

In the Regional Haze SIP Supplement, a key component of MPCA's "Long-Term Strategy" for reducing regional haze emissions from the taconite industry is compliance with the 1-hour SO_2 and NO_2 National Ambient Air Quality Standards (NAAQS). MPCA appropriately recognizes that the taconite industry is preparing to comply with a number of regulatory requirements that target reductions of the

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compounds regulated for regional haze. The State is required to consider these "emission reductions due to ongoing air pollution control programs" in developing its Long-Term Strategy for the BART SIP. See 40 CFR 51.308(d)(3)(v)(A). After the 2009 Regional Haze SIP, new NAAQS were finalized for NO_2 and SO_2 that are expected to produce emission reductions relevant to regional haze goals, and these emission reductions must be considered in the development of Minnesota's Long-Term Strategy. ArcelorMittal supports MPCA's decision to rely on the new NAAQS, instead of its 2009 Northeast Minnesota Plan for the taconite industry, to achieve the reasonable progress goals required in its Long-Term Strategy under the Rule. The NAAQS approach allows sources to choose their compliance strategies to meet a common numeric federal standard. The Northeast Minnesota Plan, by contrast, would have imposed a unique obligation on Minnesota facilities to fund and implement pilot projects in the hope that they would produce a cost effective emission control technology for the industry. By adopting NAAQS compliance as its Long-Term Strategy for regional haze, MPCA removes an additional and unnecessary state-specific burden on Minnesota businesses.

While MPCA appropriately considers the effect of the new NAAQS on relevant emission reductions to help Minnesota meet its regional haze goals, it is not necessary or appropriate to adopt aspects of those other programs into the BART SIP as MPCA does by mandating NAAQS modeling for the taconite industry as part of its proposed AO for BART. NAAQS modeling is following an implementation schedule that is driven by federal requirements for establishing nonattainment areas and strategies to bring those areas into attainment. SO_2 and NO_2 are on different implementation schedules with EPA prioritizing SO_2 modeling for a SIP Call deadline in June 2013. NO_2 modeling is on a slower implementation schedule in part because the modeling must consider complex atmospheric interactions that convert some NO_x emitted into NO_2 downwind. Importantly, EPA is not currently requiring that states use modeling to set regulatory limits for NO_2. It is premature, therefore, for MPCA to include NO_2 modeling in an AO with the intent of relying on its results for making decisions regarding emission controls at the end of 2012.

MPCA may rely on the benefits to be derived from meeting the one-hour NAAQS for NO_2 without arbitrarily expediting its implementation ahead of the refinements to the model expected from EPA. The NO_2 NAAQS process is currently on schedule to produce emission reductions by 2017, which will be in time to help MPCA achieve BART goals by 2018. SO_2 modeling is currently underway to meet NAAQS obligations so an AO mandating SO_2 modeling is also unnecessary. MPCA is relying on CAIR, CSAPR, NAAQS, and many other regulatory obligations to help reduce SO_2 and NO_x emissions without requiring or needing an AO from affected sources. Thus, it seems arbitrary to require the taconite industry to sign an Order mandating NAAQS modeling for NO_2 and SO_2. The NAAQS process will produce appropriate emission reductions on its own timeline, which can be relied upon to meet BART SIP limits without using an AO.

2. The Air Dispersion Modeling Schedule Should Be Delayed to Allow for Pending Model Improvements

To the extent that MPCA chooses to require air dispersion modeling in its BART AOs, the schedules in the SIP Supplement must be adjusted to allow for pending model refinements. MPCA proposes that ArcelorMittal Minorca Mine and the rest of the taconite industry conduct air dispersion modeling to determine the nature and extent of emission controls that will be required to comply with

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the new one-hour NAAQS for SO_2 and NO_2. ArcelorMittal and its industry group, the American Iron and Steel Institute (AISI), have been engaged in discussions with EPA and its air modeling group to raise concerns about the accuracy of the current iterations of the AERMOD air dispersion model when predicting short-term ambient air quality impacts. A study commissioned in Northwest Indiana compared AERMOD's predicted ambient impacts using a 2008 inventory of actual SO_2 emissions to the actual ambient SO_2 concentrations at two monitoring stations. See Attachment 1. The purpose of the study was to determine the model's accuracy in an area dominated by complex manufacturing facilities. Using a Q-Q plot to compare the results, a peer review of the study concluded that the model over predicted the SO_2 ambient impact by a factor of 10 at the 99th percentile (4th highest) daily maximum value. This suggests a fundamental problem in how the model predicts ambient air quality impacts. This study has been presented to EPA along with other studies that reach similar results. The agency will be considering data and presentations at its 10th Modeling Conference this March on how to improve the accuracy of the AERMOD predictions in the vicinity of complex manufacturing facilities. EPA will be considering, for example, methods that use targeted monitoring in the vicinity of the highest modeled concentration to validate or calibrate model predictions. This work must precede any use of the model to render regulatory decisions on the level of emission reduction necessary to meet the national standards because the substantial evidence of inaccuracy would make such decisions arbitrary and vulnerable to legal challenge.

The inaccuracy is more significant now because models are being asked for the first time to predict one-hour impacts for SO_2 and NO_2. These short-term concentrations are significantly affected by meteorological variations that are discounted by AERMOD's assumption that wind direction is constant. The evidence indicates that AERMOD becomes less accurate during low wind periods when its assumptions about wind speed and wind direction run counter to documented observations. For instance, low wind observations typically show a plume moving straight up while AERMOD predicts the plume moves horizontally with downwash characteristics that will invariably produce a higher predicted concentration for local receptors than will actually occur. These obvious inaccuracies and strained assumptions are contributing to the over prediction increasingly demonstrated by model studies. EPA is expected to address some of these issues in modeling guidance after the 10th Modeling Conference.

Unfortunately, the schedules proposed by MPCA would not allow modeling protocols to incorporate EPA's final modeling guidance. A key component of the draft Administrative Order appended to the BART SIP Supplement is a requirement to submit modeling protocols by April 1, 2012 and modeled attainment demonstrations by December 15, 2012 for both SO_2 and NO_2. This schedule must be extended to allow Minnesota facilities to benefit from the refinements to the model anticipated from EPA's 10th Modeling Conference scheduled for March 13-15, 2012. Federal guidance arising from the Modeling Conference is anticipated in the late summer of 2012 and it is expected to address issues critical to improving the accuracy of the models for NO_2 and SO_2. If MPCA moves forward with its current schedule the protocols submitted in April 2012 will have to be revised and resubmitted to address EPA's final guidance.

MPCA's reliance on NAAQS compliance for its Long-Term Regional Haze Strategy should not expedite the timelines for implementing the NAAQS. EPA has embarked on an aggressive timeline for SO_2 modeling that requires states to conduct the air dispersion modeling before a June 2013 SIP Call deadline. EPA is prioritizing efforts to refine and improve SO_2 modeling in 2012 to help address

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widespread concerns that the models significantly over predict ambient impacts. MPCA should require SO_2 modeling protocols no sooner than 60 days after the federal guidance on SO_2 modeling is finalized with final results 90 days after MPCA approves the SO_2 modeling protocol. This helps to ensure that ArcelorMittal will have the benefit of EPA's anticipated improvements to the model when we submit our modeling protocols.

EPA has not called for SIPs that use air dispersion modeling for NO_2. As a result, EPA is expected to continue to work on improvements to the NO_2 modeling after it releases the final SO_2 modeling guidance in 2012. As described in more detail below, the NO_2 model refinements include better methods for predicting complex atmospheric chemistry reactions that produce NO_2 after the NO_x exhaust leaves the stack. These refinements are expected to take more time. Since MPCA does not have a current federally-imposed schedule for NO_2 modeling, ArcelorMittal recommends that the schedule for NO_2 protocols begin after the SO_2 modeling results are submitted. This allows EPA more time to address the complex NO_2 modeling issues before the state requires a modeling protocol. MPCA should require NO_2 modeling protocols no earlier than the first quarter of 2013 with modeling results by the end of 2013. This is still plenty of time to have emission controls engineered and installed to meet the BART SIP goals for regional haze improvements. Minnesota should follow the federal timelines closely to ensure that Minnesota facilities are not burdened by using less accurate models for regulatory determinations than those used by other states.

In addition to the general concerns raised above, ArcelorMittal has several specific concerns about the accuracy of air dispersion modeling for predicting ambient impacts that can be addressed in part at the State level using the discretion that EPA accords to states in implementing the models. The air dispersion modeling issues of concern include, but are not limited to, the following:

- *Representative AERMINUTE Data Is Not Available for All Sources:* Current modeling guidance recommends the use of AERMINUTE for processing meteorological data. The AERMINUTE data set has a much greater frequency of low wind speed conditions which tend to be associated with distorted maximum modeled concentrations, especially for low-level sources and fugitive sources. Since AERMINUTE data is not available from all meteorological stations and it is contributing to over prediction, ArcelorMittal asks that MPCA accept modeling that does not use AERMINUTE data to satisfy BART.

- *Reasonable Background Values Should be Used for Northeastern Minnesota:* Actual ambient data from Northeastern Minnesota is limited, so background values must be developed in some other way. The LADCO default values should provide a ceiling for background concentrations, but States should use lower background concentrations if local data supports the departure. The background method should not include any conservative assumptions because the model predictions are already overly conservative. ArcelorMittal suggests that the State gather available representative actual ambient monitoring data that avoids double counting emissions already reflected by the model inputs. The data should be averaged to remove spikes and outliers that would otherwise contribute to inaccurate assessments of the contribution of background to ambient monitors.

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- *Model the Individual Impact of Indurating Furnaces at Each Facility:* EPA has confirmed that States have discretion to choose a threshold for NAAQS modeling. Modeling all emission sources at all facilities simultaneously at the potential to emit (PTE) is not representative of actual air quality due to the substantial difference between hourly PTE and actual emissions. To avoid overestimating air quality impacts, we suggest modeling the impact of the indurating furnaces at a reasonable maximum operational rate and exclude any space heaters or other minor combustion sources. Also, the impact of ArcelorMittal's emissions should not be combined with the emissions of other companies when evaluating receptor concentrations and emission reductions. Modeling is not accurate enough to be used to allocate responsibility among companies. Only monitored violations should trigger an evaluation of the relative culpability among contributing companies.

- *Limit Modeled Receptors to those Reasonably Exposed:* The role of receptor placement plays a significant part for modeled NAAQS attainment for 1-hour standards. ArcelorMittal asks that MPCA allow NAAQS modeling using "reasonably exposed" receptors. For example, receptors should not be modeled on steep slopes, roadways or bicycle trails where people would be present for much less than one hour.

- *Exclude Intermittent Sources from 1-hour NAAQS Modeling Inputs.* Modeling of non-routine operations (examples: emergency generator, back-up fuel oil, etc.) overestimates a source's actual ambient air impacts. For the probabilistic SO_2 and NO_2 NAAQS, EPA has suggested that intermittent sources have a de minimis likelihood of contributing emissions on the day when meteorological conditions and continuous sources have produced one of the 1-2% worst days of the year. See EPA's March 1, 2011 Modeling Guidance. We recommend modeling of typical facility operations so that the model reasonably predicts the future attainment status of actual air quality. Modeling of maximum potential emissions for all facilities will unnecessarily overestimate actual impacts.

  Modeling of emergency engines / peak shaving engines / monthly engine testing is poorly represented in the model, and emissions are generally overstated in the modeling which leads to unnecessary permit conditions (e.g., can only test one engine for ½ hour between the hours of 10 – 11 am). Therefore, we recommend that these types of sources should not be included in the modeling demonstrations for BART purposes.

- NO_2 –specific modeling concerns:

  a) *Elevated ambient 1-hour NO_2 concentrations are primarily an urban roadway corridor problem*, and not due to stationary sources. Facilities should have the option of placing a monitor in the receptor area with the highest model concentration to demonstrate that actual ambient impacts do not justify emission control expenditures.

  b) *The NO_2:NO_x default in-stack ratio of 0.5 leads to unrealistically high modeled NO_2 concentrations.* A more reasonable default in-stack ratio of 0.1 should be applied for all sources. Alternatively, the timeline could be adjusted to allow the facilities sufficient time

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to conduct performance testing under representative operating conditions to allow a facility to determine a site-specific ratio.

c) *MPCA should streamline approval of Tier 3 NO_2 modeling approaches (OLM / PVMRM) for individual source modeling.* To the extent multiple source modeling is conducted for NO_2, it should be based on photochemical / regional models and not AERMOD.

Based on these concerns with the current modeling and the expected federal guidance on some of these issues, ArcelorMittal recommends that the schedule for submitting the modeling protocol and modeled attainment demonstrations be extended to allow time for these modeling protocol issues to be resolved by EPA before regulatory decisions are made based on inaccurate and unreliable modeled predictions. As indicated above, please consider separating the SO_2 and NO_2 modeling schedules so that SO_2 modeling protocols will come due 60 days after the final federal guidance for SO_2 NAAQS modeling and a modeling report due 90 days after MPCA approves the protocol. The NO_2 modeling protocol should follow the SO_2 modeling report and be due no earlier than April 1, 2013 with a report due be December 31, 2013. These deadlines should be adjustable as needed to allow for the incorporation of anticipated federal developments designed to improve model accuracy.

3. The Proposed NO_x Limitation Is Inconsistent with the Definition of BART

Best Available Retrofit Technology means "an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant which is emitted." See 40 CFR Part 51, Appendix Y, Section V "Enforceable Limits/Compliance Date." BART does not require a redesign of the emission unit or a switch to a different fuel. See Appendix Y, Section IV.D.5. BART does not require curtailments or compromise production rates. As the definition dictates, the BART NO_x emission limitation for an indurating furnace should reflect its full range of operating conditions when continuous good combustion practices are applied. This means that the numeric BART emission limitation cannot be lower than the highest NO_x rate measured during a test that reflects the continuous application of good combustion practices. To the extent that the test did not reflect all operating conditions, a reasonable margin should be added to account for that variability. In the end, an appropriate BART analysis yields a NO_x emission limit that is no less stringent than the BACT limit already in its permit.

In the early 1990s, a BACT analysis was conducted at the Minorca Mine, and the indurating furnace at the facility received an emissions limit of 1088 pounds NO_x per hour to represent the emission rate achieved by best available control technology for the indurating furnace at this facility. The BACT determination and related permitting activities are described in the Technical Support Document for Air Emissions Permit No. 13700062-001. BACT was based on good combustion practices; the same technology that MPCA determined constituted BART for the taconite industry. For the reasons provided below, MPCA should adopt the existing BACT limit (1088 lbs NO_x/hr) as BART instead of the proposed limit in the Supplemental SIP (1018 lbs NO_x/hr).

EPA's Guidelines for BART Determinations under the Regional Haze Rule (Appendix Y to Part 51) proposes a method for evaluating whether an NSR/PSD BACT determination should constitute BART. First, the technology determination should be more recent than "the 1970s or early 1980s". See

Appendix Y at section IV.C. The ArcelorMittal BACT determination meets this criterion. Second, no new technologies subsequent to the BACT determination which would lead to cost-effective increases in the level of control are identified. If the two criteria are met, EPA finds it appropriate to rely on the BACT standard for BART. The good combustion practices that were used to set the BACT limit are the same practices implemented during the extended NO_x stack test conducted in March 2008 under an MPCA AO that produced a maximum emission rate of 1060.5 lbs NO_x/hr. Table 1 of the SIP Supplement references a furnace efficiency project in 2007 as a component of the BART determination for ArcelorMittal. Furnace efficiency is an ongoing objective that is driven by the competitive necessity to reduce costs. The 2007 project was part of an effort to sustain efficiency that would have otherwise deteriorated, but as the 2008 data indicate, it did not constitute a new technology improvement that would justify a step change in the NO_x emission rate since the 1990s BACT determination. ArcelorMittal asks that MPCA use this BACT=BART strategy and set the NO_x BART limit at the 1088 lb/hr BACT limit.

The draft SIP Supplement proposes a lower NO_x BART limit for the Indurating Furnace (EU 026) at ArcelorMittal:

> *NO_X emissions from EU026 shall not exceed 1018.0 lbs/hour at all times that EU026 is operating, measured on a 30-day rolling average.*

The proposed emission limit was developed as described in the draft SIP Supplement in "Appendix 1 – BART Determination Memos" in the document titled *Nitrogen Oxides BART Limits for ArcelorMittal Steel Company* ("the Memo"). As stated in the Memo, the "*MPCA focused analysis on a set of 157 hourly NO_X emission data points collected in March 2008*" pursuant to a BART AO. The purpose of this testing was stated in the Memo as follows:

> *Arcelor was required to collect a minimum of 150 one-hour data points under the range of [furnace] operating parameters that influence NO_X emissions. The range of each operating parameter during testing should be representative of furnace's operating range for the parameters in the 12 months previous to testing.* This requirement was to ensure that the emissions data collected was appropriately representative of the range of operating conditions for the furnace.

As ArcelorMittal explained throughout the data gathering process, a test conducted in one seven-day period cannot reflect the full range of operating parameters in the year prior to testing. Seasonal variations and ore variations that contribute to emission variability cannot be re-created for a testing period. Within this constraint, ArcelorMittal conducted the extended test to be representative of a range of operating conditions.

The Memo also describes MPCA's methodology for calculating the limit as follows:

> *The process of calculating the BART limit for Arcelor's indurating furnace began by constructing a 99% confidence interval and taking the upper prediction level. The MPCA believes the use of a 99% upper predictive level for setting the limit is appropriate, due to the need for limits to be met during all operating conditions, including during times of startup, shutdown, and malfunction.*

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During the development of the statistical justification for the NO_x BART limit, ArcelorMittal again raised concerns to MPCA that the database did not capture all seasonal and ore-related operating conditions. In response to this concern, MPCA used "bootstrapping," a resampling technique used for statistical inference. Using this method, the original data set is resampled multiple times by randomly drawing a set of data points for each replication thereby allowing for a more robust estimation of the true standard error of the population. MPCA used bootstrapping to generate a surrogate population (or data set) consisting of 30-hour average emissions rates. The standard error of this surrogate population was used in the calculation of an upper prediction limit of the mean emission rate of the original 157 data point population (i.e., 994.1 lbs/hour).

While bootstrapping can be an appropriate technique to estimate the true standard error of a population, the surrogate population used to calculate the standard error is based on the original limited data set and the erroneous assumption that the data were representative of all anticipated operating conditions. Furthermore, inherent in the bootstrap procedure is the main underlying assumption that each data point is an independent observation or sample unrelated to any other data point or sample. This is not the case for the underlying data set and it cannot be true for the extended data set when the same population is resampled multiple times. Although the bootstrap analysis increases the number of samples, it does not increase the amount of information in the original data set and is limited by the range of values in the original population (from the original 157 data points). This statistical exercise provides a better estimate of the true variance of the population; however, imposing an emission limit based on this estimate fails to account for expected data points outside the range of values in the original population due to seasonal and ore-related variance. Therefore, the proposed BART NO_X limit does not meet MPCA's objective to set a limit that is achievable under all operating conditions when continuously applying BART technology (good combustion practices).

The MPCA AO for ArcelorMittal requires compliance with the NO_x limit during periods of startup, shutdown and malfunction ("SSM"). The dataset used to set the emission limitation did not contain emission information for SSM events. Therefore, an upper predicted limit calculated from that dataset would not cover the variability introduced by SSM events. This provides additional justification for adding a margin of safety beyond the calculated BART limit in the proposed SIP Supplement.

It is common practice to apply a factor of 10 percent or more to stack test values to accommodate normal source variability and the accuracy of the proposed compliance method when setting an enforceable emission limit. See e.g. MPCA Guidance for Proposing Synthetic Minor Permit Limits, http://www.pca.state.mn.us/index.php/air/air-permits-and-rules/air-permits-and-forms/air-permits/proposing-synthetic-minor-permit-limits.html (recommending that a 10% factor be added to test-based limits to accommodate the accuracy of the proposed compliance method and other variables); see also In re Prairie State, 13 E.A.D. 1, 58 (U.S. Environmental Appeals Board 2006) (accepting Illinois EPA's use of a 10% safety factor as a standard method to accommodate variability in setting a consistently achievable BACT emission limitation).

Ten percent is not a random value; it correlates to the standard performance test objective, which is to operate within 10% (at 90%) of rated capacity. Agencies recognize that operating at 100% capacity is not a realistic expectation during a given stack test because some variables are not within the company's control during a test. Seasonal variations, common in Northeastern Minnesota, and ore

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variations common in any mining operation dictate that testing at or around 90% of capacity is all that can be expected for any given test. Therefore, test data will not reflect the true maximum capacity of the equipment and an upward adjustment is needed to ensure that equipment can use their full capacity when conditions allow without violating their emission limit. Therefore, it is appropriate for MPCA to add 10% to the average value derived from the NO_x stack test data when setting a limit that is achievable under all normal operating conditions. Based on this standard approach to setting enforceable emission limitations from a limited data set, ArcelorMittal's BART NO_x emission limit should be calculated as follows:

1018 lbs/hour (99% UPL from 7-day stack test data set)
+101.8 lbs/hour (10% margin of safety)
1119.8 lbs/hour

This value is greater than the existing NO_x BACT determination already in ArcelorMittal's permit for its Indurating Furnace (EU 026), which reads:

Nitrogen Oxides: less than or equal to 1088 lbs/hour. The sum of the NO_x emissions from all four stacks (SV014-017) shall not exceed 1088 lbs/hour. (40 CFR pt. 52.21 BACT)

Compliance with the BACT limit is demonstrated by periodic stack testing in accordance with standard EPA Methods but no averaging period is specified. MPCA's BART analysis suggests that a 30-day averaging period is an appropriate measure of compliance. ArcelorMittal does not object to utilizing this extended averaging period to demonstrate compliance with a BART NO_x limit of 1088 lbs/hr.

4. The Proposed SO_2 Limitation Should Accommodate Higher Sulfur Iron Ore Deposits

MPCA has proposed a BART limit of 0.165 pounds SO_2 per long ton of pellets fired (finished) (ltpf) when the company is burning natural gas.[1] MPCA acknowledges that natural gas has negligible sulfur content and the source of SO_2 emissions for ArcelorMittal's indurating furnace is the iron ore feedstock. MPCA has determined that BART for this natural gas-fired indurating furnace is the ancillary SO_2 reductions achieved by the existing wet scrubber designed to control particulate emissions from the furnace. ArcelorMittal does not object to the technology determination, but it cannot ensure continuous compliance with a numeric SO_2 limit when the sulfur content of the iron ore significantly increases. Sulfur content is a variable inherent to this mining operation that ArcelorMittal does not control. Since Clean Air Act Section 302(k) requires that emission limits be met on a continuous basis, the BART SO_2 limit must reflect the highest SO_2 emission rate under expected operating conditions when applying the designated BART technology (wet PM scrubber). We propose the following solution to address this compliance concern.

The SO_2 emission limitation (0.165 lb SO_2/ltpf) was developed based on 99% upper predictive limit (UPL) from a data set generated by a continuous emissions monitor during an extended stack test in March 2008 under representative operating conditions for the ore processed. As indicated above, It

[1] ArcelorMittal uses fuel oil as its back up fuel for the indurating furnace. We agree with MPCA's determination that the BART SO_2 limit would not apply when burning back up fuel.

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is common practice to apply a margin of safety factor of ten percent or more to stack test values when setting an emission limit to accommodate normal source variability not captured during the test period and the accuracy of the proposed compliance method. This margin of safety will help accommodate the seasonal variability and the ore variability that could not be captured during the testing period. Ten percent also accommodates the delta between the rated capacity and the utilization rate achieved during the stack test, which is typically within 10% (at 90%) of rated capacity for a valid test. Therefore, it is appropriate for MPCA to add 10% to the average value derived from the SO_2 stack test data (0.165 lb/ltpf) when setting a limit that is achievable under all normal operating conditions. Based on this standard approach to setting enforceable emission limitations from a limited data set, ArcelorMittal's BART SO_2 emission limit should be 0.182 lbs/ltpf calculated as follows:

0.165 lb/ltpf (99% UPL from extended stack test)
<u>+0.017 lbs/ltpf (10% of the average)</u>
= 0.182 lbs/ltpf

A ten percent margin of safety may not be sufficient to address potentially significant swings in the sulfur content of the ore mined in new locations. ArcelorMittal has limited information regarding the sulfur content of ore deposits in the mining areas currently under development. The proposed BART SO_2 limit should not apply to new ore mined from areas with higher sulfur levels. When higher sulfur ores are encountered, ArcelorMittal would initiate a procedure established in its AO for setting a new SO_2 BART emission limit for ores mined from that zone or area. This helps ensure that the BART limit(s) for SO_2 reflect the true variability of the emission unit including the variability of the sulfur content of the ore from areas that cannot technically be ascertained at this time. The wet scrubber parameters for proper operation of the control device would continue to apply during the interim period, but the numeric SO_2 emission limit would need to be developed for the ore mined from the new high sulfur area based on a stack test conducted within 180 days after encountering the high sulfur ore.

5. The Compliance Testing and Monitoring Approach Is Unnecessarily Burdensome

The AO for ArcelorMittal proposes a number of requirements that are unnecessarily burdensome and should be revised or streamlined to be more efficient and effective in rendering the appropriate BART limits enforceable. As presented in the SIP Supplement, the draft Administrative Order (AO) for ArcelorMittal presents the following method of demonstrating compliance for both NO_x and SO_2:

- Simultaneous measurement of emissions from all four stacks for 30 hourly data points.
- Perform initial test within 12 months of the effective date of the limit.
- Conduct additional stack tests on an annual basis with each test being conducted within two-month of the initial stack testing anniversary.
- CEMS can be installed as an alternative to stack testing.

We have several concerns regarding this compliance demonstration:

- *The Limits Should Be Effective Five Years After SIP Approval.* The draft AO states that the NO_x and SO_2 emission limit "is effective on and after the date six months after the effective date of

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EPA's approval of this BART determination." By contrast the federal rule requires that existing facilities install and operate BART "no later than five years after plan approval." See 40 CFR 51.302(c)(4)(iv). MPCA should allow affected sources the full amount of time established by Federal rule. As MPCA indicates in the SIP Supplement, Minnesota has already surpassed its 2018 Regional Haze goal of a 30% reduction of combined SO_2 and NO_x emissions from sources that emit over 100 tons per year. MPCA offers no reason to expedite this timeline and place Minnesota businesses at a competitive disadvantage with those in States that are following the 5-year federal timeline for BART implementation.

- *Submit a Test Frequency Plan to Set Future Test Frequency:* The draft AO for ArcelorMittal requires that stack testing for NO_X and SO_2 be conducted every 12 months. We believe that the requirement for annual stack testing should be adjusted based on the stack test results as allowed under MPCA's test frequency guidance. The AO should allow ArcelorMittal to submit a test frequency plan to MPCA following the initial stack test. The recommended frequency could be based on MPCA's test frequency guidance (http://www.pca.state.mn.us/index.php/view-document.html?gid=409) which states:

Test Result	Test Frequency
Test results $\geq$ 90% of limit	Every 12 months
60% $\leq$ test results < 90% of limit	Every 36 months
Test results < 60% of limit	Every 60 months

To address this concern, the following requirement should be added to the AO:

> Test Frequency Plan. Within 60 days following the initial performance test, ArcelorMittal may submit a Test Frequency Plan to set the frequency of future performance tests.

- *The Testing Deadlines Should Be Less Restrictive.* The draft AO for ArcelorMittal requires that stack testing for NO_X and SO_2 be conducted every 12 months within 2-months of the anniversary date of the initial BART compliance test. The requirement is overly restrictive because it would limit the time-of-year in which the testing can take place and would therefore limit the operating conditions in which the testing could occur. It is also important to note that the taconite industry has historically experienced unpredictable market swings causing decreased production and extended downtime. To address these concerns, the stack testing requirement should be rewritten as follows:

> Periodic BART NO_x/SO_2 Tests. Testing shall be conducted at the frequency set in the Test Frequency Plan. Testing required every 12 months shall include a minimum of 6 months between tests; testing required every 36 months shall include a minimum of 24 months between tests; and testing required every 60 months shall include a minimum of 36 months between tests.

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Automatic Stack Test Extensions. If a facility experiences an extended outage (> 90 days) during a year in which a stack test is required, the facility will be granted an automatic 12-month extension to the testing deadline provided that the facility submits written notification to MPCA.

- *The Test Duration is Too Long:* The draft AO for ArcelorMittal requires that stack testing for NO_x and SO_2 be conducted on all 4 stacks simultaneously for 30 consecutive hours. We believe that a 30-hour stack test is excessively long, particularly for ArcelorMittal's indurating furnace that demonstrated a low relative variability index (RVI) during its extended Method 7E test in March 2008. To address this concern, the stack testing requirement should be rewritten as follows:

  Stack Test Duration: The initial BART performance test shall be conducted for a sufficient duration to generate 30 hourly data points. Periodic BART NO_x/SO_2 Tests shall be scheduled to collect 30 hourly data points. However, if after collecting 3 hours of test data the results of the performance test are less than or equal to 90% of the emission limit, the stack test can be stopped and the test will be considered an acceptable duration for demonstrating compliance with the emission limitation.

- *Scrubber Operating Parameters Should Not be Set Based on BART SO_2 Stack Tests:* The draft AO states that the SO_2 compliance stack test would be used to set the minimum scrubber water flow and pressure drop limits. These are the same scrubber parameters that are already set for the Taconite MACT when testing for filterable particulate matter. MPCA should not set new and potentially different limits during the SO_2 test on the same control device. Since the wet scrubber is primarily designed to control PM, the Taconite MACT parameter values should be used to demonstrate proper scrubber performance. Also, for BART testing, all stacks are tested simultaneously and the aggregate value is used to determine compliance. The Taconite MACT test evaluates each scrubber stack separately and is, thus, a more appropriate test for setting individual scrubber parameters. To address this concern, the requirements to set scrubber operating limits based on SO_2 performance testing should be replaced with the following:

  Scrubber Operating Parameters. The scrubber operating parameters shall be those established pursuant to the Taconite MACT for this emission control system.

- *Permanent Recordkeeping is Inconsistent with Title V Permit Obligations.* The AO includes a section entitled "permanent records" that would mandate that ArcelorMittal permanently maintain "information on the NO_x, SO_2 and PM emission limits and operations requirements imposed by this Order." First, the 5-year recordkeeping requirement under the Title V program should be sufficient for any records required under the AO. Second, the language does not provide a clear indication of what records must be kept. "Information on" these emission limits is too vague to be discernable. The data that formed the basis of the emission limit determination for SO_2 and NO_2 has been provided to MPCA and can be permanently maintained by the agency. The permanent records section of the recordkeeping provision in the AO should be removed. All records required under the AO should be subject to the minimum 5-year recordkeeping obligation in the Title V permit and recited in the second part of the recordkeeping section of the AO.

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Conclusion

The Regional Haze SIP Supplement should be revised. While NAAQS compliance is preferable to pilot testing, the schedule to complete NAAQS modeling must be extended to allow EPA to improve the accuracy of the model and to provide states the guidance needed to properly implement the models. The NO_2 BART numeric limit should be revised upward so that it reflects the average emission rate during the extended test plus a margin of compliance. The effect of this change is to establish the BACT NO_x limit as BART, which streamlines the compliance obligations for ArcelorMittal. The SO_2 BART numeric limit cannot account for changes in the sulfur content of ore deposits so we will need the opportunity to set new SO_2 BART limits if we encounter an ore deposit with high sulfur levels. Finally, the testing and compliance obligations in the BART SIP and its appended Administrative Order can be streamlined to reduce unnecessary burdens on ArcelorMittal and the rest of the Minnesota taconite industry.

The draft SIP Supplement and the proposed AOs did not go through interested party review prior to public notice. We would appreciate an opportunity to sit down with MPCA and discuss the portions of the SIP Supplement and AO that apply directly to ArcelorMittal before the draft SIP is finalized. Please contact me at (218) 749-5910 x283 or Jaime.Baggenstoss@ArcelorMittal.com if you have any questions or if you would like to discuss this matter in more detail.

Sincerely,

Jaime Baggenstoss

Jaime Baggenstoss
Environmental Engineer

Cc: Rich Zavoda, ArcelorMittal
Tim Peterkoski, ArcelorMittal
Keith Nagel, ArcelorMittal

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Attachment 1

Ambient Sulfur Dioxide Concentrations in Northwest Indiana in 2008: A Comparison Study of Monitored Values and AERMOD Predicted Values

September 2011

Prepared by:

OCS Environmental, Inc.
Les Chapman, President
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Peer Reviewed by:

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Glenn England, Principal Consultant
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Prepared at the request of counsel for:

ArcelorMittal, Inc.

Foreword:

This report entitled, "Ambient Sulfur Dioxide Concentrations in Northwest Indiana in 2008: A Comparison Study of Monitored Values and AERMOD Predicted Values" presents the results of a study designed to evaluate the accuracy of the AERMOD air dispersion model at predicting one-hour ambient concentrations of sulfur dioxide (SO_2). Northwest Indiana was chosen for study because it had two monitor locations that collected ambient measurements of SO_2 surrounded by large and complex manufacturing facilities, including significant iron and steel facilities. The State of Indiana had prepared meteorological data that it deemed suitable for air dispersion modeling using AERMOD in this area. The primary author of the Study was able to obtain the State's 2008 inventory of actual SO_2 emissions and stack characteristics from large SO_2 sources in the vicinity of the monitors to use as model inputs.

The primary author, OCS Environmental, Inc., has significant air modeling experience in Indiana and has worked with the Indiana Department of Environmental Management (IDEM) on projects that use air modeling for many years. OCS collected the model input data and conducted the AERMOD modeling that forms the foundation for this Study. ENVIRON International Corporation, a nationally known expert in the development and implementation of air dispersion models, was asked to conduct a peer review of the initial and subsequent drafts of the OCS Study to provide critical feedback and analysis. This final Report reflects the benefit of the ENVIRON peer review including the additional Q-Q plots analysis provided by ENVIRON.

The Study represents a single, conservative basis for evaluating the predictive accuracy of the AERMOD model. The model would over-predict by a far greater margin if the model inputs were based on maximum allowable emissions as EPA guidance recommends, instead of the actual emission inventory based on 2008 production rates used in this Study. This Study suggests that the over-prediction bias for modeling complex manufacturing facilities may be far greater than the 2x factor that EPA has used to describe the accuracy of AERMOD following studies focused on large stack sources. This Study suggests that refinements are necessary to AERMOD and its implementation guidance before it can provide a reliable basis for making regulatory decisions with significant economic consequences.

Douglas A. McWilliams
Squire, Sanders & Dempsey (US) LLP

ENVIRON

September 23, 2011

MEMORANDUM

To: Doug McWilliams (Squire, Sanders & Dempsey)

From: Glenn England

c: Timothy Peterkoski (ArcelorMittal USA)
Kyle Heitkamp, Ken Richmond, Ralph Morris (ENVIRON)

Subject: Peer Review of OCS SO_2 Ambient Air Quality Modeling Study

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ENVIRON International Corporation (ENVIRON) was requested by ArcelorMittal USA (AMUSA) to conduct a peer review of a modeling study performed by OCS Environmental Inc. (OCS) that compared air quality modeling results for sulfur dioxide (SO_2) with observations in Lake County, Indiana for the 2008 calendar year ("SO_2 Modeling Study"). The peer review consisted of confirming the models used in the analysis, comparing the modeling databases with available data and EPA's current guidance for model application, and reviewing the summary and interpretation of model results. No attempt was made to independently reproduce the modeling results. This peer review is based solely on information and data provided by OCS and AMUSA and publicly-available information regarding the models and EPA application guidance.

Summary

ENVIRON found that AERMOD was applied consistent with current EPA modeling guidance and the input files are accurate, with the limitations that source emissions data were not independently verified and processed meteorological data provided by IDEM were not reviewed for conformance with current EPA guidelines. The results of this SO_2 Modeling Study demonstrate that the application of AERMOD following EPA's guidance can result in over predicting the 99^{th} percentile of daily maximum SO_2 concentrations by a factor as high as 10 compared to monitoring data.

Background

EPA recently promulgated a new 1-hour SO_2 National Ambient Air Quality Standard (NAAQS). The new standard specifies a maximum three year average of the 99^{th} percentile of daily maximum 1-hour SO_2 concentrations of 75 ppb (when rounded to the nearest ppb). EPA is proposing to use both monitoring and modeling data to define areas that are not attaining the new 1-hour SO_2 NAAQS. This is in contrast to past NAAQS in which nonattainment areas (NAA) are designated based mainly on monitoring data. The EPA-recommended air quality model for near-source dispersion modeling is the AERMOD steady-state Gaussian plume model. [1]

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1 Appendix W to Part 51 – Guideline on Air Quality Models

ArcelorMittal USA sponsored a case study[2] to perform SO_2 modeling for Lake County, Indiana and the 2008 calendar year that included an AMUSA steel mill located in East Chicago. Emissions for the AMUSA steel mill were obtained from AMUSA and emissions for the remainder of the SO_2 sources were obtained from the Indiana Department of Environmental Management (IDEM). The AERMOD model was applied using 2008 data and the modeled SO_2 concentrations were compared against observed SO_2 values at two monitoring sites: Gary and Hammond, Indiana. The study found that the maximum AERMOD-estimated 1-hour SO_2 concentration at Gary was 5.1 times greater than the maximum observed value (unmatched by time) and on an annual average basis, the AERMOD-estimated SO_2 concentration at Gary was 4.8 times the observed value. At the Hammond monitoring site, the maximum AERMOD 1-hour SO_2 concentration was 9.3 times greater than the observed value (unmatched by time) and on an annual average basis the modeled value was 2.1 times greater than the observed value.

Peer-Review

ENVIRON performed several quality assurance checks to determine whether the AERMOD input files and AERMOD results are accurate and reasonable. OCS provided the following model files for this review:

File Name	Date	Time	File Size
Aermap domain detail file	9/19/2011	4:20 PM	1,843
Aermap input file	9/19/2011	4:20 PM	47,713
Aermap map detail file	9/19/2011	4:20 PM	7,924
Aermap map parameters file	9/19/2011	4:20 PM	1,532
Aermap output file	9/19/2011	4:20 PM	138,258
Aermap receptor file	9/19/2011	4:20 PM	879
Aermap source file	9/19/2011	4:20 PM	67,344
Aermod input file	9/19/2011	4:39 PM	792,789
Aermod output file	9/19/2011	5:00 PM	884,812
Bpip input file	9/19/2011	4:21 PM	155,915
Bpip output file	9/19/2011	4:37 PM	440,549
Bpip summary file	9/19/2011	4:37 PM	6,002,516
Event output file	11/27/2009	10:53 AM	1,417,441
Model objects.dxf	9/19/2011	5:00 PM	1,132,698
SBN08ILX_1MIN_ASOS_ADJ.PFL	4/13/2011	11:49 AM	588,528
So2, all, 1-hr.pst	9/19/2011	5:00 PM	958,423
SBN08ILX_1MIN_ASOS_ADJ.SFC	4/13/2011	11:49 AM	1,449,460
Projection.txt	9/19/2011	5:00 PM	50
Breeze.xml	9/19/2011	4:39 PM	3,163
Polygon.xml	9/19/2011	5:00 PM	654,360

2 Suitability of Using AERMOD Dispersion Model in Determining Compliance with the Primary One-Hour Sulfur Dioxide NAAQS in Lake County, Indiana (no date or author provided)

Limitations of our review are:

- AMUSA provided the basis for SO_2 emission rates from its facilities, and SO_2 emission rates were provided by IDEM for other sources. ENVIRON did not independently verify the accuracy of the emission rate data.

- The meteorological data files for 2008 were processed by IDEM and the AERMET summary files were not available for review. Thus, it could not be verified whether IDEM followed the latest EPA guidance for processing meteorological data and included available 1-minute ASOS data to limit periods of calm and variable winds at the primary surface meteorological station.

The following summarizes the findings of our peer-review:

- The latest versions of AERMOD and AERMET were applied in the SO_2 Modeling Study. EPA released an updated version of AERMET in February 2011 (Version 11059), which includes the pre-processor AERMINUTE. The latest version of AERMOD was released in April 2011 (Version 11103). The modeling study used a previous version of AERMAP (Version 06431), but ENVIRON would not expect the receptor elevation or hill height to change based on using the existing digital elevation model (DEM) file and the latest version of AERMAP.

- The source and building/structure locations used in the AERMOD input file of the SO_2 Modeling Study were plotted on a Google Earth aerial map to verify whether their coordinates were reasonable. Figure 1 displays the source locations. Note that these types of overlays do not always line up perfectly. Given this uncertainty, the locations of the sources in the AERMOD database appear plausible and no unreasonable locations were identified.

- The SO_2 monitor locations used as receptors in the AERMOD input file were plotted on a Google Earth aerial map and compared with locations provided by IDEM on their website to determine whether the input coordinates appeared reasonable (http://leads.idem.in.gov/cgi-bin/idem/daily_summary.pl?cams=31). Figure 2 displays the receptor locations. The monitor coordinates in the AERMOD input file are reasonable.

- ENVIRON verified that the observed SO_2 monitoring data used in the SO_2 Modeling Study and 1-hour SO_2 observations available from EPA's Air Quality System (AQS) Data Mart are consistent. The part per billion (ppb) SO_2 observations were converted to microgram per cubic meter ($\mu g/m^3$) concentrations correctly. ENVIRON also verified the 99^{th} percentile daily maximum 1-hour SO_2 concentrations estimated by AERMOD and observed at the monitoring sites.

Figure 1. Plot of the locations of sources in the AERMOD input file on a Google Earth display.

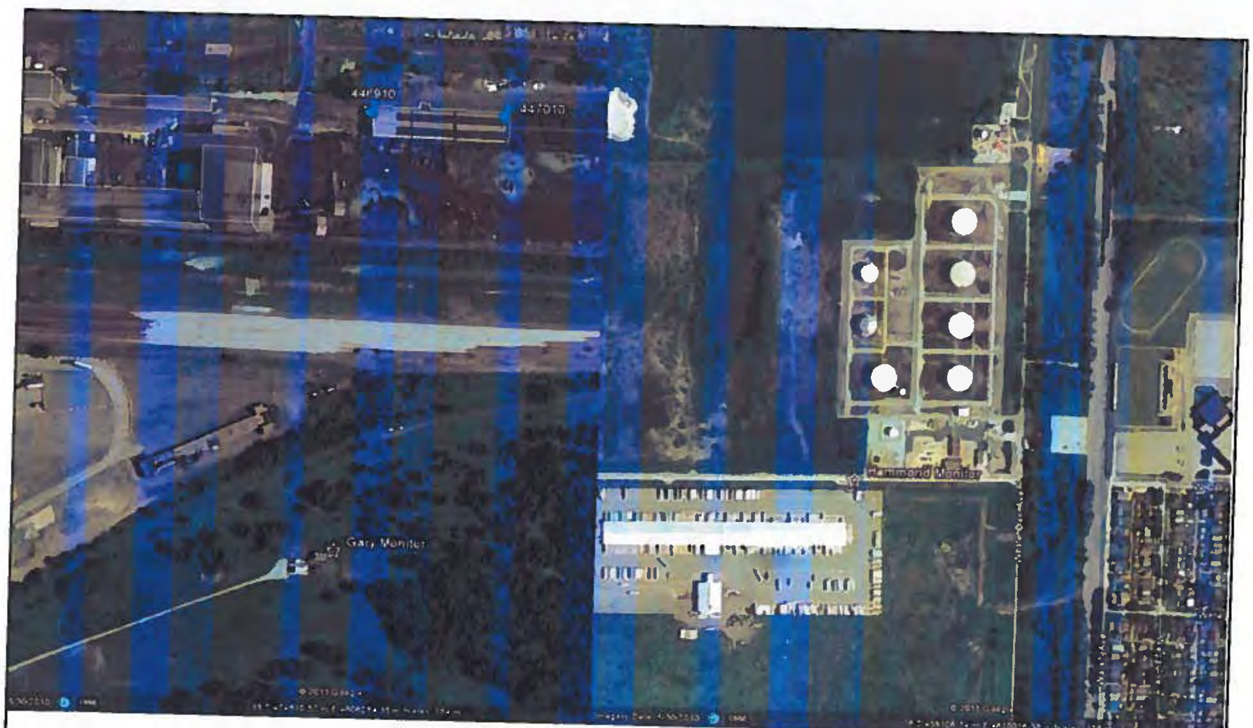

Figure 2. Plot of the receptor locations in the AERMOD input file on a Google Earth display.

Findings

Overall, the approach used in the SO_2 Modeling Study followed current EPA guidelines for an air quality dispersion modeling analysis. The results of the SO_2 Modeling Study demonstrate that the application of AERMOD following EPA's guidance can result in over-predicting the 99^{th} percentile of daily maximum SO_2 concentrations by a factor as high as ten compared to monitoring data.

Another generally-accepted practice for evaluating Gaussian plume models is to examine the highest predicted and observed concentrations unmatched by time. EPA's AERMOD evaluation report focused on comparing the frequency distribution of the predicted and observed concentrations unmatched by time. [3] The comparison of the cumulative frequency distribution plots are referred to as "Q-Q" plots. The Q-Q plots for both Gary and Hammond SO_2 monitor locations are presented as Figures 3 and 4, respectively. Both of the Q-Q plots show a significant over-prediction of daily maximum 1-hour SO_2 concentrations by AERMOD using EPA's latest modeling guidance.

3 http://www epa.gov/ttn/scram/7thconf/aermod/aermod_mep.pdf

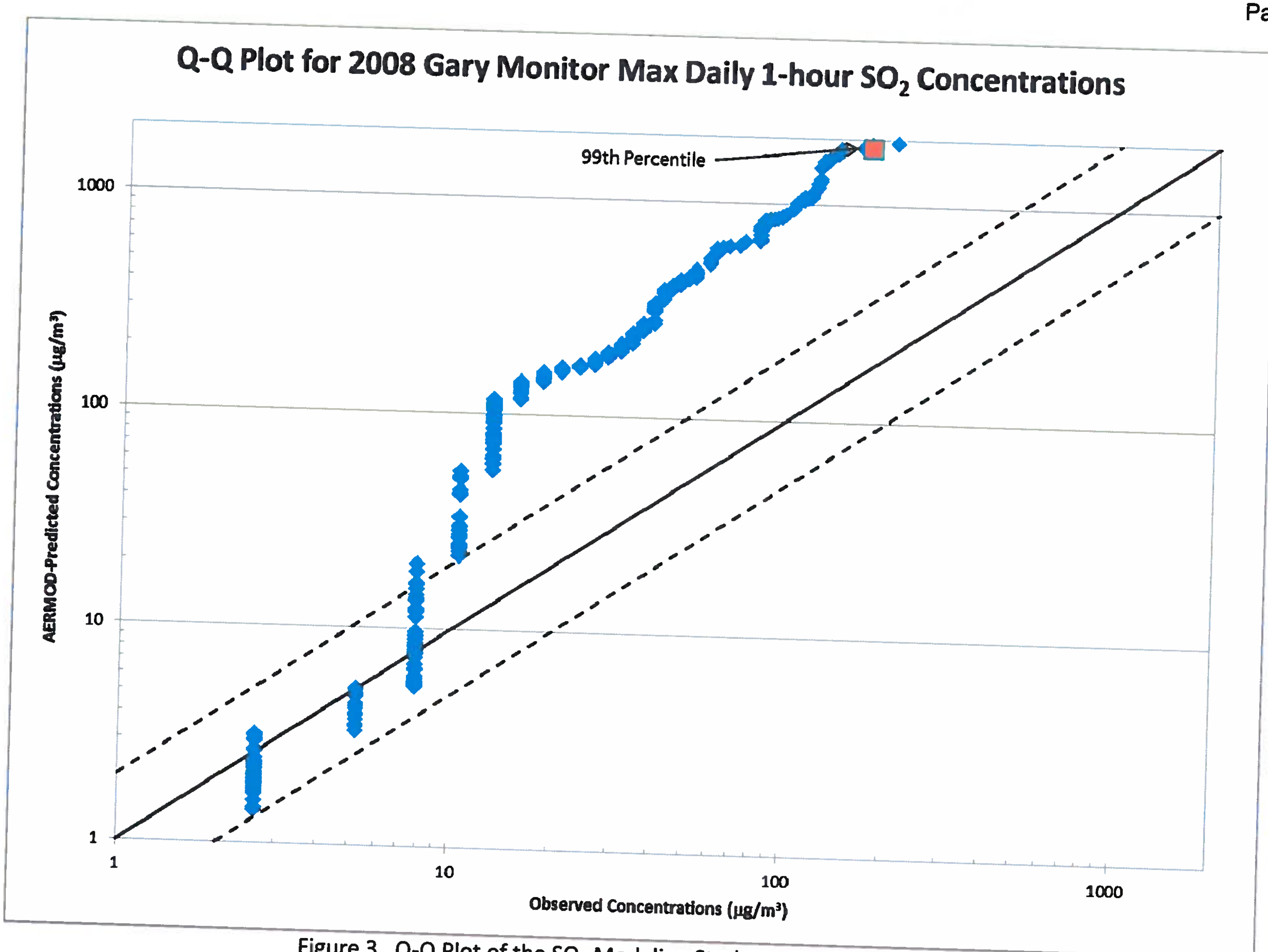

Figure 3. Q-Q Plot of the SO_2 Modeling Study at Gary Monitor.

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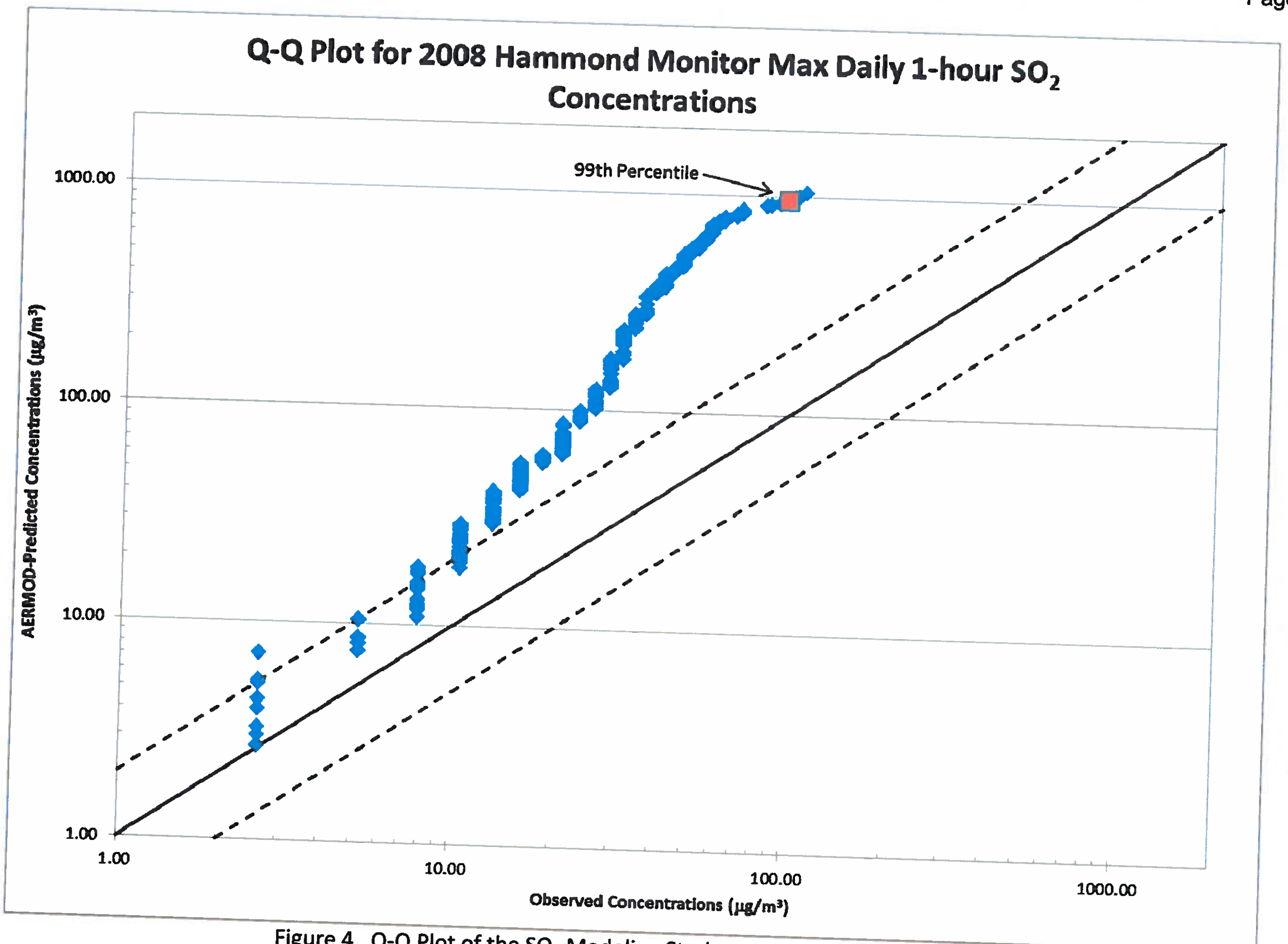

Figure 4. Q-Q Plot of the SO_2 Modeling Study at Hammond Monitor.

SUITABILITY OF USING AERMOD AIR DISPERSION MODEL IN DETERMINING COMPLIANCE WITH THE PRIMARY ONE-HOUR SULFUR DIOXIDE NAAQS IN LAKE COUNTY INDIANA

USEPA has suggested the use of air dispersion modeling as well as ambient air monitoring data in determining compliance with the latest primary one-hour sulfur dioxide National Ambient Air Quality Standard (NAAQS). We understand that modeled ground-level exceedances of the one-hour NAAQS will be used to help formulate revised air emissions limitations for the regulated community even if available ambient air monitoring data shows compliance with the one-hour sulfur dioxide NAAQS.

The AMS/U.S. EPA's AERMOD model is an EPA-preferred regulatory air dispersion model to be used in a wide variety of air dispersion modeling situations.[i] AERMOD is a steady-state plume model in that it assumes that concentrations at all distances during a modeled hour are governed by the temporally averaged meteorology of the hour. The steady state assumption yields useful results since the statistics of the concentration distribution are of primary concern rather than specific concentrations at particular times and locations. AERMOD has been designed to handle the computation of pollutant impacts in both flat and complex terrain within the same modeling framework. In fact, with the AERMOD structure, there is no need for the specification of terrain type (flat, simple, or complex) relative to stack height since receptors at all elevations are handled with the same general methodology.[ii] AERMOD uses hourly meteorological data preprocessed by AERMET. At the present time AERMET is designed to accept data from any for the following sources: 1) standard hourly National Weather Service (NWS) data from the most representative site; 2) morning soundings of winds, temperature, and dew point from the nearest NWS upper air station; and 3) on-site wind, temperature, turbulence, pressure, and radiation measurements (if available).[iii]

Due to the meteorological data constraints, the one-hour averaging period is the shortest averaging period allowed by AERMOD and represents one data point per emission point-receptor pair. Longer averaging periods such as three-hour average or 24-hour average represents the average of three and 24 data points respectively. By necessity, the one-hour meteorological data must be consolidated into one set of values per hour although wind speed, wind direction, ambient temperature and other meteorological parameters change during the one-hour period. The impact of condensing the variable meteorological data into a single value is most pronounced for the shortest (*i.e.*, one-hour) averaging period. The averaging effect of longer averaging periods tends to mitigate the impact of variable meteorological conditions with the greatest mitigation associated with the longest averaging period. The variability of meteorological conditions can be particularly pronounced in Lake County where Lake Michigan can influence the local conditions due to effects such as on-shore and off-shore wind patterns in addition to normal frontal changes.

USEPA has conducted studies to evaluate how well AERMOD predicts ground-level concentrations that are used to assess compliance with air quality regulations.[iv] The observed peak concentration for a given arc of samplers was compared to the predicted arc maximum. The comparisons included time and downwind-distance pairings to challenge the model components. Residual plots (predicted/observed, paired in time and downwind distance) of concentration estimates were used to judge whether AERMOD was performing correctly.[v] These evaluations were performed using short-term tracer studies and conventional long-term sulfur dioxide monitoring devices placed in arcs around emission points.[vi] In the case of the databases using conventional monitoring devices, the hourly sulfur dioxide emissions from the upstream monitoring point were well documented through continuous emissions monitors. The evaluation showed ratios of modeled to observed concentrations as high as 1.78:1.[vii]

The use of AERMOD to evaluate NAAQS compliance for an entire airshed introduces significantly greater uncertainties that those encountered during the evaluation studies described above. Air dispersion modeling associated with state implementation plans (SIPs) normally use steady-state emission rates (*i.e.,*"allowable") emission rates for each major emission point modeled. Variance in emission rates is usually limited to seasonal variations or the development of completely different alternate operating scenarios. Most emission sources do not operate at steady-state rates and the allowable emission rates are set to be protective of maximum production rates, which are infrequently obtained. This is further compounded in that *every* emission point being modeled in the airshed is assumed to be at the infrequently achieved allowable emission rate *at the same time.* Finally, using the daily maximum predicted concentrations at each receptor assumes that the unrealistic scenario of every source at the maximum allowable rate occurs during the *worst* meteorological conditions of the day. The use of AERMOD with the inherent uncertainty pointed out in EPA's evaluation studies compounded with the overly conservative emission and meteorological assumptions described above can yield predicted ground-level sulfur dioxide concentrations vastly above those observed by ambient air monitoring stations.

A case study was undertaken to evaluate the impact of the uncertainties described above in sulfur dioxide modeling using AERMOD for Lake County, Indiana. The year 2008 was used because of the availability of emissions, meteorological data and 1-hour ambient air monitoring data. Lake County has two sulfur dioxide ambient monitoring stations operated by the Indiana Department of Environmental Management (IDEM). They are located in Gary and Hammond, Indiana.[viii] Hourly-average sulfur dioxide monitoring data were obtained from IDEM.[ix] The emissions rate data for 2008 were obtained from two sources. Stack data and calculated emission data based on 2008 production rates for the ArcelorMittal steel mill located in East Chicago, Indiana was obtained from company sources. Stack data and emission rate data for 2008 for the remainder of the major sources in Lake County was obtained from IDEM's NAAQS modeling database.[x] Monitoring site location data was obtained from IDEM.[xi] Meteorological data was preprocessed using AERMET with surface data obtained from the National Weather Service Station in South Bend, Indiana and upper air data obtained from Lincoln, Illinois. The South Bend location corresponds to the surface data station used to produce the regulatory five-year meteorological data used for Lake County (1988-1992). Upper air data previous obtained from Peoria, Illinois used in the 1988-1992 meteorological data has been moved to nearby Lincoln, Illinois.

The study used AERMOD version 09292 in the regulatory mode and the data described above. Predicted 1-hour sulfur dioxide ground-level concentrations for the two Lake County ambient air monitoring sites from AERMOD were paired actual 1-hour average concentrations from the ambient air monitors. Hours where 1-hour average monitoring data were not available (*e.g.,* during calibrations and maintenance) were excluded from the analysis. The concentration difference between the modeled and monitored sulfur dioxide concentrations (in micrograms per cubic meter) as well as the ratio of the modeled concentration to monitored concentration was calculated for each hour.

The results of the study are summarized in Table 1 for the Gary monitoring station and Table 2 for the Hammond monitoring station. For the Gary site, the model over-predicted the hourly-average sulfur dioxide concentration a mean of 36.7 micrograms per cubic meter (14.0 ppb) with a maximum over-prediction of 880.7 micrograms per cubic meter (336 ppb). The ratio of modeled to monitored concentrations ranged up to 337:1. Similarly for the Hammond site, the model over-predicted the hourly-average sulfur dioxide concentration a mean of 2.86 micrograms per cubic meter (1.1 ppb) with a maximum over-prediction of 947 micrograms per cubic meter (361 ppb). The ratio of modeled to monitored concentrations ranged up to 362:1. A percentile analysis of the data shows that the model over-predicts the sulfur dioxide concentrations approximately 57 percent and 27 percent of the time in 2008 for Gary and Hammond, respectively. The over-prediction is extremely significant in light of the 75 ppb primary one-hour NAAQS.

In conclusion, the real-life application of the AERMOD model as a predictor of 1-hour average ambient sulfur dioxide concentrations is flawed with over-predictions probable. Consequently, determination of compliance with the 1-hour primary sulfur dioxide NAAQS should not be based on AERMOD modeling results alone.

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[i] *40 CFR Part 51*, Appendix W.
[ii] *AERMOD: Description of Model Formulation*, USEPA, EPA-454/R-03-004, September 2004, page 40.
[iii] *Ibid*, page 75.
[iv] *AERMOD: Latest Features and Evaluation Results*, USEPA, EPA-454/R-03-003, June 2003, page 13.
[v] *Ibid*, page 14.
[vi] *Ibid*, page 15.
[vii] *Ibid*, page 19.
[viii] *Indiana 2011 Ambient Air Monitoring Network Plan*, IDEM, July 1, 2010, page 51.
[ix] E-mail from Lisa Wagner (IDEM) to Les Chapman, sent September 13, 2010.
[x] NAAQS Modeling Database located on IDEM's Air Dispersion Modeling Website.
[xi] *Indiana 2011 Ambient Air Monitoring Network Plan*, IDEM, July 1, 2010, page 51.

TABLE 1 - Revision 2

Comparison of Modeled v Monitored Ambient Air SO_2 Concentrations

Gary, Indiana Ambient Air Monitoring Site

2008 SO_2 Emission Rates

2008 NWS Meteorological Data for South Bend, IN and Lincoln, IL

	Modeled SO_2 Ambient Air Concentration (ug/m^3)	Monitored SO_2 Ambient Air Concentration (ug/m^3)	Concentration Difference (ug/m^3)	Ratio of Modeled to Monitored Concentration
Annual Average	45.12	8.41	36.71	10.6897
Annual Median	5.73	2.62	1.57	1.4370
Annual Maximum	884.51	393.00	880.70	337.1465
Annual Minimum	0.00	2.62	-244.43	0.0000

Model overpredicted ambient air concentrations 4,898 hours of 8,600 hours of available data (56.95%).

Comparison to 1-Hour NAAQS (75 ppb) based on 99th percentile of daily maximums
Modeled: 293.47 ppb
Monitored: 67.00 ppb

TABLE 2- Revision 2
Comparison of Modeled v Monitored Ambient Air SO_2 Concentrations
Hammond, Indiana Ambient Air Monitoring Site
2008 SO_2 Emission Rates
2008 NWS Meteorological Data for South Bend, IN and Lincoln, IL

	Modeled SO_2 Ambient Air Concentration (ug/m^3)	Monitored SO_2 Ambient Air Concentration (ug/m^3)	Concentration Difference (ug/m^3)	Ratio of Modeled to Monitored Concentration
Annual Average	13.62	10.76	2.86	1.8723
Annual Median	1.79	7.86	-4.70	0.2358
Annual Maximum	949.53	110.04	946.91	362.4145
Annual Minimum	0.00	2.62	-102.18	0.0000

Model overpredicted ambient air concentrations 2,198 hours of 8,207 hours of available data (26.78%).

Comparison to 1-Hour NAAQS (75 ppb) based on 99th percentile of daily maximums
Modeled: 240.65 ppb
Monitored: 37.00 ppb

A2

February 3, 2012

Ms. Catherine Neuschler
Environmental Analysis and Outcomes - Air Assessment and Environmental Data Management
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Submitted by email: Catherine.Neuschler@state.mn.us
Phone: 651/757-2607

Re: Minnesota Power Comments on the Minnesota Amended Regional Haze State Implementation Plan (SIP)

Dear Ms. Neuschler,

The Minnesota Pollution Control Agency submitted a Supplemental Plan to the December 30, 2009 Minnesota Regional Haze State Implementation Plan (SIP) to the US Environmental Protection Agency (EPA) on January 5, 2012. The EPA has published in the Federal Register (40 CFR Part 52 EPA-R05-OAR-2010-0037; FRL-9622-B "Approval and Promulgation of Air Quality Implementation Plans; Minnesota; Regional Haze") its intent to fully approve the Minnesota regional haze plan if Minnesota submits its proposed Best Available Retrofit Technology (BART) emission limits for taconite facilities in fully adopted form prior to EPA's final action under their January 25, 2012 proposal or to conditionally approve the plan if Minnesota has not done so. The MPCA is seeking comments to the Draft Regional Haze Implementation Plan Supplement through February 3, 2012. Minnesota Power respectfully submits the following comments to the Minnesota Regional Haze SIP and Supplement.

Minnesota Power has been working cooperatively with the MPCA and other Minnesota stake holders to provide input to the Minnesota Regional Haze SIP development over the last five to seven years and is a strong supporter of the MPCA's Northeast Minnesota Plan. Minnesota Power coal-fired generating units are located in the six counties (St. Louis, Lake, Cook, Carlton, Itasca, and Koochiching) in which the MPCA has targeted reductions in emissions of sulfur dioxide (SO_2) and oxides of nitrogen (NO_x) that can contribute to visibility impairment (regional haze). In addition to the electric generating unit long term strategy for emission reductions, the MPCA is finalizing emission reduction requirements for taconite mines operating in the region. The Northeast Minnesota Plan segment addressing power plant emissions has a "goal of a 30% reduction in combined SO_2 and NO_X emissions from larger sources, those that emit over 100 tons per year of either pollutant, by 2018 as compared to a baseline year of 2002.

There is an interim goal of a 20% reduction by 2012. As of 2009, the most recent year for which emission inventory data is available, emissions were down by 39%. Based on projections at the beginning of 2011, it appears Minnesota will meet both the 20% by 2012 and 30% by 2018 goals." (Reference, MPCA Regional Haze web site http://www.pca.state.mn.us/index.php/air/air-quality-and-pollutants/general-air-quality/minnesota-regional-haze-plan.html).

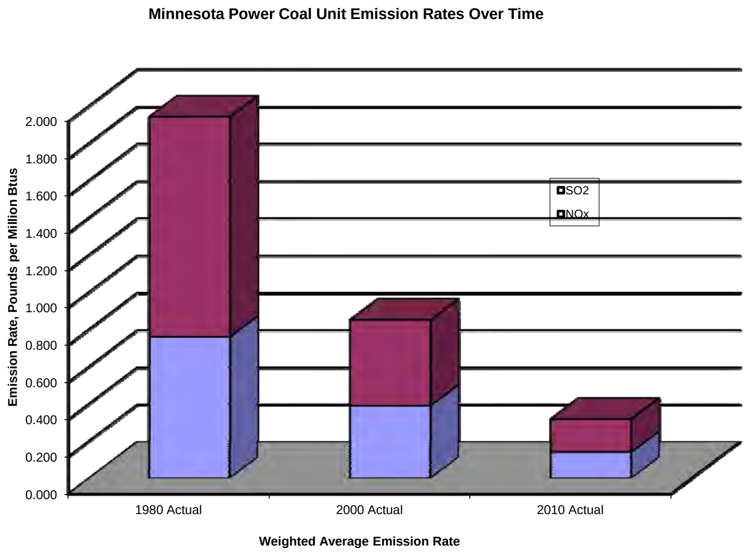
A key part of the Northeast Minnesota Plan involves the emission reductions that were delivered by Minnesota Power on our coal-fired generation units under the Arrowhead Regional Emissions Abatement (AREA) program, a voluntary emission reduction program facilitated by Minnesota regulators. These emission reductions have been supplemented by Minnesota Power's 2009 retrofit of Best Available Control Technology (BACT) style controls on our Boswell Energy Center Unit 3 and supplemental emission reductions for NO_x facilitated on Boswell Unit 4. These emission reduction measures include significant reductions in mercury emissions as a "work in progress" while Minnesota Power provides for deployment of new mercury reduction technologies on our units. As the MPCA has noted, such measures resulted in the Northeast Minnesota Plan already surpassing its 30% emission reduction goal for 2018 by over nine percent.

Part of the MPCA Supplemental Plan to the Regional Haze SIP involves inclusion of EPA's recent decision to propose the new Cross State Air Pollution Rule (CSAPR) reductions in SO_2 and NO_x emissions as being "better than BART". "Better than" refers to how the collective regional emission reductions from Minnesota and other CSAPR affected states will significantly exceed what is required to meet the first regional haze, Reasonable Further Progress targets that would otherwise have been addressed through various measures that included imposition of Best Available Retrofit Technology (BART) on certain eligible units within the same region. Minnesota Power agrees with the MPCA and EPA in recognizing that CSAPR is better than BART and notes that the emission reductions already achieved by Minnesota Power units retrofit with controls are lower than the emissions associated with emissions that might have been designated for Minnesota Power BART eligible unit reductions.

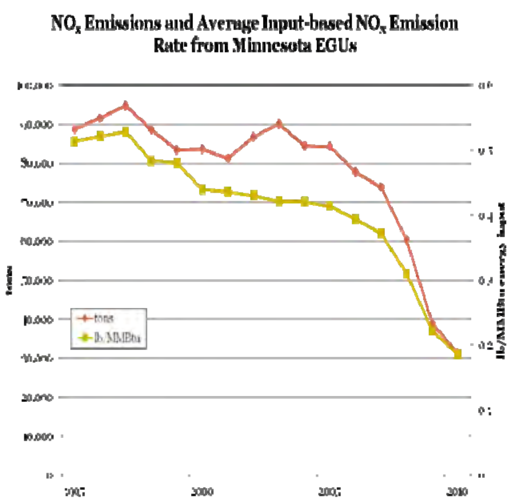
While CSAPR is being designated as better than BART, it is also noteworthy that EPA had earlier designated that units in states affected by the Clean Air Interstate Transport Rule (CAIR) would be treated as "CAIR is better than BART". Minnesota did not become an affected CAIR state, but it is noteworthy that the CSAPR requirements recently finalized by EPA impose even lower SO_2 and NO_x emissions budget restrictions on Minnesota than were designated for Minnesota under the CAIR. Consequently, Minnesota Power supports the MPCA and EPA acceptance of both "CAIR is better than BART" and "CSAPR is better than BART".

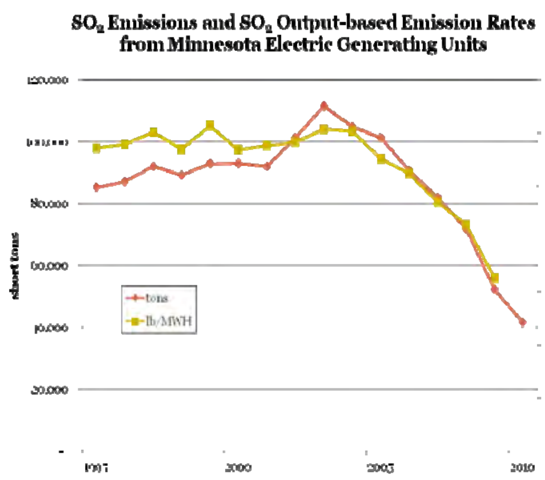
Another item of note is that Minnesota is in attainment with all existing National Ambient Air Quality Standards (NAAQS) that are established by EPA to be protective of public health and welfare with a margin of safety. Regional haze, visibility impairment concerns do not extend to public health impacts, but the SO_2 and NO_x emission reductions delivered to support regional haze Reasonable Further Progress target compliance have helped improve the margin by which Minnesota air quality stays in attainment with NAAQS. This is exemplified in Figures 1, 2 and 3.

Figure 1. Minnesota Power coal unit SO_2 and NO_x emission rates have significantly decreased, assisting with achievement of Minnesota and regional air quality goals.

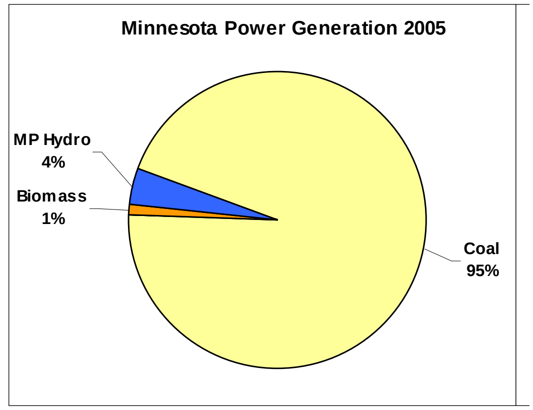


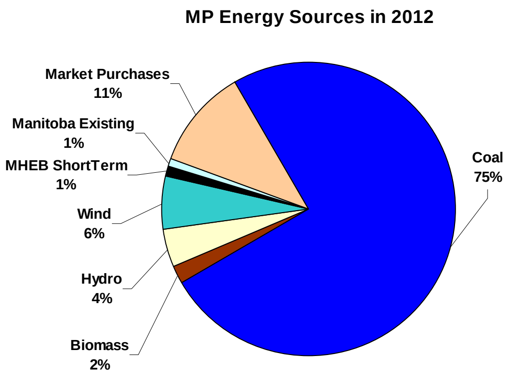
Figures 2 and 3. Minnesota Electric Generating Unit Emission Rate Trends for SO_2 and NO_x demonstrate overall emissions from Minnesota coal-fired generating units have decreased, contributing to achievement of Minnesota air quality goals. (Ref. P. Ciborowski, MPCA).

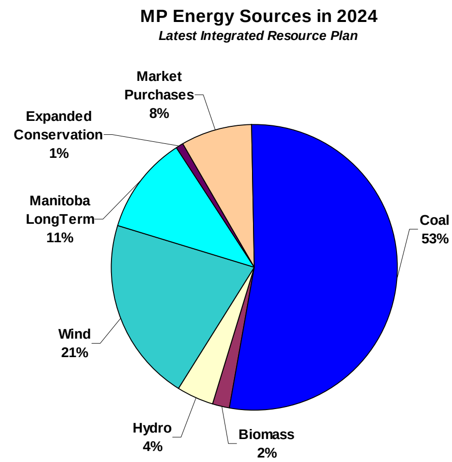




Minnesota Power expects to continue our trend of reducing emissions from our coal-fired generating units. While we have been reducing the emission rates from our existing coal units through measures such as selection of improved coal quality and retrofit of emission control equipment, we have also been increasing the proportion of low-emitting energy alternatives such as renewable biomass, wind and hydroelectric generation (Wind, Water, Wood) in our energy mix. Our most recently filed Integrated Resource Plan indicates how Minnesota Power expects to have shifted the proportion of coal in our generation mix from the 95% level of 2005 to about 53% by 2024. Expanded Minnesota Power use of renewable energy combined







with expanding implementation of conservation improvement measures leave Minnesota Power in a position where Minnesota can expect to benefit from yet lower emissions from our units when the MPCA seeks to deliver on the next Regional Haze, Reasonable Further Progress target to be developed in the 2018 through 2023 time frame.

Thank you for the opportunity to comment on the MPCA Draft Supplemental Regional Haze State Implementation Plan. Minnesota Power will be glad to address any clarifications or questions you may have about these comments.

Sincerely,

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Cc David Thornton, MPCA

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February 3, 2012

Catherine Neuschler
Minnesota Pollution Control Agency
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520 Lafayette Road North
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Re: Comment on Minnesota's Draft Regional Haze State Implementation Plan Supplement

Cliffs Natural Resources ("Cliffs") hereby submits its comments to the Minnesota Pollution Control Agency (MPCA) on its Draft Regional Haze State Implementation Plan (SIP) Supplement on behalf of Cliffs' three taconite mining operations in Minnesota: Northshore/Silver Bay, Hibbing Taconite, and United Taconite.

As explained more completely below, Cliffs requests the following changes to the Regional Haze SIP Supplement:

- Rely on the anticipated emission reductions from the NAAQS implementation without including a modeling requirement in the BART Administrative Orders;
- Extend the schedule for any required modeling deliverables to allow time for EPA to finish its guidance and to respond to concerns about the inaccuracy of model predictions.
- Adjust the BART limits as needed to reflect both an appropriate statistically derived upper bound limit using stack test data AND an additional 10% margin of safety to address the significant variability not reflected in the stack test data.
- Establish a process to address unexpected increases in the sulfur content of the ore.
- Streamline the compliance demonstration requirements to mitigate unnecessary burdens.

We appreciate the opportunity to provide comments on these issues, which are critical to our operations, and we ask that additional time be allocated to work through these comments before finalizing the SIP Supplement.

The Regional Haze Rule

In 1999, the U.S. Environmental Protection Agency ("U.S. EPA") published regulations to address visibility impairment in our nation's largest national parks and wilderness areas ("Class I areas"). This rule is commonly known as the "Regional Haze Rule" (the "Rule"). The Rule requires Minnesota to establish and achieve visibility goals for each of its Class I areas by regulating certain emissions believed to contribute to regional haze. The Rule requires that MPCA must submit to U.S. EPA a Regional Haze State Implementation Plan (SIP) that identifies sources that cause or contribute to visibility impairment in these areas. The Regional Haze SIP must also include a demonstration of reasonable progress toward reaching the 2018 visibility goal for each of the state's Class I areas.

One of the provisions of the Regional Haze Rule is that certain large stationary sources that were put in place between 1962 and 1977 and have modeled contributions to regional haze in Class I areas must conduct a Best Available Retrofit Technology (BART) analysis. The purpose of the BART analysis is to analyze available retrofit control technologies for these existing sources to determine if a technology meets the rule criteria and must be installed to improve visibility in Class I areas. The chosen technology is referred to as the BART controls, or simply BART. The SIP must require BART on all BART-eligible sources that are deemed "subject to BART."

The Minnesota State Implementation Plan – December 2009

Pursuant to the Rule, in December 2009 MPCA submitted a Regional Haze SIP to U.S. EPA identifying sources that cause or contribute to visibility impairment in its Class I areas. The SIP states that key haze causing emissions in Minnesota are sulfur dioxide (SO_2), nitrogen oxides (NO_X) and particulate matter (PM). As required by the Rule, the SIP documents the BART determinations for each subject-to-BART facility. In general, BART for the taconite facilities consisted of the following:

SO_2	Operation of existing scrubbers
NO_X	Good combustion practices
PM	Continued implementation of the Taconite Maximum Achievable Control Technology (MACT) standard

However, due to a lack of sufficient emissions data at the taconite facilities, the MPCA was unable to include numeric BART emission limits for NO_X for all taconite facilities and SO_2 for taconite facilities that burn higher sulfur fuels. Therefore, the MPCA entered into Administrative Orders (AOs) with each of the taconite facilities, including the three Cliffs facilities. The AOs required the taconite facilities to perform testing and monitoring and to report the results to MPCA.

The Draft Regional Haze State Implementation Plan (SIP) Supplement – December 2011

On December 19, 2011, the MPCA published a draft Regional Haze SIP Supplement which contains proposed numeric BART limits for NO_x and SO_2 for all taconite facilities, memos describing the process for setting the proposed BART emission limits for each facility, and draft AOs designed to make the proposed BART limits enforceable. In addition, the draft SIP Supplement proposes changes to the strategy for the Northeast Minnesota Plan, which is part of the long term strategy to improve visibility in Class I areas.

The public comment period for the draft SIP Supplement runs through February 3, 2012.

Cliffs' General Comments on the Draft Regional Haze SIP Supplement

1. **Cliffs supports MPCA's decision to use the CSAPR rule as BART for the Northshore Silver Bay Power Station.**

MPCA proposes to use the Cross-State Air Pollution Rule ("CSAPR") as BART for the Silver Bay Power Station and other utilities subject to BART. MPCA has ample legal and technical support for this determination. On December 23, 2011, EPA issued a proposed rule to clarify that the CSAPR as a replacement to CAIR, "achieves greater reasonable progress towards the national goal of achieving natural visibility conditions in Class I areas than source-specific Best Available Retrofit Technology (BART) in those states covered by the [CSAPR]." 76 Fed.Reg. 82219 (referencing 40 CFR 51.308(e)(2) as allowing alternative trading programs to satisfy BART if they achieve greater reasonable progress than BART toward visibility goals).

The D.C. Circuit Court's December 30, 2011 decision to stay CSAPR pending a decision on the legal challenge to this rule should not change MPCA's approach in the BART SIP Supplement. MPCA indicates on page 3 of the draft BART SIP Supplement that "EPA has committed to doing a rulemaking to determine if the emission reductions provided by the Transport Rule are equivalent or better than applying BART to power plants on an individual basis." EPA is vigorously defending its Transport Rule and a decision from the Court is expected by the end of 2012. EPA will then finalize its December 23, 2011 proposed rulemaking to establish whether the CSAPR that remains after legal challenge provides emission reductions that are equivalent or better than applying BART on an individual basis. Cliffs encourages MPCA to stay the course and allow this process to play out rather than move backward toward source-specific BART limits for the affected power plants, including Cliffs' Silver Bay Power Station.

2. **Cliffs supports MPCA's decision to adjust its long-term strategy for regional haze set forth in the Northeast Minnesota Plan**

MPCA appropriately proposes changes to its long-term strategy for regional haze and the Northeast Minnesota Plan. MPCA reports that Minnesota has already surpassed its 2018 goal of a 30% reduction of combined SO_2 and NOx emissions from sources that emit over 100 tons per year. Given this rapid decline in emissions, it is appropriate for MPCA to re-evaluate the second component of the Northeast Minnesota Plan, which was designed to investigate control measures and pollution prevention practices that could be applied to the taconite industry. These would be measures and practices above and beyond what MPCA established as BART for sources to be regulated under the Regional Haze Rule. This long-term strategy should be adjusted as appropriate, when considered along with all of the other downward pressures on emission rates, to meet the regional haze goals set forth in the Clean Air Act.

MPCA appropriately recognizes that the taconite industry is preparing to comply with a number of regulatory requirements that target reductions of the compounds regulated for regional haze. The State is required to consider these "emission reductions due to ongoing air pollution control programs" in developing its Long-Term Strategy for the BART SIP. See 40 CFR 51.308(d)(3)(v)(A). After the 2009

Regional Haze SIP, new 1-hour SO_2 and NO_2 National Ambient Air Quality Standards (NAAQS) were finalized and are expected to produce emission reductions relevant to regional haze goals. These emission reductions must be considered in the development of Minnesota's Long-Term Strategy. Cliffs supports MPCA's decision to rely on the new NAAQS, instead of its 2009 Northeast Minnesota Plan for the taconite industry, to achieve the reasonable progress goals required in its Long-Term Strategy under the Rule. The NAAQS approach allows sources to choose their compliance strategies to meet a common numeric federal standard. The Northeast Minnesota Plan, by contrast, would have imposed a unique obligation on Minnesota facilities to fund and implement pilot projects in the hope that they would produce a cost effective emission control technology for the industry. By adopting NAAQS compliance as its Long-Term Strategy for regional haze, MPCA removes an additional and unnecessary state-specific burden on Minnesota businesses.

3. The NAAQS Air Dispersion Modeling Should Be Driven By Federal Requirements and Schedules

While MPCA can appropriately consider the effect of the new NAAQS on relevant emission reductions to help Minnesota meet its regional haze goals, it is not necessary or appropriate to adopt the NAAQS obligations into the BART SIP, as MPCA does by mandating NAAQS modeling for the taconite industry as part of its proposed Administrative Order (AO) for BART. NAAQS modeling is following an implementation schedule that is driven by federal requirements for establishing nonattainment areas and strategies to bring those areas into attainment. SO_2 and NO_2 are on different implementation schedules with EPA prioritizing SO_2 modeling for a SIP Call deadline in June 2013. NO_2 modeling is on a slower implementation schedule in part because the modeling must consider complex atmospheric interactions that convert some NO_x emitted into NO_2 downwind. Importantly, EPA is not currently requiring that states use modeling to set regulatory limits for NO_2. It is premature, therefore, for MPCA to include NO_2 modeling in an AO with the intent of relying on its potentially erroneous and overly conservative results for making decisions regarding emission controls at the end of 2012.

MPCA may rely on the benefits to be derived from meeting the one-hour NAAQS for NO_2 and SO_2 without arbitrarily expediting its implementation ahead of the refinements to the model expected from EPA. The NO_2 and SO_2 NAAQS are currently on schedule to produce emission reductions by 2017, which will be in time to help MPCA achieve its Regional Haze goals. SO_2 modeling is currently underway to meet NAAQS SIP Call deadlines in June 2013. MPCA does not need AOs mandating SO_2 modeling in Minnesota. MPCA is relying on CAIR, CSAPR, NAAQS, and many other regulatory obligations to help reduce SO_2 and NO_x emissions without requiring or needing to adopt those obligations into AOs for affected facilities. Thus, it seems arbitrary to require the taconite industry sources to sign an Order mandating NAAQS modeling for NO_2 and SO_2. The NAAQS process will produce appropriate emission reductions on its own timeline, which can be relied upon to meet BART SIP limits without an Administrative Order.

If MPCA insists on imposing a schedule for modeling in the BART AOs, the schedule must be extended beyond what has been proposed in the SIP Supplement to allow for improvements to the modeling being developed at the federal level. Cliffs and one of its industry groups, the American Iron and Steel Institute (AISI), have been engaged in discussions with EPA's air modeling group to raise concerns about the accuracy of the current iterations of the AERMOD air dispersion model when predicting short-term ambient air quality impacts. A study commissioned in Northwest Indiana compared AERMOD's predicted ambient impacts using a 2008 inventory of actual SO_2 emissions to the actual ambient SO_2 concentrations at two monitoring stations. The purpose of the study was to determine the model's accuracy in an area dominated by complex manufacturing facilities. Using a Q-Q plot to compare the results, a peer review of the study concluded that the model over predicted the SO_2 ambient impact by a factor of 10 at the 99th percentile (4th highest) daily maximum value. This suggests a fundamental problem in how the model predicts ambient air quality impacts. This study has been presented to EPA along with other studies that reach similar results. The agency will be considering data and presentations at its 10th Modeling Conference this March on how to improve the accuracy of the AERMOD predictions in the vicinity of complex manufacturing facilities. EPA will be considering, for example, methods that use targeted monitoring in the vicinity of the highest modeled concentration to validate or calibrate model predictions. This work must precede any use of the model to render regulatory decisions on the level of emission reduction necessary to meet the national standards because the substantial evidence of inaccuracy would make such decisions arbitrary and vulnerable to legal challenge.

The inaccuracy of model predictions is more significant now because models are being asked for the first time to predict one-hour impacts for SO_2 and NO_2. These short-term concentrations are significantly affected by meteorological variations that are discounted by AERMOD's assumption that wind direction is constant. The evidence indicates that AERMOD becomes less accurate during low wind periods when its assumptions about wind speed and wind direction run counter to documented observations. For instance, low wind observations typically show a plume moving straight up while AERMOD predicts the plume moves horizontally with downwash characteristics that will invariably produce a higher predicted concentration for local receptors than will actually occur. These obvious inaccuracies and strained assumptions are contributing to the over prediction increasingly demonstrated by model studies. EPA is expected to address some of these issues in modeling guidance after the 10th Modeling Conference.

Unfortunately, the modeling schedules proposed by MPCA in the SIP Supplement AOs would not allow modeling protocols to incorporate EPA's final modeling guidance. A key component of the draft Administrative Order appended to the BART SIP Supplement is a requirement to submit modeling protocols by April 1, 2012 and modeled attainment demonstrations by December 15, 2012 for both SO_2 and NO_2. This schedule must be extended to allow Minnesota facilities to benefit from the refinements to the model anticipated from EPA's 10th Modeling Conference scheduled for March 13-15, 2012. Federal guidance arising from the Modeling Conference is anticipated in the late summer of 2012 and it is expected to address issues critical to improving the accuracy of the models for NO_2 and SO_2. If MPCA moves forward with its current schedule, the protocols submitted in April 2012 will have to be revised and resubmitted to address EPA's final guidance.

MPCA's reliance on NAAQS compliance for its Long-Term Regional Haze Strategy should not expedite the timelines for implementing the NAAQS. EPA has embarked on an aggressive timeline for SO_2 modeling that requires states to conduct the air dispersion modeling before a June 2013 SIP Call deadline. EPA is prioritizing efforts to refine and improve SO_2 modeling in 2012 to help address widespread concerns that the models significantly over predict ambient impacts. MPCA should require SO_2 modeling protocols no sooner than 60 days after the federal guidance on SO_2 modeling is finalized with final results 90 days after MPCA approves the SO_2 modeling protocol. This helps to ensure that Cliffs will have the benefit of EPA's anticipated improvements to the model when we submit our modeling protocols.

EPA has not called for SIPs that use air dispersion modeling for NO_2. As a result, EPA is expected to continue to work on improvements to the NO_2 modeling after it releases the final SO_2 modeling guidance in 2012. As described in more detail below, the NO_2 model refinements include better methods for predicting complex atmospheric chemistry reactions that produce NO_2 after the NO_x exhaust leaves the stack. These refinements are expected to take more time. Since MPCA does not have a current federally-imposed schedule for NO_2 modeling, Cliffs recommends that the schedule for NO_2 protocols begin after the SO_2 modeling results are submitted. This allows EPA more time to address the complex NO_2 modeling issues before the state requires a modeling protocol. MPCA should require NO_2 modeling protocols no earlier than the first quarter of 2013 with modeling results by the end of 2013. This is still plenty of time to have emission controls engineered and installed to meet the BART SIP goals for regional haze improvements. Minnesota should follow the federal timelines closely to ensure that Minnesota facilities are not burdened by using less accurate models for regulatory determinations than those used by other states.

In addition to the general concerns raised above, Cliffs has several specific concerns about the accuracy of air dispersion modeling for predicting ambient impacts that can be addressed, in part, at the State level using the discretion that EPA accords to states in implementing the models. The air dispersion modeling issues of concern include, but are not limited to, the following:

- *Representative AERMINUTE Data Is Not Available for All Sources:* Current modeling guidance recommends the use of AERMINUTE for processing meteorological data. The AERMINUTE data set has a much greater frequency of low wind speed conditions which tend to be associated with distorted maximum modeled concentrations, especially for low-level sources and fugitive sources. Since AERMINUTE data is not available from all meteorological stations and it is contributing to over prediction, Cliffs asks that MPCA accept modeling that does not use AERMINUTE data to satisfy BART.

- *Reasonable Background Values Should be Used for Northeastern Minnesota:* Actual ambient data from Northeastern Minnesota is limited, so background values must be developed in some other way. The Lake Michigan Air Directors Consortium (LADCO) collected monitoring data supporting 4-8 ppb as a default value for SO_2 background in the Midwest. MPCA can justify the low end of this range as background for Northeast Minnesota. The background method for NO_2 should not include any conservative assumptions because the model predictions are already overly conservative. Cliffs suggests that the State gather available representative actual ambient monitoring data that avoids double counting emissions already reflected by the model inputs. The data should be averaged to remove spikes and outliers that would otherwise contribute to inaccurate assessments of the contribution of background to ambient monitors.

- *Model the Individual Impact of Indurating Furnaces at Each Facility:* EPA has confirmed in its March 1, 2011 guidance that States have discretion to choose a threshold for NAAQS modeling. Modeling all emission sources at all facilities simultaneously at the potential to emit (PTE) is not representative of actual air quality due to the substantial difference between hourly PTE and actual emissions. To avoid overestimating air quality impacts, we suggest modeling the impact of the indurating furnaces at a reasonable maximum operational rate and exclude any space heaters or other minor combustion sources. Also, the impact of Cliffs' emissions should not be combined with the emissions of other companies when evaluating receptor concentrations and emission reductions. Modeling is not accurate enough to be used to allocate responsibility among companies. Only monitored violations should trigger an evaluation of the relative culpability among contributing companies.

- *Limit Modeled Receptors to those Reasonably Exposed:* The role of receptor placement plays a significant part for modeled NAAQS attainment for 1-hour standards. Cliffs asks that MPCA allow NAAQS modeling using "reasonably exposed" receptors. For example, receptors should not be modeled on steep slopes, waterways, roadways or bicycle trails where people would not normally be present for a full hour of exposure.

- *Exclude Intermittent Sources from 1-hour NAAQS Modeling Inputs.* Modeling of non-routine operations (examples: emergency generator, back-up fuel oil, etc.) overestimates a source's actual ambient air impacts. For the probabilistic SO_2 and NO_2 NAAQS, EPA has suggested that intermittent sources have a de minimis likelihood of contributing emissions on the day when meteorological conditions and continuous sources have produced one of the 1-2% worst days of the year. See EPA's March 1, 2011 Modeling Guidance. We recommend modeling of typical facility operations so that the model reasonably predicts the future attainment status of actual air quality. Modeling of maximum potential emissions for all facilities will unnecessarily overestimate actual impacts.

  Modeling of emergency engines / peak shaving engines / monthly engine testing is poorly represented in the model, and emissions are generally overstated in the modeling which leads to unnecessary permit conditions (e.g., can only test one engine for ½ hour between the hours of 10 – 11 am). Therefore, we recommend that these types of sources should not be included in the modeling demonstrations.

- NO_2 –specific modeling concerns:

  a) *Elevated ambient 1-hour NO2 concentrations are primarily an urban roadway corridor problem*, and not due to stationary sources. Facilities should have the option of placing a monitor in the receptor area with the highest model concentration to demonstrate that actual ambient impacts do not justify emission control expenditures.

  b) *The NO_2:NO_x default in-stack ratio of 0.5 leads to unrealistically high modeled NO_2 concentrations.* A more reasonable default in-stack ratio of 0.1 should be applied for all sources. Alternatively, the timeline could be adjusted to allow the facilities sufficient time to conduct performance testing under representative operating conditions to allow a facility to determine a site-specific ratio.

  c) *MPCA should streamline approval of Tier 3 NO_2 modeling approaches (OLM / PVMRM) for individual source modeling.* To the extent multiple source modeling is conducted for NO_2, it should be based on photochemical / regional models and not AERMOD.

Based on these concerns with the current modeling and the expected federal guidance on some of these issues, Cliffs recommends that the schedule for submitting the modeling protocol and modeled attainment demonstrations be extended to allow time for these modeling protocol issues to be resolved by EPA before regulatory decisions are made based on inaccurate and unreliable modeled predictions. As indicated above, please consider separating the SO_2 and NO_2 modeling schedules so that SO_2 modeling protocols will come due 60 days after the final federal guidance for SO_2 NAAQS modeling and a modeling report due 90 days after MPCA approves the protocol. The NO_2 modeling protocol should follow the SO_2 modeling report and be due no earlier than April 1, 2013 with a report due by December 31, 2013. These deadlines should be adjustable as needed to allow for the incorporation of anticipated federal developments designed to improve model accuracy.

4. The Proposed NOx Limitation Is Inconsistent with the Definition of BART

Best Available Retrofit Technology means "an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant which is emitted." See 40 CFR Part 51, Appendix Y, Section V "Enforceable Limits/Compliance Date." BART does not require a redesign of the emission unit or a switch to a different fuel. See Appendix Y, Section IV.D.5. BART does not require curtailments or production constraints. As the definition dictates, the BART NO_x emission limitation for an indurating furnace should reflect its full range of operating conditions when continuous good combustion practices are applied. This means that the numeric BART emission limitation should not be lower than the highest NO_x rate measured during a test that reflects the continuous application of good combustion practices. Cliffs supports the use of a statistical method to predict the upper bound limit from the variability within the data set as a refined starting point for establishing a BART limit.

Additional upward adjustments are necessary, however, to reflect operational variability that is not captured in the stack test data set. A reasonable safety margin should be added to the statistically derived limit to account for the following:

- The delta between the production rate during testing and the production capacity of the equipment;
- Seasonal variations in temperature, humidity, and precipitation that affect emission rates;
- The variations in the ore that serves as the primary raw material and variations in the product demands;
- Startup, Shutdown and Malfunction events.[1]

[1] The MPCA AOs require compliance with the NO_x and SO2 emission limits during periods of startup, shutdown and malfunction ("SSM"). The dataset used to establish the emission limitations did not contain emission information for SSM events. Therefore, an upper predicted limit calculated from that dataset would not cover the variability introduced by SSM events. This provides additional justification for adding a margin of safety beyond the calculated BART limit in the proposed SIP Supplement.

- The inherent variability contributed by sampling and analysis equipment when using stack test data to establish emission limits.

It is common practice to apply a factor of 10 percent or more to stack test values to accommodate source variability not reflected in the stack test data set, and the inaccuracy of the proposed compliance method, when setting an enforceable emission limit. See e.g. MPCA Guidance for Proposing Synthetic Minor Permit Limits, http://www.pca.state.mn.us/index.php/air/air-permits-and-rules/air-permits-and-forms/air-permits/proposing-synthetic-minor-permit-limits.html (recommending that a 10% factor be added to test-based limits to accommodate the accuracy of the proposed compliance method and other variables); see also In re Prairie State, 13 E.A.D. 1, 58 (U.S. Environmental Appeals Board 2006) (accepting Illinois EPA's use of a 10% safety factor as a standard method to accommodate variability in setting a consistently achievable BACT emission limitation). Emission limitations that must be met continuously should use the ten percent factor to ensure that the variability external to the data set is accounted for in the enforceable limit.

Ten percent is not a random value; it correlates to the standard performance test objective, which is to operate within 10% (at 90%) of rated capacity. Agencies recognize that operating at 100% capacity is not a realistic expectation during a given stack test because some variables are not within the company's control during a test. Seasonal variations, common in Northeastern Minnesota, and ore variations common in any mining operation dictate that testing at or around 90% of capacity is all that can reasonably be expected for any given test. Therefore, test data will not reflect the true maximum capacity of the equipment and an upward adjustment is needed to ensure that equipment can be used at full capacity when conditions allow without violating an emission limit. Therefore, it is appropriate for MPCA to add 10% to the value derived from the NO_x stack test data when setting a limit that must be achievable under all normal operating conditions. This analysis also applies to the development of SO_2 emission limits.

5. The Proposed SO_2 Limitation Should Accommodate Higher Sulfur Iron Ore Deposits

Cliffs cannot ensure continuous compliance with a numeric SO_2 limit when the sulfur content of the iron ore significantly increases. SO_2 emissions are generated from the sulfur content of the fuel and the sulfur content of the ore. The ore's sulfur content is a variable inherent to mining operations that Cliffs does not control. As indicated above, BART numeric emission limits must be derived from the continuous application of BART controls to the full range of normal operating conditions. For SO_2, that is difficult in the taconite industry because the level of sulfur can increase as new zones of ore are excavated. To account for this variability, Cliffs generally recommends the use of an appropriate UPL based on available stack test data plus a 10% margin of safety. However, even this adjustment may be insufficient to account for the potential increases in the sulfur content of ore in newly mined areas. The proposed BART SO_2 limit should not apply to new ore mined from areas with higher sulfur levels. When higher sulfur ores are encountered, Cliffs proposes to initiate a procedure to be established in its AOs for setting new SO_2 BART emission limits for ores mined from that zone or area. This helps ensure that the BART limit(s) for SO_2 reflect the true variability of the emission unit including the variability of the sulfur content of the ore from areas that cannot technically be ascertained at this time. The wet scrubber parameters for proper operation of the control device would continue to apply during the interim period, but the numeric SO_2 emission limit would need to be developed for the ore mined from the new high sulfur area based on a stack test conducted within 180 days after encountering the high sulfur ore.

6. MPCA's Compliance Testing and Monitoring Approach Is Unnecessarily Burdensome

The AOs in the SIP Supplement propose a number of requirements that are unnecessarily burdensome and should be revised or streamlined to be more efficient and effective in rendering the appropriate BART limits enforceable. As presented in the SIP Supplement, the draft AOs present the following method of demonstrating compliance for both NO_X and SO_2:

- Simultaneous measurement of emissions from multiple stacks for 30 hourly data points.
- Perform initial test within 12 months of the effective date of the limit.
- Conduct additional stack tests on an annual basis with each test being conducted within two-month of the initial stack testing anniversary.
- CEMS can be used as an alternative to stack testing.

We have several concerns regarding this compliance demonstration:

- *The Limits Should Be Effective Five Years After SIP Approval.* The draft AO states that the NO_x and SO_2 emission limits are "effective on and after the date six months after the effective date of EPA's approval of this BART determination." By contrast the federal rule requires that existing facilities install and operate BART "no later than five years after plan approval." See 40 CFR 51.302(c)(4)(iv). MPCA should allow affected sources the full amount of time established by Federal rule. As MPCA indicates in the SIP Supplement, Minnesota has already surpassed its 2018 Regional Haze goal of a 30% reduction of combined SO_2 and NO_x emissions from sources that emit over 100 tons per year. MPCA offers no reason to expedite this timeline and place Minnesota businesses at a competitive disadvantage with those in States that are following the 5-year federal timeline for BART implementation.

- *Submit a Test Frequency Plan to Set Future Test Frequency:* The draft AOs require that stack testing for NO_X and SO_2 be conducted every 12 months. The requirement for annual stack testing should be adjusted based on the stack test results as allowed under MPCA's test frequency guidance. The AO should allow Cliffs to submit a test frequency plan to MPCA following the initial stack test for each of its facilities. The recommended frequency could be based on MPCA's test frequency guidance (http://www.pca.state.mn.us/index.php/view-document.html?gid=409) which states:

Test Result	Test Frequency
Test results $\geq$ 90% of limit	Every 12 months
60% $\leq$ test results < 90% of limit	Every 36 months
Test results < 60% of limit	Every 60 months

To address this concern, the following requirement should be added to each AO:

Test Frequency Plan. Within 60 days following the initial performance test, Cliffs may submit a Test Frequency Plan to set the frequency of future performance tests.

- *The Testing Deadlines Should Be Less Restrictive.* The draft AOs require that stack testing for NO_X and SO_2 be conducted every 12 months within 2-months of the anniversary date of the initial BART compliance test. The requirement is overly restrictive because it would limit the time-of-year in which the testing can take place and would therefore limit the operating conditions in which the testing could occur. It is also important to note that the taconite industry has historically experienced unpredictable market swings causing decreased production and extended downtime. To address these concerns, the stack testing requirement should be rewritten as follows:

  > Periodic BART NO_x/SO_2 Tests. Testing shall be conducted at the frequency set in the Test Frequency Plan. Testing required every 12 months shall occur within 6 months of the test anniversary; testing required every 36 months or longer shall occur within 12 months of the test anniversary.
  >
  > Automatic Stack Test Extensions. If a facility experiences an extended outage (> 90 days) during a year in which a stack test is required, the facility will be granted an automatic 12-month extension to the testing deadline provided that the facility submits written notification to MPCA.

- *The Test Duration is Too Long:* The draft AOs for Cliffs facilities require that stack testing for NO_X and SO_2 be conducted simultaneously on all stacks for 30 consecutive hours. We believe that an annual 30-hour stack test is excessively long and burdensome. To address this concern, the stack testing requirement should be rewritten as follows:

  > Stack Test Duration: The initial BART performance test shall be conducted for a sufficient duration to generate 30 hourly data points. Subsequent BART NO_x or SO_2 performance tests shall be scheduled to collect 30 hourly data points if needed. However, if after collecting 3 or more hours of test data the results of the performance test are less than or equal to 90% of the emission limit, the stack test can be stopped and the test will be considered an acceptable duration for demonstrating compliance with the emission limitation.

- *Scrubber Operating Parameters Should Not be Set Based on BART SO_2 Stack Tests:* The draft AOs for Northshore and Hibbing Taconite state that the SO_2 compliance stack test would be used to set the minimum scrubber water flow and pressure drop limits for the existing wet scrubber system. These are the same scrubber parameters that are already set for the Taconite MACT when testing for filterable particulate matter (PM). MPCA should not set new and potentially different limits during the SO_2 test on the same control device. Since the wet scrubber is primarily designed to control PM, the Taconite MACT parameter values should be used to demonstrate proper scrubber performance. Also, BART testing measures emissions from all stacks simultaneously and the aggregate value is used to determine compliance. The Taconite MACT test, by contrast, evaluates each scrubber stack separately and is, thus, a more appropriate test for setting individual scrubber parameters. To address this concern, the AO requirements to set scrubber operating limits based on SO_2 performance testing should be replaced with the following:

Scrubber Operating Parameters. The scrubber operating parameters shall be those established pursuant to the Taconite MACT for this emission control system.

- *Permanent Recordkeeping is Inconsistent with Title V Permit Obligations.* The AOs include a section entitled "permanent records" that would mandate that Cliffs permanently maintain "information on the NO_x, SO_2 and PM emission limits and operations requirements imposed by this Order." First, the 5-year recordkeeping requirement under the Title V program should be sufficient for any records required under the AOs. Second, the language does not provide a clear indication of what records must be kept. "Information on" these emission limits is too vague to be discernable. The data that formed the basis of the emission limit determination for SO_2 and NO_2 has been provided to MPCA and can be permanently maintained by the agency. The permanent records section of the recordkeeping provision in the AOs should be removed. All records required under the AOs should be subject to the minimum 5-year recordkeeping obligation in the Title V permit and recited in the second part of the recordkeeping section of each AO.

Facility-Specific Comments on Proposed BART Emission Limitations

In addition to the general comments above, Cliffs has prepared the following facility-specific comments on the proposed NO_x and SO_2 BART emission limitations for each of its taconite facilities.

United Taconite: Nitrogen Oxides

The NO_x limits proposed by the MPCA in the Regional Haze State Implementation Plan Supplement for United Taconite are as follows:

- Line 1: 4.5 ton NO_x / day attributed to "Good Combustion Practices, past heat recuperation project" as BART
- Line 2: 10.1 ton NO_x / day attributed to "Good Combustion Practices" as BART

Air Permit 13700113-005 issued to United Taconite cites the following existing NO_x emissions limits:

- Line 1: less than or equal to 816 tons using 180-day rolling sum rolled daily. This condition restricts NO_x emissions from EU 040 (Line 1) to 1655 tons per year.
- Line 2: less than or equal to 1820 tons using 180-day rolling sum rolled daily. This condition restricts NO_x emissions from EU 042 (Line 2) to 3692 tons per year.

It appears as though MPCA has attempted to convert the 180-day rolling sum limits present in the existing air permit to daily values by simply dividing by 180 days, with the intent to assess compliance with that daily value on a 30-day rolling average basis. The condensation of the limits to a daily value eliminates the very reason for the 180-day rolling sum. The 180-day rolling sum enables operationally crucial fuel flexibility while still providing overall lower emissions of SO_2 and NO_x. Allowing this fuel flexibility ultimately yields a 'better than BART' solution that benefits both the facility and the environment.

United Taconite is permitted to burn a combination of solid and gaseous fuel on both Line 1 and Line 2 during normal operation. It is United Taconite's desire to burn as much solid fuel as practical because it represents a more economic fuel source, and yields an overall lower emissions profile of combined SO_2 and NO_x emissions. In fact, on a daily basis, 100% solid fuel combustion on both Lines 1 and 2 yields >800 lb/hr lower combined SO_2 and NO_x emissions.

However, arbitrarily reducing the averaging period from 180-days to 30-days will make it impossible for UTAC to achieve compliance when the use of natural gas for an extended period of time is essential to furnace operations. Extended periods of natural gas usage arise in several situations.

- The furnaces must be started up while burning natural gas because the energy-efficient design of the furnace requires recovered excess heat from latter regions of the furnace to dry the solid fuel. Further, kiln temperatures must be hot enough to ignite the solid fuel upon entry into the furnace, requiring startup on natural gas to elevate the kiln to that required temperature. A full furnace startup procedure, after a normal maintenance outage, will last several days. Depending on the nature of maintenance conducted during the outage, startup may last a week or more while the furnace reaches a stable operating state.

- Solid fuel combustion requires a more complex fuel delivery system than natural gas, and thus temporary interruptions in solid fuel use, and the ability to revert to natural gas use must remain as part of the facility's operational plan. Interruptions to the system include solid fuel delivery issues or delays to the coal dock and/or to the United Taconite plant, fuel handing conveyor malfunctions, bin storage and coal mill pluggage due to elevated fuel moisture levels from atmospheric conditions, and planned and unplanned maintenance on any of the above elements, including the coal pulverizer and burners. Despite our best efforts and the economic incentive to operate using the lowest cost fuel, interruptions are inevitable and must be recognized in the BART NO_x limits.

  In August 2010, United Taconite experienced an unexpected catastrophic failure with the Line 2 coal mill. The parts to repair the mill had over an 8-week lead time, and the repair took several days. In order to continue production during that time, United Taconite produced pellets using 100% gas in the furnace. This was not a foreseeable failure, and had United Taconite not been able to switch to natural gas, it would have been forced to drastically reduce its operations and/or idle the plant until the repairs could be made.

- Precipitation events result in higher solid fuel moisture content and reduced heating value from the fuel. This scenario requires United to supplement solid fuel with gas to maintain required heat input to the furnace in order to maintain quality standards for our customers.

The limits proposed in the BART SIP Supplement, even when averaged over a 30-day period, will result in the forced shutdown of United Taconite's furnaces to comply with the NO_x limits. This forced shutdown could occur during any of the operationally crucial extended natural gas usage events listed above. BART was not intended to force shutdowns or curtailments. BART limits should reflect the furnace's operational capability with all existing fuels. See 40 CFR Part 51, Appendix Y (stating that BART is not intended to require fuel switching).

Application of the limits as designed in the present version of the United Taconite air permit actually yields the lowest overall combination of SO_2 and NO_x emissions. These limits also go the furthest to reduce emissions of these haze-forming constituents, while still retaining the operational flexibility that allows United Taconite to produce a quality product and remain commercially competitive.

Cliffs cannot accept limits that over-reach the intent of BART by being more prescriptive than the furnaces' present capability and for which it already has information suggesting it will not be able to reliably assure continuous compliance with those limits.

Proposed Limits

Considering all of the above information, Cliffs proposes that the NO_x emission limits be revised for the United Taconite furnaces as follows in order of preference:

a) Utilize the existing permit limits in their 180-day forms as BART. This is the most straightforward approach, relying on the permit terms already in place.

   - *Line 1: less than or equal to 816 tons using 180-day rolling sum rolled daily. This condition restricts NOx emissions from EU 040 (Line 1) to 1655 tons per year.*
   - *Line 2: less than or equal to 1820 tons using 180-day rolling sum rolled daily. This condition restricts NOx emissions from EU 042 (Line 2) to 3692 tons per year.*

b) In the alternative, utilize a 30-day limit that is reflective of United Taconite's operationally required fuel flexibility to burn natural gas for greater than 30 consecutive days in some circumstances, and retain the annual emissions caps already present in the air permit. A preliminary analysis supports the following NOx limits:

   - *Line 1: less than or equal to 18.68 ton NOx/day on 30-day average. This condition restricts NOx emissions from EU 040 (Line 1) to 1655 tons per year.*
   - *Line 2: less than or equal to 29.7 ton NOx / day on 30-day average. This condition restricts NOx emissions from EU 042 (Line 2) to 3692 tons per year.*

If MPCA is interested in setting limits using this alternative approach, Cliffs requests a meeting to discuss the appropriate statistical procedure to use before settling on a numeric NO_x limit.

United Taconite: Sulfur Dioxide

The SO_2 limits proposed in the Regional Haze State Implementation Plan Supplement for United Taconite are as follows:

- Line 1: 106.3 tons SO_2, 30-day rolling sum attributed to 'Existing wet scrubber' as BART

- Line 2: 197 tons SO_2, 30-day rolling sum, attributed to 'Existing wet scrubber'[2] as BART

These limits are reflective of the current operating restrictions in Air Permit 13700113-005 issued to United Taconite. Cliffs is supportive of these SO_2 limits for its facility.

Hibbing Taconite Company: Nitrogen Oxides

The NO_x limits proposed by MPCA in the Regional Haze State Implementation Plan Supplement for Hibbing Taconite Company are as follows:

- Line 1: 447.4 lb NO_x / hour attributed to "Good Combustion Practices, furnace energy efficiency projects (2005 and 2006)" as BART

- Line 2: 571.7 lb NO_x / hour attributed to "Good Combustion Practices, furnace energy efficiency projects (2005 and 2006)" as BART

- Line 3: 338.3 lb NO_x / hour attributed to "Good Combustion Practices, furnace energy efficiency projects (2005 and 2006)" as BART

Taconite Furnace Operations and Good Combustion Practices

Taconite indurating furnaces are complicated combustion devices that work to deliver consistent heat input to the pellets for consistent product quality. There are a number of factors that lead to inevitable day-to-day, season-to-season, and testing or monitoring variation that must be accounted for in establishment of an emissions limit as prescribed by BART. Those factors include:

- Changes in fuel efficiency before and after regularly scheduled maintenance outages as a result of routine inspection and maintenance on physical elements of the furnace that may affect NO_x generation including, fans, air supply ductwork, furnace refractory and burners.

- Furnace operating rates during the collection of available emissions test data not being reflective of furnace capacity. Typically the operating rates during stack testing events do not reach 100% of the capacity of the process including throughput and product mix and ore mix worst case conditions, typically stack testing rates are performed within 90% of the operating capacity. A BART limit must account for the full present capability of the furnace.

- Operational ability to produce more than one type of pellet products and operational production plans as future demand for those pellet products changes

- Changes in ore body and respective changes in furnace heat input required to initiate the exothermic conversion of magnetite to hematite.

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[2] MPCA also identifies "fuel blending" as a component of the BART determination. Cliffs objects to this characterization because it suggests incorrectly that BART technology determinations can drive fuel choices for Cliffs. Please delete that characterization from the BART description.

- NO_x sampling and analysis also has inherent variability that should be recognized when using stack testing data to establish emission limits.

Cliffs has been, and continues to utilize good combustion practices (GCP) as part of its normal operations because process fuel represents a significant cost of operation in the tens of millions annually for Cliffs Minnesota operations. GCP represents a set of operations and maintenance activities that support optimized operation of the furnace fuel and air delivery systems, burners and associated control systems. Cliffs' GCPs include the following:

- Daily monitoring of fuel use per ton of product produced and comparison against established targets.

- Routine monitoring of ore blends to anticipate potential changes to furnace heat load requirements.

- Established operational furnace settings understood to yield optimal conditions for combustion.

- Use of computer-driven control systems maintain consistent combustion conditions in the furnace.

- Operational responses for instances where fuel use exceeds targets.

- Routine maintenance practices to ensure optimal condition of fuel delivery, air handling and combustion systems, and associated monitoring equipment.

- Availability of an array of diagnostic tools from infrared cameras to monitor flame characteristics to airflow surveys to watch for air losses.

- Monthly and annual review of fuel use to correct for longer term trends.

As noted above, the significant cost of fuel and Cliffs' obligations to produce a product that it can competitively sell on the open market have mandated that Cliffs utilize GCPs. It is essential to note that all the emissions test data collected from 2008 forward have been collected while good combustion practices have been in place at Cliffs' operations.

However, GCP is distinctly different from application of a control technology that is designed to deliver a precise emissions rate. In those cases, a specific technology has been manufactured to deliver a certain emissions rate. GCP ensures that fuel and air use is monitored and responded to on a daily and monthly basis, thus ensuring as good a combustion environment as is practical, but lacking any direct numerical link to an emissions rate.

<u>Statistical Approaches</u>

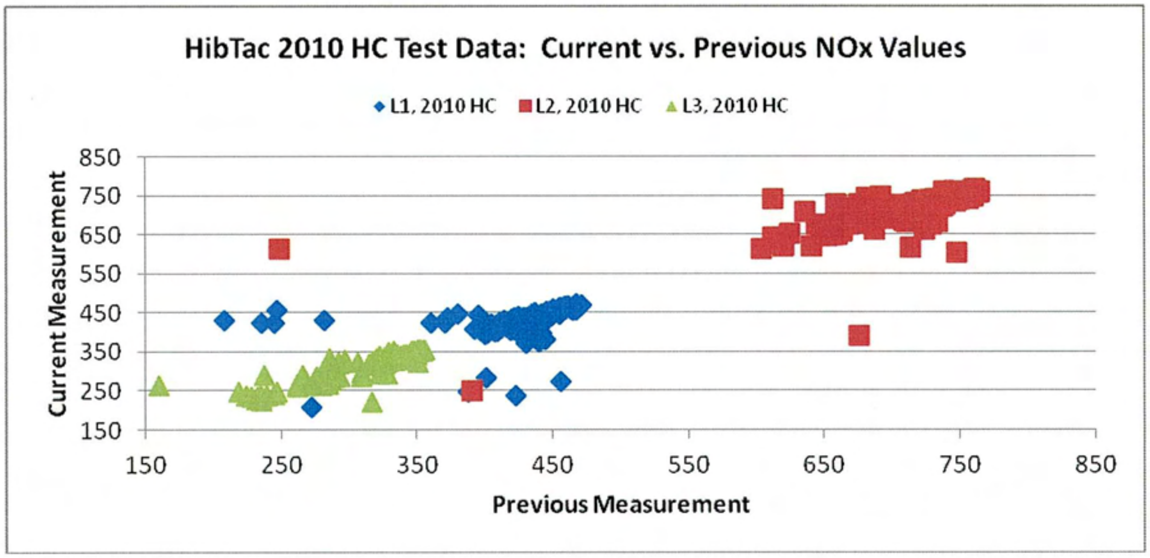
MPCA employs the Upper Predictive Limit (UPL) tool to derive its proposed limit and predicates its approach on the available emissions data as being fully representative of the entire range of permissible operating factors for the furnace. The UPL as applied by MPCA is not appropriately reflective of furnace capability for the following reasons:

- While NO_x testing has been conducted over a *range of operating conditions* thought to influence NO_x, as outlined in the original BART Administrative Orders, it is inaccurate to characterize that this testing has encompassed the *range of NOx emissions* for the facility. A correct application of the UPL must recognize the entire range of factors that could affect NO_x variability (not only the range of furnace operating conditions during the test). While the testing conducted thus far as a result of the Administrative Orders improves understanding of NO_x emissions from the furnaces, it does not account for those sources of variability outside the furnace (as described above), leading to an underestimate of the standard deviation, and thus an unrealistically low UPL with which the facility would be unable to reliably comply while operating under GCP.

- The methodology MPCA used to set up the UPL is statistically flawed as it does not recognize the fact that successive hourly emissions are highly correlated. The two-sample t-test depends critically on the assumption that the different observations in the emissions test data are mutually independent, a presumption which must also hold true for future test data. This assumption is required for the $\sqrt{\frac{1}{m}+\frac{1}{n}}$ factor of the t-test, which is also present in the UPL method and requires the same mutual independence. A simple way to gauge data independence is to plot the current measurement against its predecessor. Under the independence assumptions required of the *t* analysis (and also of the UPL), the plot should be a formless circle of points, indicating independence of one measurement to the next. The plot clearly shows a strong dependence between the two measurements in the form of the linear relationship plotted on the chart. This dependence invalidates the base assumption required of utilizing the *t*-test and the UPL in that the emissions measurements are not mutually independent, but that any measurement point has some relationship to its predecessor. Ignoring this serial correlation as MPCA has done leads to invalid and an unrealistically low UPL.

It is in fact this interdependence that also draws question to MPCA's use of the 'bootstrapping' method to gauge future ability to comply. Bootstrapping is a technique in which collected data is randomized to determine future ability to meet a certain threshold. Because data here are time-dependent, bootstrapping as implemented by MPCA fails to reflect the time dependency of the actual data series, which inappropriately overstates the amount of information in the constructed datasets than from the sample set, yielding a false sense of ability to meet a given threshold.

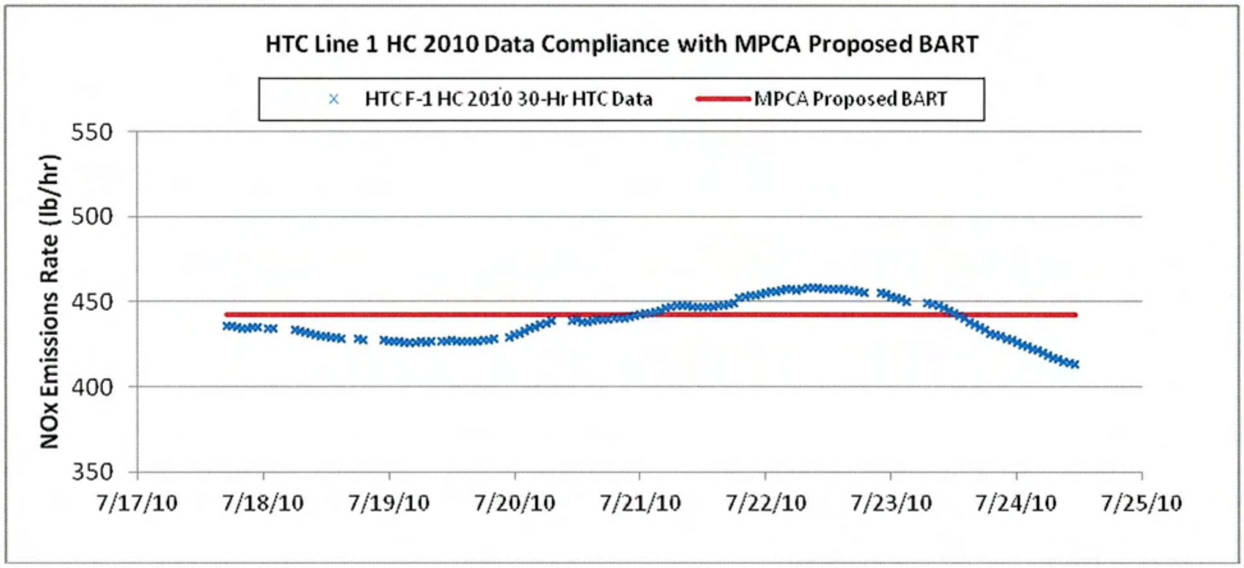
- It is worth noting that the data interdependence demonstrated by these datasets also reinforces the understanding of relative stability of emissions from these units. Because the plot of value and its predecessor shows a strong relationship, it also shows that the rate of change from these emissions units is slow and emissions are stable because any single data point is in factor a strong predictor of the points before and after it.

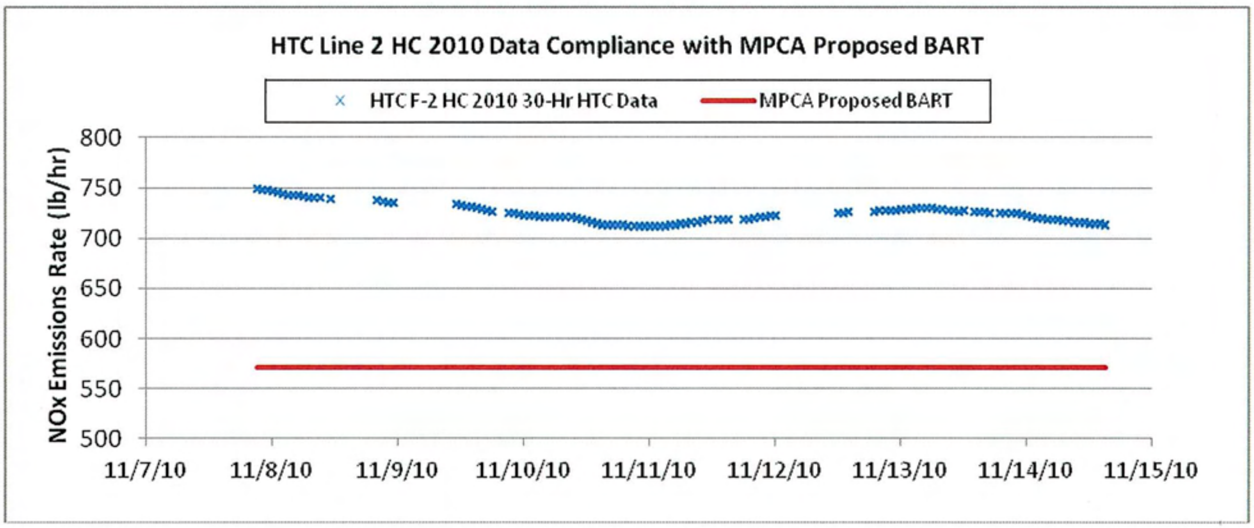


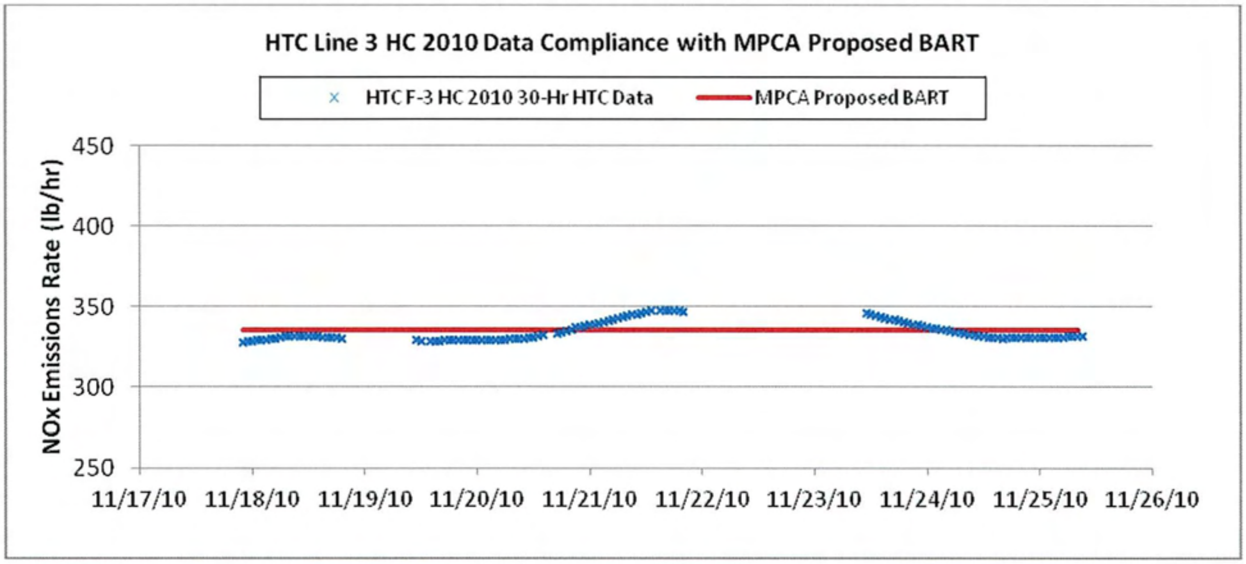
Based on this information, the application of the UPL leads to an incorrect derivation of limits reflective of the furnaces' present capability, and a limit with which the furnaces will be unable to demonstrate continuous compliance.

In fact, available emissions data already demonstrates inability for all three of Hibbing Taconite's furnace lines to reliably meet the limits proposed as part of the SIP Supplement. As an example, a review of emissions data collected during 2010, with a 30-day rolling average applied, indicates the following:

- HTC Line 1 would have emissions in excess of the proposed limit 39% of the time during the duration of the test.
- HTC Line 2 would have emissions in excess of the proposed limit 100% of the time during the duration of the test.
- HTC Line 3 would have emissions in excess of the proposed limit 29% of the time during the duration of the test.


HTC Line 1 HC 2010 Data Compliance with MPCA Proposed BART
HTC F-1 HC 2010 30-Hr HTC Data
MPCA Proposed BART
NOx Emissions Rate (lb/hr)
550
500
450
400
350
7/17/10
7/18/10
7/19/10
7/20/10
7/21/10
7/22/10
7/23/10
7/24/10
7/25/10


HTC Line 2 HC 2010 Data Compliance with MPCA Proposed BART
HTC F-2 HC 2010 30-Hr HTC Data
MPCA Proposed BART
NOx Emissions Rate (lb/hr)
800
750
700
650
600
550
500
11/7/10
11/8/10
11/9/10
11/10/10
11/11/10
11/12/10
11/13/10
11/14/10
11/15/10



Cliffs cannot accept limits that over-reach the intent of BART by being more prescriptive than the furnaces' present capability and for which it already has information suggesting it will not be able to reliably assure compliance with those limits.

Proposed Limits

Considering all of the above information, Cliffs proposes that the NO_x emissions limits be revised for the Hibbing Taconite furnaces to levels that are representative of the furnaces' present capability as follows:

- *Line 1: less than or equal to 565 lb NOx / hour while combusting natural gas only*
- *Line 2: less than or equal to 935 lb NOx / hour while combusting natural gas only*
- *Line 3: less than or equal to 422 lb NOx / hour while combusting natural gas only*

These limits include a 10% reasonable engineering margin of safety factor added to an appropriate statistically derived 99% UPL limit from the stack test data. As explained in more detail above, it is common practice to apply a factor of 10 percent or more to stack test values to accommodate normal source variability not reflected in the stack test data set and the relative inaccuracy of the proposed compliance method when setting an enforceable emission limit.

The proposed revised NO_x BART limits for Lines 1, 2 and 3 add this 10% margin of safety to a corrected statistical analysis. The statistical analysis is set forth in an attachment prepared by Professor Douglas Hawkins of the University of Minnesota and appended to the end of this comment.

Compliance with these limits would be assessed through an initial 30-hour performance test for any furnace that does not employ a CEMS and subsequent tests based on the test frequency recommendations in the general comments above.

Hibbing Taconite Company: Sulfur Dioxide

The SO_2 limits proposed by MPCA in the Regional Haze State Implementation Plan Supplement for Hibbing Taconite Company Lines 1, 2 and 3 are 0.207 lb SO_2 / LT pellets attributed to the 'Existing Wet Scrubber' as SO_2 control.

Sulfur is present in two key inputs to the furnaces: fuel and ore. While natural gas has generally negligible levels of sulfur, sulfur content in the ore body is known to vary to some degree. Hibbing Taconite Company's air emissions permit ascribes a rate of sulfur dioxide emissions related specifically to the ore to be 0.75 lb SO_2/mmbtu (at the stack, or post scrubber), based on a range of historical stack testing plus a reasonable margin of safety of 10%. This value translates to 0.28 lb SO_2/LT.

BART limits must reflect the continuous application of BART technology to the full range of existing furnace capability, including the full range of ores anticipated to be processed. The numeric BART limit as proposed by MPCA does not represent the range of sulfur presently known to exist in Hibbing Taconite's ore body and thus represents an inappropriate BART limit that Hibbing Taconite could not expect to reliably meet.

Cliffs cannot accept limits that over-reach the intent of BART by being more prescriptive than the furnaces' present capability and for which it already has information suggesting it will not be able to reliably assure compliance with those limits.

Proposed Limits

Considering all of the above information, Cliffs proposes that the SO_2 emissions limits be revised for the Hibbing Taconite furnaces to levels that are representative of the furnaces' present capability as follows:

- *Lines 1, 2 and 3 SO2 emissions to be less than or equal to 0.28 lb SO2/LT ore while combusting natural gas only.*

Cliffs supports MPCA's determination that this limit applies only when combusting natural gas and does not apply when these furnaces are fueled by backup fuels other than natural gas. Cliffs' further requests that the SIP expressly include a process for setting new SO_2 limits as described in the general comments above when processing ores from areas with higher sulfur ore than was anticipated in establishing this BART limit. The new SIP limit would be set using an appropriate statistical analysis of new stack test data and would apply when Cliffs was processing this higher sulfur ore.

Northshore Mining Company: Nitrogen Oxides

The NO_x limits proposed by MPCA in the Regional Haze State Implementation Plan Supplement for Northshore Mining Company are as follows:

- Furnace 11: 115.5 lb NO_x / hour attributed to 'Good Combustion Practices' as BART

- Furnace 12: 115.5 lb NO_x / hour attributed to 'Good Combustion Practices' as BART

Taconite indurating furnaces are complicated combustion devices that work to deliver consistent heat input to the pellets for consistent product quality. There are a number of factors that lead to inevitable day-to-day, season-to-season, and testing or monitoring variation that must be accounted for in establishment of an emissions limit as prescribed by BART. Those factors include:

- Changes in fuel efficiency before and after regularly scheduled maintenance outages as a result of routine inspection and maintenance on physical elements of the furnace that may affect NO_x generation including, fans, air supply ductwork, furnace refractory and burners.

- Furnace operating rates during the collection of available emissions test data not being reflective of furnace capacity. Typically the operating rates during stack testing events do not reach 100% of the capacity of the process including throughput and product mix and ore mix worst case conditions, typically stack testing rates are performed within 90% of the operating capacity.

- Operational ability to produce more than one types of pellet products and operational production plans as future demand for those pellet products changes

- Changes in ore body and respective changes in furnace heat input required to initiate the exothermic conversion of magnetite to hematite.
- NO_x sampling and analysis also has inherent variability that should be recognized when using stack testing data to establish emission limits.

Cliffs has been, and continues to utilize GCP as part of its normal operations considering that process fuel represents a significant cost of operation in the tens of millions annually for Cliffs Minnesota operations. GCP represents a set of operations and maintenance activities that support optimized operation of the furnace fuel and air delivery systems, burners and associated control systems. Cliffs' practices around GCP include the following:

- Daily monitoring of fuel use per ton of product produced and comparison against established targets.

- Routine monitoring of ore blends to anticipate potential changes to furnace heat load requirements.

- Established operational furnace settings understood to yield optimal conditions for combustion.

- Computer-driven control systems maintain consistent combustion conditions in the furnace.

- Operational responses for instances where fuel use exceeds targets.

- Routine maintenance practices to ensure optimal condition of fuel delivery, air handling and combustion systems, and associated monitoring equipment.

- Availability of an array of diagnostic tools from infrared cameras to monitor flame characteristics to airflow surveys to watch for air losses.

- Monthly and annual review of fuel use to correct for longer term trends.

As noted above, the significant cost of fuel and Cliffs' obligations to produce a product that it can competitively sell on the open market have mandated GCP practices at Cliffs for several years. It is essential to note that all the emissions test data collected from 2008 forward have been collected while good combustion practices have been in place at Cliffs' operations.

<u>Statistical Approaches</u>

However, GCP is distinctly different from application of a control technology that is designed to deliver a precise emissions rate. In those cases, a specific technology has been manufactured to deliver a certain emissions rate. GCP ensures that fuel and air use is monitored and responded to on a daily and monthly basis, thus ensuring as good a combustion environmental as practical, but lacks any direct numerical link to an emissions rate.

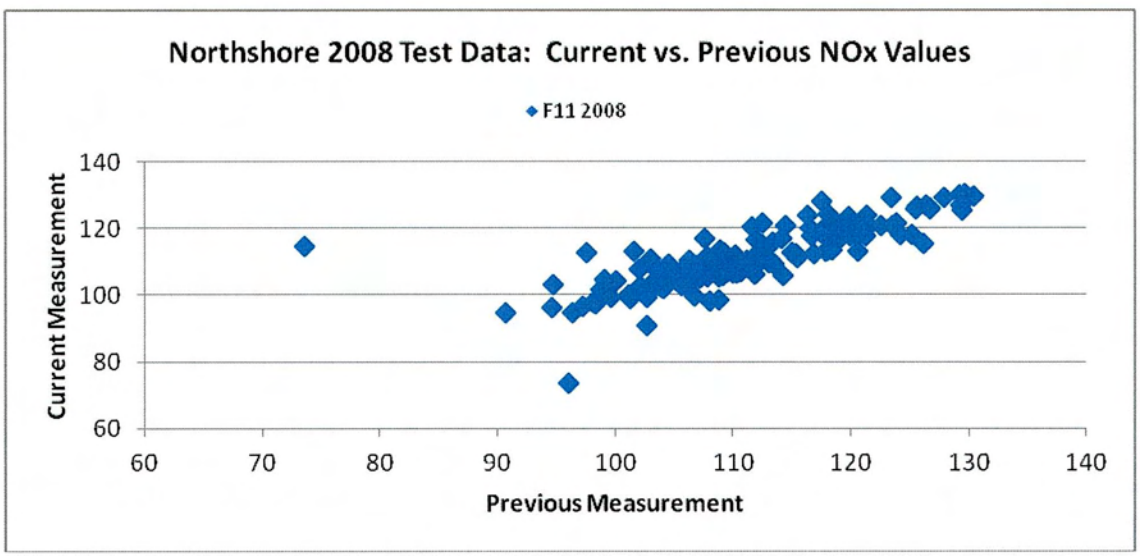
MPCA has proposed NO_x emissions limits for Northshore Mining based on a statistical prediction using emissions information available from NO_x testing on Northshore's Furnace 11. MPCA notes in the SIP Supplement that "Based on MPCA's experience in analyzing data from these units [Furnace 11 and 12], the recommended limit for Furnace 12 is the same as that for Furnace 11..." Northshore concurs with this approach in that the two furnaces are for all intents and purposes, identical to one another.

MPCA employs the Upper Predictive Limit (UPL) tool to derive its proposed limit and predicates its approach on the available emissions data as being fully representative of the entire range of permissible operating factors for the furnace. The UPL as applied by MPCA is not appropriately reflective of furnace capability for the following reasons:

- While NO_x testing has been conducted over a *range of operating conditions* thought to influence NO_x, as outlined in the original BART Administrative Orders, it is inaccurate to characterize that this testing has encompassed the *range of NOx emissions* for the facility. A correct application of the UPL must recognize the entire range of factors that could affect NO_x variability (not only the range of furnace operating conditions). The testing conducted thus far as a result of the Administrative Orders, while it improves understanding of NO_x emissions from the furnaces, does not account for those sources of variability outside the furnace (as described above), leading to an underestimate of the standard deviation, and thus unrealistically low UPL with which the facility would be unable to reliably comply while operating under GCP.

- The methodology MPCA used to set up the UPL is statistically flawed as it does not recognize the fact that successive hourly emissions are highly correlated. The two-sample t-test depends critically on the assumption that the different observations in the emissions test data are mutually independent, a presumption which must also hold true for future test data. This assumption is required for the $\sqrt{\frac{1}{m}+\frac{1}{n}}$ factor of the t-test, which is also present in the UPL method and requires the same mutual independence. A simple way to gauge data independence is to plot the current measurement against its predecessor. Under the independence assumptions required of the *t* analysis (and also of the UPL), the plot should be a formless circle of points, indicating independence of one measurement to the next. The plot clearly shows a strong dependence between the two measurements in the form of the linear relationship plotted on the chart. This dependence invalidates the base assumption required of utilizing the *t*-test and the UPL in that the emissions measurements are not mutually independent, but that any measurement point has some relationship to its predecessor. Ignoring this serial correlation as MPCA has done leads to invalid and unrealistically low UPL.

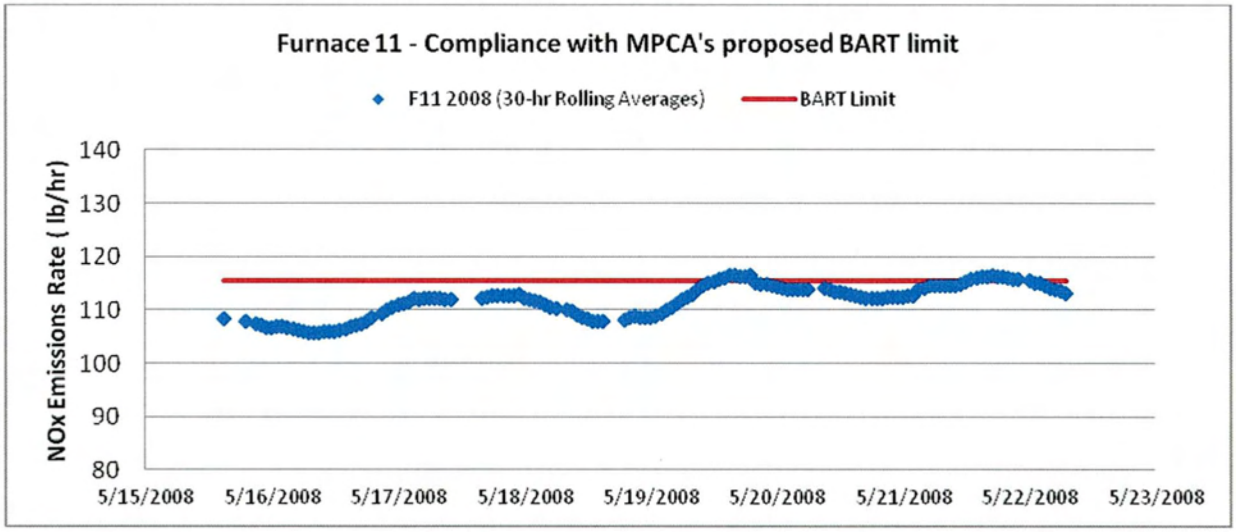
It is in fact this interdependence that also draws question to MPCA's use of the 'bootstrapping' method to gauge future ability to comply. Bootstrapping is a technique in which collected data is randomized to determine future ability to meet a certain threshold. Because data here are time-dependent, bootstrapping as implemented by MPCA fails to reflect the time dependency of the actual data series, which inappropriately overstates the amount of information in the constructed datasets than from the sample set, yielding a false sense of ability to meet a given threshold.



Based on this information, the application of the UPL leads to an incorrect derivation of limits reflective of the furnaces' present capability, and a limit with which the furnaces will be unable to demonstrate continuous compliance.

In fact, available emissions data already demonstrates inability for Northshore to reliably meet the limits proposed as part of the SIP Supplement. As an example, a review of emissions data collected during

2008, with a 30-day rolling average applied, indicates that Northshore's Furnace 11 would have emissions in excess of the proposed limit 13% of the time during the duration of the test.



Cliffs cannot accept limits that over-reach the intent of BART by being more prescriptive than the furnaces' present capability and for which it already has information suggesting it will not be able to reliably assure compliance with those limits.

<u>Proposed Limits</u>

It is important to recognize that NO_x emissions from these sources are notably the lowest in the industry, and thus do not reasonably merit an overly restrictive limit establishment approach, especially considering the relative stability of these emissions sources.

Considering all of the above information, Cliffs proposes that the NO_x emissions limits be revised for the Northshore Mining furnaces to levels that are representative of the furnaces' present capability as follows:

- *Furnace 11: less than or equal to 141 lb NOx / hour while combusting natural gas*

- *Furnace 12: less than or equal to 141 lb NOx / hour while combusting natural gas*

These limits include a 10% reasonable engineering margin of safety factor added to an appropriate statistically derived 99% UPL value from test data. As discussed in detail above, it is common practice to apply a factor of 10 percent or more to stack test values to accommodate normal source variability and the relative inaccuracy of the proposed compliance method when setting an enforceable emission limit.

The proposed revised NO_x limits for Furnace 11 and 12 add this 10% margin of safety to a corrected statistical 99% UPL analysis. The statistical analysis is set forth in an attachment prepared by Professor Douglas Hawkins of the University of Minnesota.

The 10% margin of safety is added to a baseline rate calculated from the available test data using the same UPL statistical analysis prescribed by MPCA but with adjustments to overcome the shortcomings discussed above. Those adjustments include:

- The confidence level in the UPL formula ($t_{1-\alpha,\, n-1}$) is adjusted to reflect a t-distribution appropriate to the dataset and the expected compliance test frequency.
- The serial correlation or data interdependence requires a revision to the $\sqrt{\frac{1}{m}+\frac{1}{n}}$ factor of the UPL formula to avoid the underprediction effect.

Compliance with these limits would be assessed through an initial 30-hour performance test and subsequent testing as described in the general comments section above.

Northshore Mining Company: Sulfur Dioxide

The SO_2 limits proposed in the Regional Haze State Implementation Plan Supplement for Northshore Mining Company Lines 1, 2 and 3 are 0.0651 lb SO_2 / LT pellets attributed to the 'Existing Wet Scrubber' as SO_2 control.

Air Permit 07500003 issued to Northshore Mining cites the following BACT-established SO_2 emissions limit: *Sulfur dioxide: less than or equal to 0.22 lbs/million Btu heat input for EU 100 and EU 110 individually; less than or equal to 0.074 lbs/million Btu heat input for EU 104 and EU 114 individually; when burning natural gas.*

Note that EU 100 and EU 110 represent the hood exhaust segments of Furnaces 11 and 12, respectively and EU 104 and EU 114 represent the waste gas segments of Furnaces 11 and 12 respectively. The combined hood exhaust and waste gas segments represent the total furnace emissions rate; in this case 0.22 lbs SO_2 / mmBtu + 0.074 lbs SO_2 / mmbtu, or 0.29 lbs SO_2 / mmbtu. This value translates to 0.15 lb SO_2 / LT pellets.

Sulfur is present in two key inputs to the furnaces: fuel and ore. While natural gas has generally low levels of sulfur, sulfur content in the ore body is known to vary to some degree, but limited SO_2 testing is available to accurately describe SO_2 emissions from these sources. It is important to recognize that SO_2 emissions from these sources are notably the lowest in the industry, and thus do not reasonably merit an overly restrictive limit establishment approach, especially considering the limited information available to accurately assess variability.

Considering all of the above information, Cliffs proposes that the existing BACT SO_2 emission limits represent a reasonable emissions limit with which Northshore will reliably be able to assure compliance. That limit is restated here as follows:

- *Furnace 11 and 12 SO2 emissions to be less than or equal to 0.15 lb SO2/LT ore while combusting natural gas only.*

Cliffs supports MPCA's determination that this limit applies only when combusting natural gas and does not apply when these furnaces are fueled by backup fuels other than natural gas. Cliffs' further requests that the SIP expressly include a process for setting new SO_2 limits as described in the general comments above when processing ores from areas with higher sulfur ore than was anticipated in establishing this BART limit. The new SIP limit would be set using an appropriate statistical analysis of new stack test data and would apply when Cliffs was processing this higher sulfur ore.

Conclusion

The Regional Haze SIP Supplement should be revised as described above. While NAAQS compliance is preferable to the pilot testing previously proposed in the Northeast Minnesota Plan, the schedule to complete NAAQS modeling need not be included in the BART SIP Supplement. To the extent a schedule is included, it must be extended to allow EPA to improve the accuracy of the model and to provide states the guidance needed to properly implement the models before they become the basis for potentially erroneous regulatory decisions. The NO_2 BART numeric limits should be revised upward to accommodate an appropriate statistical analysis plus a 10% margin of safety. The SO_2 BART numeric limits should also be adjusted where appropriate, but they cannot account for the full range of potential changes in the sulfur content of ore deposits. Thus, Cliffs will need the opportunity to set new SO_2 BART limits if we encounter an ore deposit with high sulfur levels. Finally, the testing and compliance obligations in the BART SIP Supplement and its appended Administrative Order should be streamlined as indicated to reduce unnecessary burdens on Cliffs and the rest of the Minnesota taconite industry.

The draft SIP Supplement and the proposed AOs did not go through significant interested party review prior to public notice. We would appreciate an opportunity to sit down with MPCA and discuss the portions of the SIP Supplement and AO that apply directly to Cliffs before the draft SIP Supplement is finalized. Please contact me at 216-694-7359.

Sincerely,

Mike Long

Michael Long
Cliffs Natural Resources

Attachments: Douglas Hawkins LLC Statistical Analysis

cc: Candice Maxwell – United
Andrea Hayden – Northshore
Julie Lucas - Hibbing
Dave Cartella – Cliffs Natural Resources

CLIFFS

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Exhibits

Consulting Statistician
Douglas Hawkins LLC
Douglas M. Hawkins
PhD, Member ISI, Fellow ASA, ASQ

Memorandum

To: Scott Gischia
Subject: Emissions limit for UTAC Line 1 running on natural gas
Date: Feb 3, 2012

The NOx emissions vary with the fuel used. Of particular interest os the NOx limit when the line is using natural gas as a fuel and the production is above 260 tons/hr.

I analyzed the 2011 data, extracting the periods when the fuel was natural gas and the production exceeded 260 tons/hr. Summary statistics on hourly NOx emissions were:

Mean 938 lb/hr
Standard deviation 207 lb/hr.

The NOx emissions showed a strong relationship from one hour to the next – the correlation coefficient was 0.903.

The furnace will be monitored using CEMS. Every day, the average of the preceding month's hourly NOx measurements will be found. Compliance will be judged on the basis of the maximum of these 365 rolling averages.

Simulation was used to find the upper two-sided 99% point of this annual rolling maximum. Five thousand years of hourly data were simulated, using the Markov model with serial correlation 0.903. This simulation found that the upper two-sided 99% point of the maximum was 2.99 standard deviations above the mean.

Thus a defensible two-sided 99% upper limit for this furnace would be
938 + 2.99*207 = 1557 lbs/hr.

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Consulting Statistician

Douglas Hawkins LLC
Douglas M. Hawkins
PhD, Member ISI, Fellow ASA, ASQ

Memorandum

To: Scott Gischia
Subject: The MPCA's BART NOx emissions limit
Date: Feb 3, 2012

Executive Summary

The MPCA's calculations of a proposed upper 99% prediction limit for NOx emissions from your furnaces omit the crucial fact that the NOx emissions are highly correlated over time. As a result of this omission, their UPL is substantially lower than it should be.

Problem with the UPL

The upper prediction limit (UPL) proposed by MPCA is almost the same as a conventional two-sample *t* test[3], but written in an unfamiliar notation – the UPL is the value at which a future compliance mean would be significantly different from the mean of the historical data set used to calibrate the limit. Specifically, the upper prediction limit is given by:

$$UPL = \overline{X} + t_{1-\alpha/2,n-1} s \sqrt{\frac{1}{n} + \frac{1}{m}}$$

where $\overline{X}$ and *s* are the mean and standard deviation of the calibration data set, *n* is the number of observations in the calibration data set, *m* is the number of observations that will go into the compliance test, and α is the desired confidence level.

Several elements of this formula warrant scrutiny.

- The calibration data set needs to he gathered under conditions that duplicate those of the subsequent compliance data set. There are many factors that could influence NOx emissions – seasonal effects, production levels, ambient conditions and changes in the product to name just a few. A data set gathered over a short time period is therefore questionable as it inevitably

[3] The primary difference is that a conventional two-sample *t* would pool the variances of the calibration and the compliance test samples. The UPL uses just the variance of the calibration sample.

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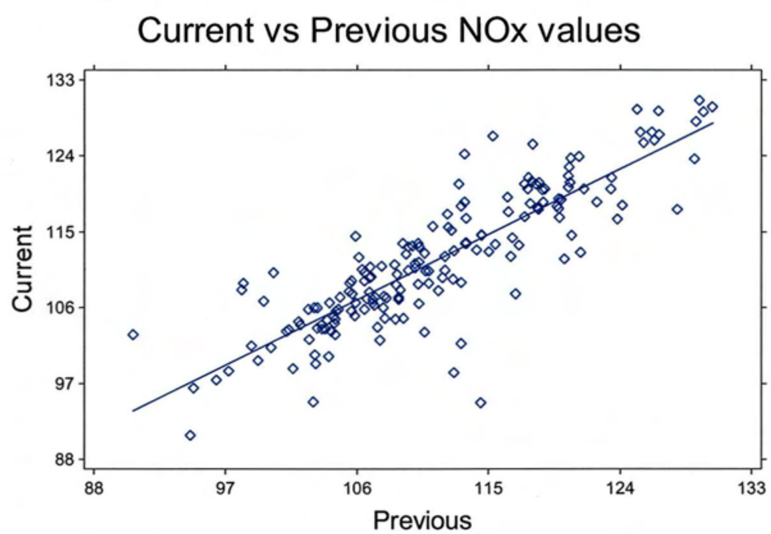
omits the variability due to these factors with their longer-term variation. While the instant snapshot at a random time should provide an unbiased estimate $\overline{X}$ of the true mean, it necessarily underestimates the true variability and so its standard deviation *s* leads to an unjustifiably low upper limit.

- The confidence level α needs to be considered carefully. The value α=0.05 is almost a cliché as it is used so commonly in statistical analyses. It is easy to lose sight of the fact that by design a two-sided α limit is supposed to fail in a fraction α of the times it is used. So while a 5% level may be adequate in situations where only a single test is done, it is not when multiple testing is to occur. And environmental monitoring involves multiple testing – different furnaces are tested at different times, different rolling averages are monitored. In this sort of multiple testing setting, the conventional single-analysis confidence levels are inappropriate, and much smaller "multiplicity-adjusted" α values should be used. The MPCA has proposed an α of 1%. This is acceptable as long as the procedure is not used for multiple tests within a plant.
- Finally, the two-sample *t* methodology depends critically on the assumption that the different observations in the calibration data set are mutually independent, as are the observations in the compliance data set. This assumption is required for the $\sqrt{1/m+1/n}$ multiplier in the UPL formula.
- The degrees of freedom *n*-1 for the *t* cutoff also requires that the data in the calibration set be independent. If they are not, then the degrees of freedom will not be *n*-1.

You have already commented on the first two of these points, and I endorse the comments you have made. You have not however explicitly explored the last two issues, and so I will offer some comments on them.

Plant data are usually correlated over time, and this is true of the NOx emissions. As an example, I looked at the 176 hourly readings in the Furnace 11 combined stacks data set. A plot of each NOx reading against its immediate predecessor shows:



Under the independence assumptions of the *t* analysis, this should be a formless circle of points;

clearly it is not. In fact, the correlation between the two is 0.862.

This means that the *n* observations in the calibration data set contain much less information than would *n* independent observations, as successive observations largely reiterate the same information that was already provided by their predecessors.

The Elements of the UPL

The UPL involves four elements:

The sample mean $\overline{X}$

The sample standard deviation *s*

The "sample size multiplier" $\sqrt{1/n+1/m}$

The cutoff table value $t_{1-\alpha/2,\, n-1}$

Apart from the concern about using short-term data to estimate the longer-term variance, the first two of these are un-controversial. The third and fourth though are more problematic.

The Sample Size Multiplier

I carried out some calculations on the Furnace 11 combined stack data set. This data set included 176 "calibration" readings and the rule will use 30 compliance monitoring readings. The MPCA rule them gives the sample size multiplier as

$\sqrt{1/n+1/m}$ = $\sqrt{1/176+1/30}$ = 0.197

A technical appendix sketches some calculations on this data set, and leads to the conclusion that, because of the serial correlation, the "effective" sample size of both the calibration and the compliance assessment data sets is less than one tenth of their nominal size. This means that the UPL's "sample size multiplier" $\sqrt{1/n+1/m}$ is far too small, and instead of the value 0.197 used in the MPCA formula, it should be 0.651.

The Cutoff Value

The fourth element of the formula is the cutoff value $t_{1-\alpha/2,\, n-1}$

This cutoff relies on the assumption that the standard deviation is estimated using an independent sample of size *n*. But the actual NOx values are strongly serially dependent, and so contain far fewer than *n* independent pieces of information.

The calculations in the technical appendix show that the standard deviation of a data set of length of the Furnace 11 data set and with its serial correlation is approximated reasonably well with the assumption that there are 12 degrees of freedom.

This changes the two-sided 99th percentile from 2.604 to 3.05.

The furnace 11 data set had a mean and variance of 111.1 and 8.7 lbs/hr respectively. Incorporating these with the corrected *t* cutoff and sample size multiplier gives:

MPCA calculations	111.1 + 2.64*8.7*0.197 = 115.5 lbs/hr
Corrected for correlations	111.1 + 3.05*8.7*0.651 = 128.4 lbs/hr

Comment on the MPCA Bootstrap Calculations

The MPCA reported some bootstrap calculations using the actual hourly data from the calibration data set. These bootstrap runs supported their UPL However looking over their bootstrap code, the samples they took from the historical calibration data set were drawn independently, and so did not incorporate the vital feature of serial dependence of the data. Thus the agreement between the bootstrap samples and theory does not support the relevance of the theory to the actual monitoring situation you face.

HTC 1 and 3

HTC furnaces 1 and 3 are slated to be monitored by a parallel UPL limit. The calibration data from these furnaces also show high serial correlation: 0.899 for HTC1 and 0.787 for HTC 3. The UPL assuming independence is therefore invalid for these furnaces also. The correct sample size multipliers are given in the technical appendix.

The means, standard deviations, multiplier and UPL for these two furnaces are:

	Mean	s.d.	multiplier	UPL
HTC 1	428	38	0.743	514
HTC 3	343	43	0.542	384

HTC 2

The HTC furnace will be monitored differently, using CEMS. Every day, the average of the preceding month's hourly NOx measurements will be found. Compliance will be judged on the basis of the maximum of these 365 rolling averages.

Statistical theory does not give good information on the distribution of the maximum of a rolling average of correlated data, so simulation was used to explore it. Ten thousand years of hourly data were simulated, using the Markov model with serial correlation 0.862. This simulation found that the upper two-sided 99% point of the maximum was 2.69 standard deviations above the mean.

The data from HTC 2 provided an hourly mean and standard deviation of 707 and 53 lbs/hr respectively. Thus a defensible two-sided 99% upper limit for this furnace would be

707 + 2.69*53 = 850 lbs/hr.

Appendix – Dependence Monitoring

Write X_t for the NOx measurement at time *t*. Time series such as this can be modeled by autoregression models, the simplest of which is the Markov model

$$X_t = \mu + \varphi X_{t-1} + e_t$$

where μ is the long-term mean NOx emission level, ϕ is the autoregression coefficient, and the e_t are independent "errors" with mean zero and standard deviation σ.

This model turns out to fit the Furnace 11 data well. Output from the SARIMA modeling of Statistix for Windows V9 gave:

```
  Term     Coefficient      Std Error     Coef/SE          P
Constant       15.3420        4.24441        3.61     0.0003
  AR  1        0.86229        0.03804       22.67     0.0000

MS (Backcasts excluded)       16.8748
DF                                174
SS (Backcasts excluded)       2936.22    SS Due to Backcasts      9.91105
N Before Differencing             176
Marquardt Criterion of 0.010 was met.
Simplex Criterion of   0.010 was met.
Ljung-Box Portmanteau Lack-of-fit Diagnostics
LAG (DF)   =     12(    10)       24(    22)       36(    34)       48(    46)
Chi-Sq (P) =   4.69(0.9109)    22.64(0.4222)    26.33(0.8235)    33.09(0.9232)
```

The last two lines of output show that the Markov model passes all the conventional tests of model fit.

If the Markov model holds, then observations *k* time periods apart will have a correlation of ϕ^k which, with ϕ being approximately 0.862, is a far cry from the value zero assumed by the two-sample *t*

The Sample Size Multiplier

The average of a Markov time series of length *n* has a variance of σ^2 multiplied by

$$\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}\varphi^{|i-j|}$$

For *n* = 176 (the size of the Furnace 11 calibration data set), this multiplier evaluates to 0.0737. This is much bigger than the 1/*n* = 0.00568 implied by the independence assumption. For *n*=30 (the size of the 30-hour compliance assessment sample), it evaluates to 0.3503, which is again much bigger than the 1/*m* = 0.0333 implied by the independence assumption.

Putting the two together, the independent data assumption implies a multiplier of

$$\sqrt{\frac{1}{n}+\frac{1}{m}} = \sqrt{0.005682 + 0.03333} = 0.197$$

But the correct value of the multiplier is

$\sqrt{0.0737 + 0.3503} = 0.651$

Thus, even absent concerns about the cutoff *t* and the likely downward bias in the standard deviation, the margin of error in the UPL calculation carried out by the MCPA is too small by a factor of 0.651/0.187 = 3.31.

Another way of looking at the results is that, thanks to the serial correlation from one hourly reading to the next, the 167 observations in the calibration data set only contain as much information as would 14 independent observations, and the 30 observations in the compliance testing data set contain less information than would 3 independent observations.

The corresponding analysis for the HTC 1 and HTC 3 data sets shows serial correlations of 0.899 and 0.787 respectively. These lead to multipliers

HTC 1: $\sqrt{0.1133 + 0.4389} = 0.743$

HTC 3: $\sqrt{0.0524 + 0.2411} = 0.542$

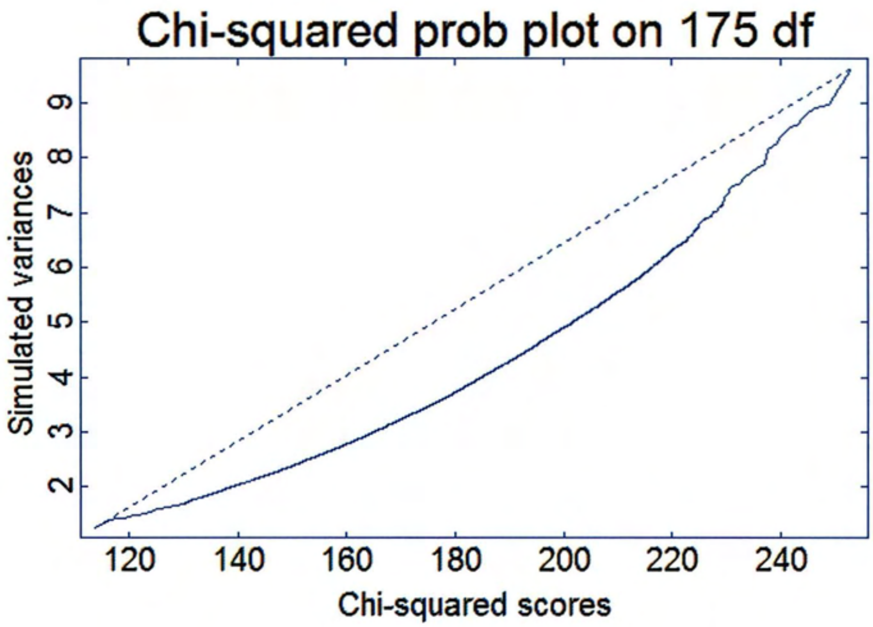
The Degrees of Freedom

The theoretical underpinning of the *t* distribution is that the denominator variance follows a scaled chi-squared distribution. If it is estimated from an independent normal sample of size *n*, then there are *n*-1 degrees of freedom. Familiar statistical theory does not say what the distribution might be if the data are dependent. To explore this, I simulated 10000 sequences of normal Markov data, length 176, with a serial correlation of 0.862 and made chi-squared probability plots of the resulting variances.

These are shown below. The first plot shows the fit for the assumed 175 degrees of freedom. If the data set were 176 independent observations, this plot should be an approximately straight line. Clearly it is not – it is highly curved, as the dotted reference line shows.

The second plot shows the same values plotted against a chi-squared with 12 degrees of freedom. Here the straight line visibly fits quite well., suggesting using the t with 12 degrees of freedom for the compliance monitoring.

This figure of 12 fits in quite well with the conclusion from the sample size multiplier that the effective independent sample size is roughly 14.


Chi-squared prob plot on 175 df
Simulated variances
Chi-squared scores
2
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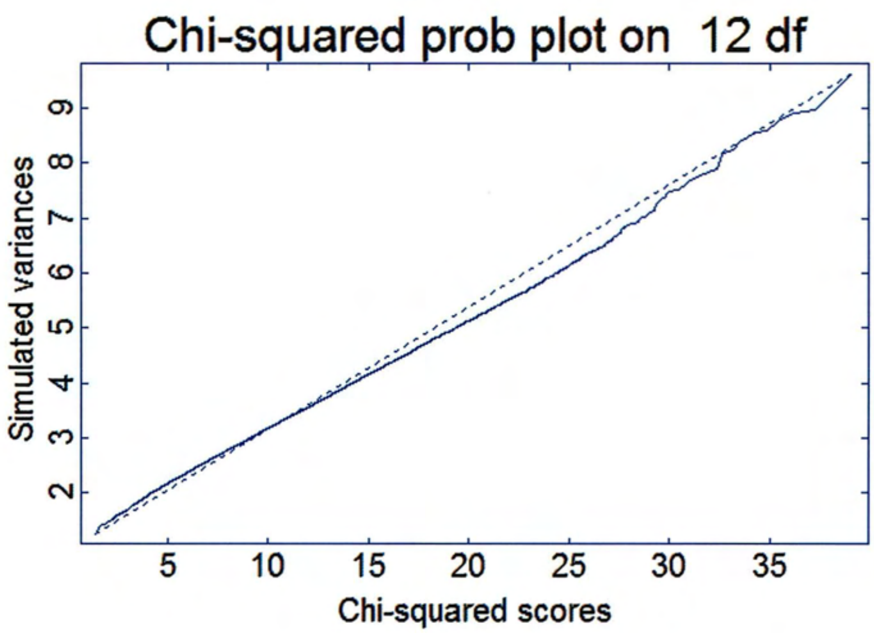
Chi-squared prob plot on 12 df
Simulated variances
Chi-squared scores
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A3

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

FEB 10 2012

REPLY TO THE ATTENTION OF:

Catherine Neuschler
Minnesota Pollution Control Agency
Environmental Analysis and Outcomes Division
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Ms. Neuschler:

We have reviewed MPCA's draft March 2012 Regional Haze State Implementation Plan Supplement and request that you consider the following information prior to setting the NOx limits for Minnesota's taconite facilities. As stated in the Minnesota Pollution Control Agency's (MPCA's) supplement, BART must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology. Based upon these criteria, use of low NOx main burners could be considered to represent BART. Please share any information you may have regarding the potential use of low NOx burners as BART at taconite facilities in Minnesota.

U.S. Steel has demonstrated the development and use of low NOx main burners that achieve 70 percent NOx reduction on its indurating lines. This level of control is not reflected on any of the taconite indurating lines in Minnesota, including on the U.S. Steel lines on which this technology has, and presumably still is, being demonstrated. Installation of low NOx main burners would therefore seem to have the potential of decreasing NOx emissions by over 60 tons per day if applied across all of the taconite facilities in Minnesota.

As MPCA is aware, the use of improved NOx reduction technology has been under discussion for some time. More specifically:

- A January, 2009, NOx reduction analysis was performed for U.S. Steel's Minntac Iron Ore Pelletizing Plant, with one of the recommendations being to pursue use of low NOx main burners.
- On April 13, 2010, U.S. Steel NOx Reduction Pilot Project recommendeded further pilot testing and on October 22, 2010, test results on Minntac's Line 7 indicating that a 70 percent reduction goal is achievable via a low NOx main burner, was submitted to MPCA by U.S. Steel.
- On May 13, 2011, a final report on Line 7 was submitted by U.S. Steel to MPCA further indicating that 70 percent reduction was achievable using a low NOx main burner.

- A December 1, 2011 final report on the Line 6 low NOx main burner, which was installed at Minntac in 2011, was submitted to MPCA. U.S. Steel concluded that, "Based on testing conducted to date, Minntac is confident that low NOx main burners are a technically and economically feasible mechanism to achieve NOx reductions."

Therefore, information supporting low NOx main burners as BART is well documented and has been available for some time. In contrast, MPCA's approach to setting limits seems to have been to reflect the upper end of uncontrolled emission levels.

The proposed SO2 limit for United Taconite's Line 2 of 197 tons as a 30-day rolling sum appears inconsistent with your October 6, 2009 memorandum titled "Sulfur Dioxide BART Determination for United Taconites LLC's Indurating Furnaces," which contains a table "Sulfur Dioxide Removal Alternatives for United Taconite Line 2." This table includes six alternatives, including fuel blend changes with a corresponding limit of 1.70 lb/MMBtu (which forms the basis of the 197 tons as a 30-day rolling sum) and fuel blending plus polishing scrubber with a corresponding limit of 0.68 lb/MMBtu. The latter option will result in about 1,000 tons less SO2 per year. However, MPCA determined that "It appears that all alternatives are cost effective" but chose fuel blends as BART because that option could be accomplished without additional construction and could be implemented more quickly, and avoids further degradation of water quality. However, speed of implementation is not a specified criterion for selecting BART and furthermore, the fuel blending control option would not be implemented quicker than any other selected as BART unless specific limits requiring an expedited implementation schedule was included in an enforceable document. In addition, water treatment costs were included as part of the overall scrubber costs.

Please consider the above information for use in setting your final limits as well as the fact that additional time is available for these recommendations to be implemented.

Sincerely,

Douglas Aburano, Chief
Attainment Planning and Maintenance Section

Minnesota Pollution Control Agency

RESPONSES TO TIMELY COMMENTS ON THE SUPPLEMENTAL REGIONAL HAZE SIP

1. US Forest Service, Superior National Forest, Letter Received January 13, 2012

Comment 1-A: "We do not agree that CSAPR is better than source-specific BART in Minnesota. No state-specific demonstration has been made…In the Supplement the emissions budget under the previous transport rule is compared to CSAPR. We do not see any value in this comparison. Both are different versions of the same trading program."

Response: In 40 CFR 51.308(e)(2), the Regional Haze Rule gives states the ability to implement an emissions trading program or other measure as an alternative to source-specific BART requirements, if the alternative program achieves greater reasonable progress towards the visibility goals than application of source-specific BART. EPA then made a national determination that implementation of EPA's SO_2 and NO_X cap-and-trade program for power plants (or electric generating units – EGUs) in the subject area and BART in areas of the country not covered by the trading rule provides for greater visibility improvement at all Class I areas than nationwide implementation of source-specific BART. Because this is a national decision, no state specific demonstration is required.

EPA originally made this determination for the trading program known as the Clean Air Interstate Rule (CAIR). States were therefore able to make a "CAIR=BART" determination. The MPCA made this determination in the initial draft Regional Haze SIP, which went on public notice in February 2008. As the result of litigation, CAIR was subsequently remanded to EPA. EPA then replaced CAIR with a revised trading program known as the Cross State Air Pollution Rule (CSAPR), sometimes also called the Transport Rule. After promulgation of CSAPR, EPA undertook a second rulemaking to determine if CSAPR could also serve as a BART alternative. When the Supplemental Regional Haze SIP went on public notice, on December 19, 2011, EPA had not yet officially made available its analysis that CSAPR=BART. Therefore, the comparison of Minnesota's budget under both programs was provided to demonstrate that, since emissions budgets were as stringent under CSAPR as they were under CAIR, EPA would be likely to determine that covered states could substitute implementation of CSAPR for source-specific BART.

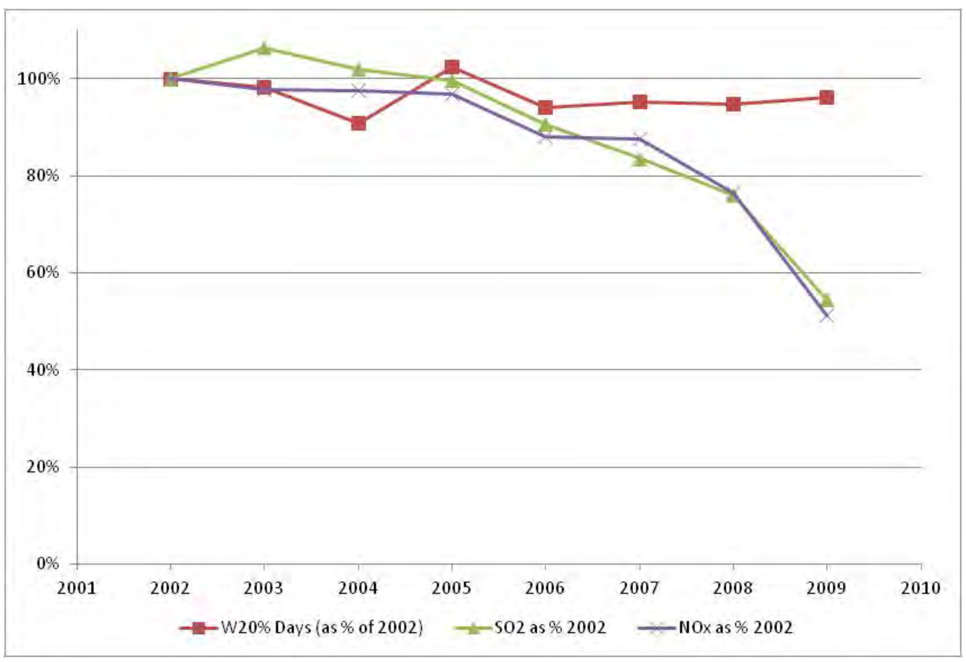
On December 30, 2011, EPA published in the Federal Register (76 FR 82219) a proposed rulemaking and technical demonstration that implementation of CSAPR would result in greater visibility improvement in all Class I areas than implementation of source-specific BART at power plants. The

MPCA is therefore choosing to rely on this national determination. The final SIP submittal will remove the comparison of CAIR and CSAPR emission budgets and instead rely on EPA's technical analysis demonstrating better visibility improvement from CSAPR than source-specific application of BART to power plants.

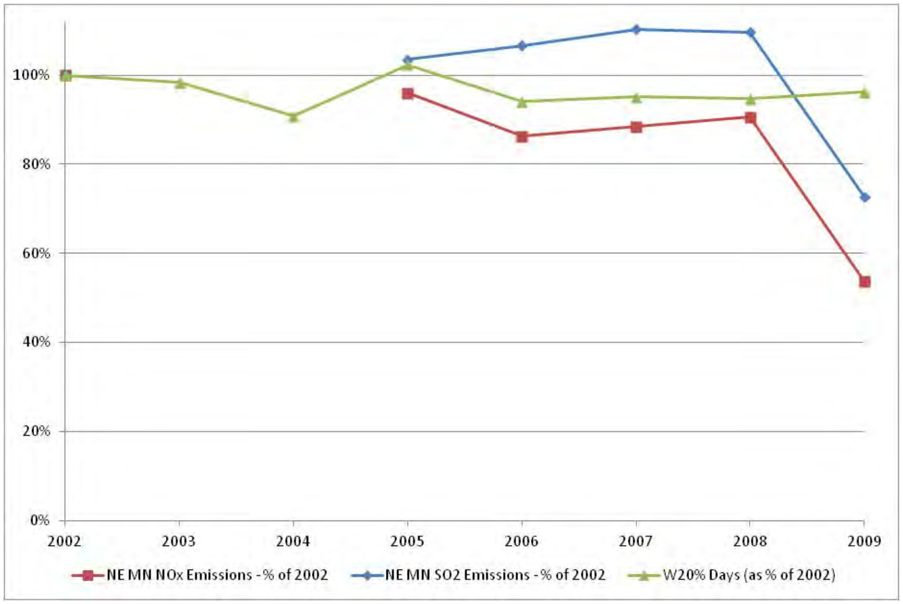
Comment 1-B: "We attempted to compare source-specific EGU BART to CSAPR for Minnesota...the graph shows that the IPM prediction of the [e]ffect of CSAPR in 2014...is an increase in emissions over current (2010) actually emissions. In addition, CSAPR is well above both what was proposed as source-specific BART by MPCA and what we and the other Federal Land Managers (FLMs) proposed as source-specific BART."

Response: The Integrated Planning Model (IPM) is used by EPA to predict future emissions from power plants based on energy demand and environmental controls installed. Although looking at emission levels is also informative, the ultimate goal is to improve visibility; there is not necessarily a direct and simple correlation between emissions within Minnesota and visibility at Minnesota's Class I areas. As shown in the graphs below, deep drops in statewide NO_X and SO_2 emissions since 2005 have not necessarily led to improved visibility. The same is true when looking at emissions from Northeast Minnesota. It should be noted that EPA's analysis comparing BART to CSAPR uses air quality modeling to compare the visibility improvement that would result from application of each program.

Graph: SO_2 and NO_X Emissions from Minnesota and Visibility at BWCAW on Worst 20% Days (as % of 2002 Baseline)



Graph: Combined SO_2 and NO_X Emissions from NE MN Plan Tracked Sources and Visibility at BWCAW on Worst 20% Days (as % of 2002 Baseline)



As noted by the commenter, the Technical Support Document for the proposed CSAPR=BART rule projects that Minnesota utility boilers may emit 50,000 tons per year (tpy) of SO_2 and about 35,000 tpy of NO_X in 2014 under the scenario of CSAPR in the covered states and BART in all other states (2014 IPM CSAPR + BART). However, the TSD also shows that under the application of the regional haze program requirements alone, Minnesota is projected to have higher SO_2 emissions (56,500 tpy) and only slightly lower NO_X emissions (34,000 tpy) than CSAPR in 2014 when BART is applied nationwide. These projections do remain slightly above the CSAPR "budget" for Minnesota of about 29,000 tpy of NO_X and 41,000 tpy of SO_2.

It is more difficult to project overall emissions from Minnesota power plants with the application of BART, as BART applies only to five facilities. IPM would likely adjust emissions at other facilities based on changes in emissions at the BART facilities. However, if we look at the projections of source-specific emissions for Minnesota's power plants under CSAPR, it shows a total of 31,300 tpy of NO_X emissions and 45,499 tpy of SO_2 emissions. Replacing the IPM projections with the source-specific BART limits results in 30,704 tpy of NO_X and 35,444 tpy of SO_2.

The following table shows the 2010 actual emissions from each subject-to-BART EGU, the projected emissions from the MPCA's source-specific BART determination, the allocation under the CSAPR, and EPA's 2014 IPM projections.

Facility	Unit	2010 Actual Emissions, tons		MPCA Source-Specific BART, tons		CSAPR Allocation, tons		2014 IPM CSAPR + BART Projection, tons	
		NO_X	SO_2	NO_X	SO_2	NO_X	SO_2	NO_X	SO_2
Minnesota Power Boswell	3	890	258	988	1270	2142	3174	991	884
Minnesota Power Taconite Harbor	3	931	1512	568	1135	431	639	846	604
Northshore Mining Silver Bay Power	1	985	615	800	800	296	439	325	1299
	2	1525	1017	1045	1254	396	587	597	2490
Rochester Public Utilities Silver Lake	3	183	204	N/A	1645	N/A	N/A	N/A	N/A
	4	12	19	573	239	145	215	238	229
Xcel Energy Sherco	1	3866	6233	3862	3089	3908	5790	4713	7822
	2	3220	5192	3861	3089	3907	5789	4582	7604

For various reasons, the MPCA does not believe power plants in Minnesota will exceed the CSAPR budget levels, despite EPA's prediction. First, although IPM is often used because it is one of few models that predict utility emissions (and because it is the model EPA relies on) states and others have frequently expressed concerns about the model's transparency and accuracy. Second, past experience shows that Xcel and Minnesota Power generally prefer not to be in a position where they are required to purchase emissions allowances. There is no indication that this position will change; both companies have completed SO_2 and NO_X reduction projects on all their operating boilers, not just the subject-to-BART boilers.

The MPCA believes that many of the subject-to-BART facilities are already operating (and will continue to operate) emission controls. Although not officially included in Minnesota's SIP, limits requiring the operation of many of these emission controls are already federally enforceable. Minnesota Power Boswell Unit 3 already has limits equivalent to the BART emission limits (NO_X limit of 0.07 lbs/MMBtu and SO_2 limit of 0.09 lbs/MMBtu, both on a 30-day rolling average basis) contained in the current facility permit (Air Emission Permit 06100004-006,issued on June 21, 2011). RPU Silver Lake also has a total facility permit containing limits equivalent to the BART limits (Air Emission Permit 10900011-004, issued September 7, 2007).

Two remaining subject-to-BART units, Minnesota Power Taconite Harbor Unit 3 and Northshore Mining Silver Bay Power, Unit 2, are slated to receive emission allocations under CSAPR that are both lower than their 2010 actual facility emissions and lower than the MPCA's source-specific BART determination. The need to meet these emission budgets or purchase emission allowances will likely drive reductions at these facilities.

There are specific concerns about Xcel Energy's Sherburne County Generating Station (Sherco), which does not have enforceable limits implementing BART-level emission reductions and is slated to receive emission allocations under the Transport Rule that are much closer to its actual 2010 emissions. In addition, Sherco is projected by EPA's IPM modeling to emit at much higher levels in 2014 than it did in 2010. However, the MPCA understands that Xcel intends to install the controls on Sherco, equivalent to those determined by the MPCA to represent BART. Therefore, the MPCA is choosing to include in the SIP an enforceable document implementing a source-specific BART determination for Sherco.

Under 40 CFR 51.308(e)(2)(v) and 40 CFR 51.308(e)(4), States that choose to implement a BART alternative also may choose to "include a geographic enhancement to the program to address the requirement under40 CFR 51.302(c) related to BART for reasonably attributable impairment". In the preamble to the CSAPR=BART proposal, EPA also indicates that "States may also include in their SIPs provisions applicable to a specific sources even if no federal land management agency has made such a reasonable attribution." (76 FR 82224). The MPCA is choosing to add such a source-specific limit as described in the preamble. With the addition of enforceable limits on Sherco, the MPCA believes the SIP clearly demonstrates that the five subject-to-BART power plants will reduce their emissions to levels that will allow Minnesota to meet the goals of the Regional Haze program.

Comment 1-C: The MPCA should re-evaluate the limits determined for Xcel Energy's Sherburne County and Northshore Mining's Power House and consider the comments made by EPA and the Federal Land Managers.

Response: It should be noted that the CSAPR allocations for Northshore Mining's Silver Bay Power plant are considerably smaller than the emissions that would be allowed under BART. Therefore, we believe CSAPR will likely drive more emission reductions at this source than BART.

In response to this and other comments, the MPCA has determined that it is appropriate to add BART conditions for Xcel Sherco. However, the MPCA continues to believe that the Selective Catalytic Reduction (SCR) technology favored is not an appropriate BART determination due to cost considerations. This information is contained in the MPCA's BART determination memo and response to comments, provided in the 2009 SIP submittal. Subsequently, Xcel provided some additional information to MPCA further documenting the cost figures. The additional information is attached. Comment Letter 5, from Xcel Energy, further documents cost analysis for SCRs. Finally, even if SCRs were cost-effective, the MPCA has concerns (documented in 2009) about the feasibility of the emission limits that the FLMs believe can be achieved with SCR technology.

Comment 1-D: "The recent stay of CSAPR puts its future in doubt. The regional haze plans are more than four years overdue already. Please do not delay the plan and visibility improvement any longer by keeping Minnesota's Regional Haze Plan tied to any of the federal trading rules."

Response: Although CSAPR has been stayed, the courts are moving very expeditiously to decide the case. Briefs have been submitted and oral argument will be held on April 13. A decision could be made by mid-2012. Again, the MPCA believes that many of the emission reductions expected under CSAPR and BART are already being achieved. Should EPA believe that source-specific BART limits are necessary because of the legal uncertainty of CSAPR, it could choose to promulgate a FIP based on the information provided in the 2009 Regional Haze SIP.

Comment 1-E: In the excerpt from the 2009 Regional Haze SIP "it can be seen that the MPCA proposed BART controls for this group of units [the taconite indurating furnaces]…the MPCA was unclear as to the specifics of each BART control options, but they were clear that BART was not 'no control'."

Response: The MPCA agrees. The BART determination for the taconite facilities are, generally, optimization of the existing scrubber to ensure SO_2 removal and good combustion practices, along with past energy efficiency projects undertaken at many of the facilities, to reduce NO_X emissions. However, the MPCA does not believe that a precise combination of specific practices can be enumerated that would represent "good combustion practices" at each facility or furnace.

Comment 1-F: "To be serious about reducing NO_X, CEMS must be installed."

Response: The issues concerning the installation of Continuous Emission Monitor Systems (CEMS) were discussed prior to the submittal of the 2009 Regional Haze SIP. It was determined at that time that CEMS were not necessary on all facilities. However, the MPCA does believe that the industry is moving in the direction of having CEMS. Keetac, Minntac, and United Taconite all have CEMS installed. Due to the Administrative Orders included in the 2009 Regional Haze SIP, Northshore and Hibbing Taconite have installed and are operating stack gas flowmeters. In addition, the Order implementing the BART limits included in this Supplemental SIP requires installation of CEMS on Hibbing Taconite Line 2.

Comment 1-G: "The Supplement says the MPCA felt that at least one year of emissions data was needed from each facility in order to determine the appropriate BART limits. It then goes on to say that only 150 hours of data was used to set the limits for most facilities. This is about six days versus the one year originally proposed and no explanation given as to why such a small data set was chosen."

Response: The Administrative Orders issued included in the 2009 Regional Haze SIP require each facility to make quarterly reports to the MPCA. For facilities with CEMS, the quarterly report is to include NO_X and SO_2 emissions, along with hourly data for heat input, pellet type, pellet production rate, fuel used, combustion zone temperature, stack gas flow rate, pH of water entering and leaving the scrubber, total volume of the water entering the scrubber, and the units for each of the parameters. Facilities without CEMS were required to conduct continuous testing of each indurating furnace for a period of time sufficient to gather a minimum of 150 one-hour data points under the range of operating parameters that influence NO_X emissions, and the range for each parameter was to be representative of the furnace's operating range for the parameter in the 12 months previous to the test. The parameters to be recorded included ferrous iron content of the feed materials, pellet type, production rate, heat input, stack gas flow rate, and combustion zone temperature. The facilities then were required to report relevant hourly average operating parameters on a quarterly basis to demonstrate that operating conditions continue to be within the range established during the 150 hour test.

The MPCA chose to derive the limits by applying statistical techniques to the 150 hours of continuous data provided by the facilities without CEMS. These facilities had demonstrated, based on the procedures provided in the Orders, that emissions were minimally variable. In order to check the emission limits derived from the hours of continuous data, the MPCA also looked at prior stack test information in order to determine if there were major inconsistencies.

Comment 1-H: "Our view is that the testing should've been done under operating conditions that represent BART, as determined previously by the MPCA to be good combustion parameters and scrubber optimization. Instead the incentive for the companies was to operate at the highest emitting levels during the testing. There is no other documentation in the Supplement regarding whether BART operating practices were being followed during the tests."

Response: As noted in the response to Comment 1-E, given the diversity of the sources, the MPCA does not believe that a precise combination of specific practices can be enumerated that would represent "good combustion practices" at every facility or furnace. The facilities are in the best position to determine which specific combustion practices are appropriate to each furnace and process. As an example, comment letter 9 sets out some good combustion practices that are generally followed by the Cliffs facilities.

The conditions for the testing were set in the 2009 Regional Haze SIP. As noted above, the facilities were required to conduct testing under the range of operating parameters that influence NO_X

emissions, and that the range was to be representative of the furnace's operating range in the 12 months prior to the testing. This requirement for representativeness serves to limit the ability to simply conduct a test at full capacity in order to secure the highest emission limits. However, it is important that testing also represent the full capacity or worst case operations of the facility. Therefore, the MPCA's intention in requiring the testing was to force an appropriate level of variability.

Comment 1-I: "A further concern is the use of a 99% confidence interval. In other recent permit-related work the MPCA has used 95%. The MPCA chose a 99% value: 'due to the need for limits to be met during all operating conditions, including during times of startup, shutdown, and malfunction.' Other technology-based limits, such as best available control technology (BACT) limits, are not set this way. The correct way is to set a separate limit for startup, shutdown, and malfunction (SSM) conditions and one for regular operations. Otherwise if an overall limit was set to encompass all possible emission scenarios (normal operations and SSM) the resulting limit would be inflated and not represent BACT. We believe a similar approach should be taken for BART. The use of the 99% level in combination with a limited data set, while doing a good job of statistically encompassing all possible emission scenarios, artificially inflates the emission limits, which in the end do not require the facilities to operate according to BART."

Response: To be clear, the MPCA used a prediction interval, not a confidence interval. A prediction interval based on a sample is expected to contain an additional observation from the process with a specific degree of certainty. The interval is usually used to predict the next observed value in a sample. The prediction interval has two important values – the lower prediction limit, which the next observation would be expected to be above, and the upper prediction limit, which the next observation would be expected to be below. In setting the emission limits, the MPCA used the upper prediction limit (UPL). The MPCA adjusted the formula for the prediction interval to account for the fact that we are not trying to predict a single observation, but a value to be met within a series of several (30) additional operations. Using a confidence interval would underpredict the uncertainty. Based on this comment, for the majority of the sources, the MPCA has revised the limits to use a 95% UPL for those sources without CEMS data. The limits set for Keetac and Minntac were set slightly differently due to the availability of CEMS data, using a 98% and 99% interval, and these limits have not been revised to use a 95% interval.

The MPCA does believe that the limit can be met during regular operations and during startup and shutdown events. The BART NO_X limit is not a technology-based limit, but rather a work-practices based limit. In an emission unit with add-on controls, such as a utility boiler, there are times during the startup and shutdown phases when low flue gas temperature prevents the add-on controls from being operated. This results in elevated NO_X emissions. Because the taconite furnaces are not equipped with SCR or other controls at the end of the process, they do not experience this relatively predictable period of higher emissions. Instead, because the NO_X formed is primarily thermal NO_X, its formation is tied directly to temperature. Therefore, we would generally expect lower NO_X emissions during start up and shutdown than during operations, and there is no need to set a separate (higher) limit. The decision on whether failure to meet a limit during a malfunction results in enforcement action is a case by case decision. See also the response to Comment 6-F.

Comment 1-J: "We believe the BART determination for United Taconite does not follow the Clean Air Act and does not follow the conditions in its permit…MPCA issued United a permit for the expansion that included a condition to address BART on the now coal-fired Line 1: 'Within 120 days of being notified by the MPCA in writing of the final proposed NOx BART limits for Lines 1 and 2 (EU040 and EU042), the Permittee shall submit an application for a permit amendment to incorporate into its air emissions permit either (1) NOx and SO2 BART emission limits as proposed or (2) a BART alternative as described in the December 2009 Regional Haze State Implementation Plan submittal. Alternatively, the Permittee may submit, within 120 days of the written notification, an updated BART analysis based on the modified Lines 1 and 2 for the facility with an appropriate permit amendment application to incorporate proposed NOx and SO2 BART limits into its air emissions permit.'

"It is unclear how United's proposal complies with its permit requirement…Is it a BART alternative? If so, what is the initial BART determination for coal-fired Line 1? To our knowledge no BART determination has been completed for a coal-fired Line 1. According to 40 CFR 51.308(e)(1)(ii)(A) the BART determination must consider…the following factors…we find none of this information in the Supplement."

Response: The BART determination for United Taconite, of good combustion practices for NO_X control and fuel blending on Line 2 for SO_2 control, was made for the 2009 Regional Haze SIP submittal and the BART factors were appropriately considered at that time. The role of the Supplemental Regional Haze SIP is simply to set and make enforceable emission limits corresponding to those determinations.

Throughout the process of considering BART at United Taconite, the MPCA looked for information on how to deal with BART at a modifying facilities. Despite discussions with EPA, FLMs, and others familiar with the Regional Haze program, no useful guidance for dealing with such a situation was found. The MPCA therefore made a BART determination based on the status of the facility as it existed when the Regional Haze SIP was written and submitted in 2009. At that time, Line 1 at United used only natural gas as a fuel, while Line 2 used natural gas and solid fuels such as coal and petroleum coke. Use of natural gas tends to result in higher NO_X emissions, while use of solid fuels results in higher SO_2 emissions.

Nearly a year later, in August 2010, the MPCA issued a permit allowing United Taconite to begin burning solid fuels on Line 1 and to produce more taconite pellets. In the permit, the MPCA offered United several options for fulfilling the BART requirement. Option 1 was to accept the BART limits originally developed. Option 2 was to do a BART alternative. Option 3 was to complete a new BART analysis based on the modified facility. The MPCA did not intend for Option 2 to be contingent on completion of Option 3.

The MPCA expected United to propose a BART alternative, and had discussed this option with United. In the 2009 Regional Haze Submittal, the MPCA described the possibility that some sources with subject-to-BART sources may be considering projects that could result in greater overall emissions reductions than would be obtained through installation of BART. This was based on the preamble to EPA's rule published in October 2006, *Revisions to Provisions Governing Alternative to Source-Specific Best Available Retrofit Technology (BART) Determinations*.

The preamble emphasized the authority provided to states to implement alternative measures, and stated that "States have the flexibility to design programs to reduce emissions from stationary sources in a more cost-effective manner so long as they can demonstrate that the alternative approach will achieve greater reasonable progress towards improving visibility than would have been achieved by implementation of the BART requirements…[T]he emissions reductions that could be achieved through implementation of the BART provisions at section 51.308(e)(1) serve as the benchmark against which States can compare an alternative."

In order to evaluate the BART alternative, the MPCA used the BART emission reductions as a benchmark. The MPCA set BART limits based on the determination included in the 2009 Regional Haze SIP. United was notified of these limits in a memo provided to them on December 8, 2011.

The limits were as shown below:

	Line 1	Line 2
SO_2 BART Limit	0.121 lbs/LT pellets	1.7 lbs/MMBtu
NO_X BART Limit	1018.3 lbs/hour	753.8 lbs/hour

The MPCA believes that the benchmark against which to evaluate any alternative is the total emission reductions that would be achieved at an unmodified United facility from the implementation of these emission limits compared to an unmodified United facility without these limits.

The MPCA conducted this analysis as follows (and as shown in the attachment to the United Taconite BART determination memo).

1. Estimate the NO_X and SO_2 emissions from each indurating furnace using baseline information from the unmodified facility
    a. A tons per year figure was calculated using the furnace capacity, emission rates from the baseline actual emissions calculations included in the August 2010 permitting action, and 365 days of operation annually.

	Line 1	Line 2	Total Facility
SO_2 Emissions (tpy)	38	7008	7046
NO_X Emissions (tpy)	4371	1968	6339

2. Estimate the NO_X and SO_2 emissions from each indurating furnace using the MPCA's proposed BART limits.
    a. A tons per year number was constructed using the MPCA's limits applied to full furnace capacity and 365 days of operation annually.

	Line 1	Line 2	Total Facility
SO_2 Emissions (tpy)	148	2978	3126
NO_X Emissions (tpy)	4460	3302	7762

3. Estimate the expected emission reductions from BART
    a. BART would result in 3920 tpy of SO2 emission reductions and would allow a slight increase in NO_X emissions based on facility operations at full capacity, for a total reduction of 2496 tons of emissions.

4. Look at the expected emissions from the BART alternative proposed by United.
    a. United proposed the following emissions.

	Line 1	Line 2	Total Facility
SO_2 Emissions (tpy)	1293	2394	3687
NO_X Emissions (tpy)	1655	3692	5347

5. Determine the emission reductions resulting from the BART alternative

   a. The MPCA used the total tons per year of emissions resulting from the BART alternative and compared those to the tons per year emissions that would result from the application of MPCA's BART determination to the full furnace capacity.

6. Compare the BART alternative reductions to the BART reductions
   a. When comparing the baseline operations (prior to the modification or application of BART) to the proposed BART alternative, the BART alternative results in NO_X emission reductions of 991 tpy and SO_2 emission reductions of 3359 tpy. This is a total of 4350 tpy of emission reduced compared to the reductions from application of MPCA's BART emission limits, or about 1850 total more total tons per year of emission reductions of emission reductions.

Because the BART alternative offers greater emission reductions than the MPCA's BART analysis, the MPCA chose to accept the BART alternative, with one change. Rather than allow a 180-day limit for NO_X emissions, the MPCA proposed a 30-day limit to be consistent with the other BART determinations.

Comment 1-K: "The reductions in United's proposal were calculated from an inflated baseline. The baseline values used in the Supplement rely on the baseline emissions value calculated in the permit for the plant expansion. Under those regulations the facility is free to choose the highest emitting two years in the past ten…the result is a value well above recent actual emissions."

Response: The MPCA's calculations use an emission factor drawn from the factors shown in the baseline actual emission calculations used in the most recent permit action. The factor chosen is generally in the mid to lower end of the factors shown. The calculation then uses the full capacity of the furnace to calculate the potential emissions from application of BART. The MPCA believes this is an appropriate calculation, as the BART limit does not constrain hours of operation or furnace capacity.

Also, in comparing the emissions resulting from the BART proposal to actual emissions from recent years, it is important to consider the impact of the recession. For instance, many taconite facilities experienced periods of extended shutdown. Therefore, the most recent actual emissions likely do not reflect the maximum allowable emissions from the facility.

Comment 1-L: "A major reason United's proposed BART limits are more restrictive than the MPCA's is because the MPCA's NO_X limits were set artificially high…In the case of SO_2, as stated above, we believe the limit for line 2 should be 0.68 and not 1.7 lbs/MMBtu."

Response: The discussion of the NO_X BART limits is provided in response to other comments. The issue over whether an SO_2 BART limit based on fuel blending should more appropriately be 1.7 lbs/MMBtu or 0.68 lbs/MMBtu was discussed during the preparation of the 2009 Regional Haze SIP. The MPCA chose a 1.7 lbs/MMBtu limit at that time, and this action is not meant to reconsider that limit. It therefore continues to serve as the appropriate benchmark against which the BART alternative is evaluated.

2. National Park Service, Letter Received February 2, 2012

Comment 2-A: "We do not believe that CSAPR is better than source-specific BART in Minnesota. No state-specific demonstration has been made…In the Supplement, the emissions budget under the Clean Air Interstate Rule (the previous transport rule) is compared to CSAPR. We believe the relevant comparison that is required is a comparison of controls under CSAPR with controls under fully implemented BART."

Response: See response to Comments 1-A and 1-B.

Comment 2-B: "US Forest Service (USFA) analysis shows that the IPM prediction of the [e]ffect of CSAPR in 2014 is an increase in emissions over current (2010) actual emissions and above what was proposed as source-specific BART by MPCA and what we and other Federal Land Managers (FLMs) proposed as source-specific BART. Without any other information specific to Minnesota, we find source-specific BART to be far superior to CSAPR."

Response: See response to Comment 1-B.

Comment 2-C: "We strongly encourage the MPCA to reject using CSAPR as a replacement and believe the source-specific BART limit approach should be maintained. The MPCA should also re-evaluate the limits determined for Xcel Energy's Sherburne County and Northshore Mining's Power House and consider the comments made by EPA…and NPS."

Response: See response to Comment 1-C.

Comment 2-D: "With regional haze plans overdue already, and the recent stay of CSAPR putting CSAPR's future in doubt, we are concerned with further delays in the plan and visibility improvement, and that Minnesota's Regional Haze Plan tied to rules that would provide less pollution reduction than those tailored specifically to Minnesota's needs. Instead, we ask that MPCA use source-specific BART limits that have already been evaluated and can be readily implement in this plan."

Response: See response to comment 1-D.

Comment 2-E: In the excerpt from the 2009 Regional Haze SIP "it can be seen that the MPCA proposed BART controls for this group of taconite units…the MPCA was unclear as to the specifics of each BART control options, but they were clear that BART was not 'no control'."

Response: See response to Comment 1-E.

Comment 2-F: "To be serious about reducing NO_X, CEMS must be installed."

Response: See response to Comment 1-F.

Comment 2-G: "The Supplement says the MPCA felt that at least one year of emissions data was needed from each facility in order to determine the appropriate BART limits. It then goes on to say that only 150 hours of data was used to set the limits for most facilities, which is less than 2% of the data originally said to be needed, and no explanation is given as to why such a small data set was chosen…MPCA does not explain how it determined that such a small data set was representative of 12 months of operation."

Response: See response to Comment 1-G.

Comment 2-H: "Furthermore, testing should have been done under operating conditions that represent BART, as determined previously by the MPCA to be good combustion parameters and scrubber optimization. Instead the incentive for the companies was to operate at the highest emitting levels during the testing. There is no other documentation in the Supplement regarding whether BART operating practices were being followed during the tests."

Response: See response to Comment 1-H.

Comment 2-I: "A further concern is the use of a 99% confidence interval. In other recent permit-related work the MPCA has used 95%. The MPCA chose a 99% value: 'due to the need for limits to be met during all operating conditions, including during times of startup, shutdown, and malfunction.' Other technology-based limits, such as best available control technology (BACT) limits, are not set this way. The correct way is to set a separate limit for startup, shutdown, and malfunction (SSM) conditions and one for regular operations. Otherwise, if an overall limit were set to encompass all possible emission scenarios (normal operations and SSM), the resulting limit would be inflated and not represent the capabilities of BACT."

Response: See response to Comment 1-I.

Comment 2-J: "In addition to our concern about the confidence level chosen for its statistical analyses, MPCA did not use a valid statistical approach in settings its limits. For example, most of the data distributions were skewed, and some were not close to 'normal' in the statistical sense. We saw no explanation of any adjustments made to the data to yield distributions to which conventional statistical procedures could be correctly applied."

Response: The MPCA did some exploration of NO_X emission data in order to gain insight into distribution patterns from original data to different types of extracted data. As the commenter points out, the original hourly data is distributed with a long tail to the left, therefore conforming to a Weibull distribution rather than a normal distribution. If we assume that the hourly data is coming from a large number of data points, than the mean of three new data points drawn from the original data (representing a routine stack test with three one-hour runs) would have a similar, but narrower Weibull distribution. As we move to the mean of 30 new data points (representing the 30-hour stack test proposed for compliance with the taconite facility limits), the distribution moves considerably closer to a normal distribution.

In addition, the MPCA used the bootstrap resampling technique to look at much of the data, although this technique has not been used to set the limits subsequently revised based on these responses to comments. If a bootstrap technique is used to derive multiple samples from the original data set, each of the same size as the original dataset, and then the mean of each of those "new" samples is plotted, the mean curve follows a normal distribution. Furthermore, the entire bootstrap curve generally fits within the 95% confidence interval around the mean of the original sample, and the mean of the bootstrap curve nearly coincides with the mean of the original sample. This indicates that statistical analysis based on mean values should hold regardless of the fact that the original distribution was not normal. Therefore, the MPCA believes that this approach is statistically valid and gives an adequate estimate for an emission limit.

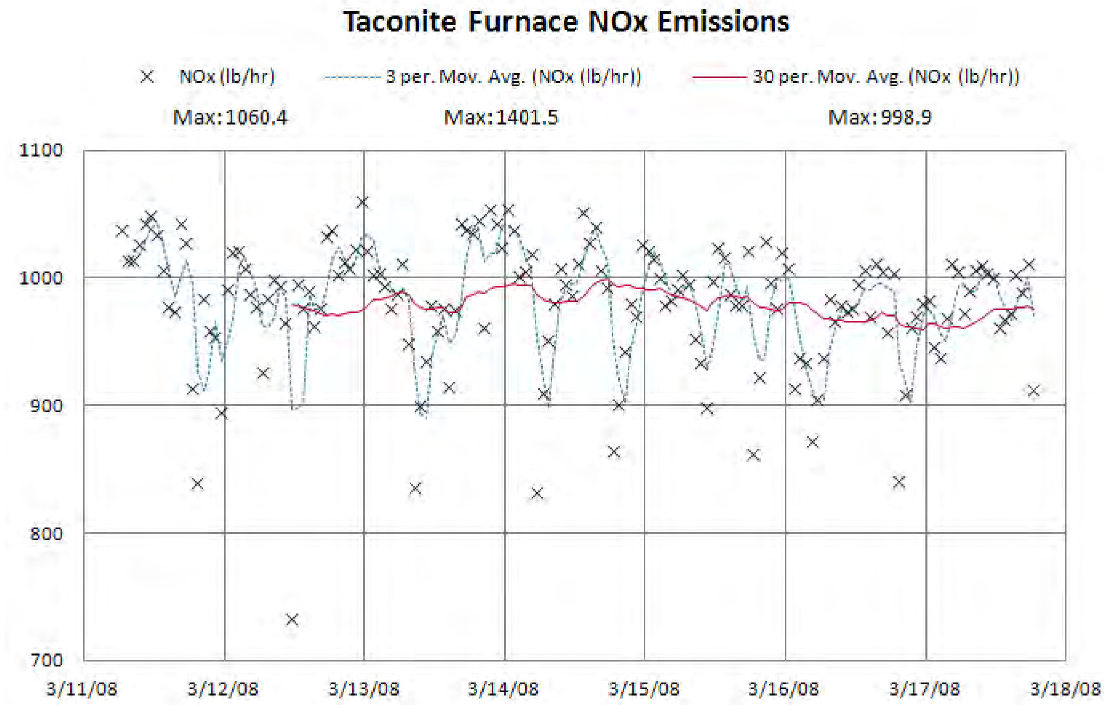
The attached data distribution summary document contains a sample exploration of NO_X emission data and insight into the derivation of the prediction interval for 30 extra data points.

Comment 2-K: "Our greatest concern is how the limits derived from the statistical analyses were used. MPCA used a (sometimes very small) set of hourly data to estimate an emission rate that could be met 99% of the operating hours. MPCA then assumed that this hourly maximum emission was an appropriate limit to be met on a 30-day rolling average basis. In effect, MPCA is allowing sources to emit at their almost-maximum one-hour emission rate every hour of every 30-day period. Combined with the use of the 99% level…the MPCA process artificially inflates the emission limits, which, in the end, do not require the facilities to operate according to BART."

Response: As stated in the response to Comment 1-I, the MPCA has revised the limits to use the 95% UPL. It is important to note that, for facilities without CEMS, the calculations predict a level to be met over the next 30 hours of operation, based on the compliance mechanism. If the statistical analysis had been used to set the next single value (the maximum one-hour emission rate), then the resulting emission limit would be much higher and would, effectively, allow the facility to emit at the maximum level.

As an example, take a stack test consisting of three one-hour runs. If this results in three emission values (lbs/hr) of 3.00, 12.0, and 6.00, then we have an average of 7.00 lbs/hr to compare with an enforceable limit based on a three-hour averaging time. If the same stack test is used to show compliance with a different limit associated with a one-hour averaging time, the 12.0 lbs/hr value would be used. A numeric emission limit is always linked to the averaging time. A longer averaging time (where more data points are used to calculate the average emission value) allows us to set a smaller numeric emission limit.

The following graph shows the nature of averaging time (note this does not discuss limit setting). The more data points are used, the less influence extreme values (peaks and valleys) would have on the resultant average value. A properly formulated rolling average value can reflect the central tendency of the data, however volatile it may first appear.



Comment 2-L: "We believe the BART determination for United Taconite does not follow the Clean Air Act and does not follow the conditions in its permit…MPCA issued United a permit for the expansion that included a condition to address BART on the now coal-fired Line 1: 'Within 120 days of being notified by the MPCA in writing of the final proposed NOx BART limits for Lines 1 and 2 (EU040 and EU042), the Permittee shall submit an application for a permit amendment to incorporate into its air emissions permit either (1) NOx and SO2 BART emission limits as proposed or (2) a BART alternative as described in the December 2009 Regional Haze State Implementation Plan submittal. Alternatively, the Permittee may submit, within 120 days of the written notification, an updated BART analysis based on the modified Lines 1 and 2 for the facility with an appropriate permit amendment application to incorporate proposed NOx and SO2 BART limits into its air emissions permit.'

"It is unclear how United's proposal complies with its permit requirement…Is it a BART alternative? If so, what is the initial BART determination for coal-fired Line 1? To our knowledge no BART determination has been completed for a coal-fired Line 1. According to 40 CFR 51.308(e)(1)(ii)(A) the BART determination must consider…the following factors…we find none of this information in the Supplement."

Response: See response to comment 1-J.

3. Earthjustice, National Park Conservation Association, Friends of the Boundary Waters Wilderness, Voyageurs National Park Association, and Fresh Energy, Letter Received February 3, 2012

Comment 3-A: "Early in 2011, a number of environmental organizations commenced suit against EPA for failure to enforce its earlier decision regarding states in violation of the CAA, by failing to timely approve or disapprove the SIPs that were submitted, and for EPA's failure to prepare federal implementation plans for those states that had inadequate or nonexistent haze SIPs. The lawsuit against EPA is in the final stages of resolution, with a consent decree containing deadlines by which EPA must issue decisions on state haze SIPs awaiting final review and approval by the court. The deadline in the consent decree for EPA to act on Minnesota's haze SIP was January 17, 2012. In late December of 2011, Minnesota published the SIP Supplement that is the subject of these comments, giving the public until February 3, 2012 to comment—weeks beyond EPA's deadline to take action on Minnesota's SIP. It is our understanding from EPA that Minnesota also submitted the Supplement to EPA for approval on January 5, 2012, a month before public comments in the state process need be complete and more than two months before the MPCA Board will take final action to decide whether the Supplement should be approved by the state. Minnesota's actions, combined with EPA's simultaneous consideration, plainly deprive the public of a meaningful opportunity to review and comment on this significant decision."

Response: After the 2009 submittal, the MPCA knew that a second submittal would be necessary in order to complete the BART requirements. The MPCA was working to finalize the BART emission limits and enforceable documents when the consent decree was announced (November 9, 2011) and EPA had only until January 2012 to propose action on Minnesota's SIP. The MPCA could not complete an effective public process and submit the SIP by that time. Therefore, the MPCA completed the SIP and placed it on public notice in December 2011; because the comment period included the holidays, it extended into February 2012 in order to ensure that the public had enough time to comment effectively. On January 5, 2012, the MPCA requested preliminary review of the plan from EPA as provided under 40 CFR 51.103(b). This does not constitute an official submittal to EPA for approval. Both MPCA and EPA can change the plan based on comments.

Comment 3-B: "The SIP Supplemental cannot substitute CSAPR for BART while the D.C. Circuit continues the stay of CSAPR."

Response: EPA has continued to indicate that this avenue is available for the states. Should CSAPR be revoked, EPA can issue a SIP call for Minnesota or choose to promulgate a FIP based on the previous BART determinations sent to EPA by the MPCA in the 2009 Regional Haze SIP.

Comment 3-C: "EPA regulations do not authorize the substitute of CSAPR for BART for a particular source if a Federal Land Manager has certified that visibility impairment is reasonably attributable to that source."

Response: EPA's rules concerning Reasonably Attributable Visibility Impairment (RAVI) were written prior to the general use of cap-and-trade programs in environmental regulations. EPA's more recent regulations provide for an alternative to source-specific BART under the Regional Haze program, including substitution of CSAPR for BART (and CAIR for BART previously). The MPCA's intent is to fulfill the requirements of the Regional Haze portion of the visibility rules. Before the 2009 certification of Xcel's Sherburne County Generating Station (Sherco) as causing RAVI, Minnesota did not have any sources so designated. Therefore, Minnesota did not submit a SIP for the RAVI visibility rules. This submittal also is not intended to address the RAVI portion of the rules. As noted in the Federal Register notice proposing approval of Minnesota's Regional Haze SIP (7 FR 3681), EPA views Minnesota's submittal as addressing Regional Haze under 40 CFR 51.308 and not RAVI under 40 CFR 51.302 to 51.306. EPA will make a determination on RAVI at a later date. The MPCA believes this process will continue to apply even with the inclusion of source-specific limits for Sherco in the Regional Haze SIP.

Comment 3-D: "Minnesota has not performed the required analysis of whether CSAPR will achieve more visibility improvement at Minnesota's Class I Areas than would source-specific BART".

Response: See response to Comment 1-A and 1-B. In addition, much of this comment concerns EPA's nation-wide analysis for the CSAPR=BART proposed rule. These comments are more appropriately raised to EPA.

Comment 3-E: "Whereas EPA purports to show that CSAPR is better than BART nationwide, no one has attempted to demonstrate that CSAPR is better than BART for Minnesota—and, as explained below, the existing analyses suggest that CSAPR is worse than BART for Minnesota. For at least one Minnesota EGU, the CSAPR allocations far exceed the emissions that would be allowed under BART."

Response: See response to Comment 1-A and 1-B.

Comment 3-F: "Even if it were lawful to substitute CSAPR for BART, Minnesota must impose BART on EGUs in order to satisfy its legal obligation to meet the reasonable progress goals…If CSAPR alone will not ensure reasonable progress toward attaining natural visibility at Boundary Waters, Voyageurs, and Isle Royale—and it is plain it will not—Minnesota must include in its regional haze SIP additional measure to ensure that reasonable progress is made."

Response: The MPCA believes that the implementation of CSAPR as a substitute for BART can be expected to achieve the same reasonable progress goals (RPGs) as included in the December 2009 submittal. The RPGs for the worst 20% (W20%) days at each Class I area only changed by 0.1 dv from the first draft of Minnesota's SIP, which relied on CAIR=BART, to the submitted version which included BART determinations. This is largely because some emission measures required under BART, along with other emission reductions at non-BART units, were already being implemented at the power plants in preparation for CAIR. The MPCA believes that these emission measures are continuing to be implemented due to CSAPR. In addition, the CSAPR allocations are generally more stringent than the CAIR allocation. Along with the source-specific controls for Sherco, the change to CSAPR=BART should not impact the RPGs.

Comment 3-G: "MPCA failed to consider the five factors the Clean Air Act requires to be considered in every BART analysis...MPCA has failed to document that it properly analyzed the five factors required to demonstrate and determine BART for any BART-eligible taconite facility."

Response: The Clean Air Act requires the consideration of five factors: available retrofit control options, pollution control equipment in use at the source, costs of compliance, remaining useful life, energy and non air quality environmental impacts, and visibility impacts. The MPCA considered these factors provided documentation thereof in the 2009 Regional Haze SIP submittal, when the BART determinations were made. The MPCA views the Supplemental SIP as simply providing emission limits associated with these BART determinations, rather than reexamining the BART determinations *de novo*.

Comment 3-H: "MPCA rejected potential control technologies without an adequate explanation. Overall, due to the failure of MPCA to consider the five statutory factors to determine BACT, MPCA has improperly rejected technologies for control of taconite air pollution that should have been included in a full BART analysis…SCR, RSCR, and SNCR have all been rejected without proper analysis of those technologies. Additionally, MPCA improperly used Cue Cost instead of EPA's cost manual, and MPCA failed to consider the cumulative number of Class I areas that are affected by a source and the improvements to all of those Class I areas as a result of appropriate BART controls at a source. Even technologies such as LoTOx that are less-effective in reducing pollutants, but are in use at some of the facilities, have been rejected for inadequately-documented reasons at other facilities."

Response: Again, the MPCA considered this information and provided this documentation in the 2009 Regional Haze SIP submittal, when the BART determinations were made. The MPCA views the Supplemental SIP as simply providing emission limits associated with these BART determinations, rather than reexamining the BART determination. That being said, the BART analyses from the taconite facilities do use EPA's control cost manual, with only some small use of CUECost. Several technologies, such as SCR, RSCR, SNCR, LoTOx, and LNB in the indurating zone had never been previously used on taconite plants. As noted in the BART *Guidelines* "we do not expect the source owner to purchase or construct a process or control device that has not already been demonstrated in practice...Similarly, we do not expect a source owner to conduct extended trials to learn how to apply a technology on a totally new and dissimilar source type." LoTOx is not in use at any taconite facility.

Comment 3-I: "Because MPCA failed to follow-through on its earlier claim that it would require CEMS in order to determine BART limits for taconite, MPCA used inferior data to set inadequate emissions limits in the Supplement. MPCA required the taconite facilities to collect only 150 hours of emissions data for MPCA to set pollution emissions limits. MPCA's requirements for the data collected were that the data 'be collected under the range of [furnace] operating parameters that influence NO_X emissions' and that the range of each operating parameter reflect 'the furnace's operating range for the parameters in the 12 months previous to testing.' Although MPCA required the data to reflect the range of operations, it does not appear that MPCA required data to be submitted in the taconite pellet production rate and/or the fuel firing rate during the periods tested based on a review of the NO_X testing data presented in Appendix A of the Regional Haze Supplement. Without that data, MPCA could not verify that the companies had truly collected the required range of data."

Response: As noted before, in the response to Comment 1-F, the MPCA believes the issue of CEMS was fully aired and discussed in 2009. As the commenter noted, the facilities were required to make quarterly reports of operating parameter data, including pellet production and fuel firing rate. NO_X testing results, around 150 hours, were submitted along with process operation data in stack test reports. Based on the analysis of the data, the facilities that do not have CEMS determined that the emissions were minimally variable. Therefore, although process operating data was still collected, there was no development of a direct correlation between process parameters and NO_X emissions. Therefore, the process operation data were not used to formulate the proposed BART limit and are not included in the calculation spreadsheets supporting the BART limit.

Comment 3-J: "In setting NO_X BART limits for each unit, MPCA then determined the 99th percentile Upper Confidence Level ("UPL") emission rate based on this 150 hours of emissions data. In plain terms, this means that MPCA set BART emission limits for each unit at levels such that the unit's NO_X emissions are currently lower than the emissions limits 99 percent of the time and sets that 99 percent level as the BART emissions 'limit.' Then, in case setting a limit that the facility currently meets 99 percent of the time is not lenient enough, MPCA calculates the limit based on a 30-day rolling average. This is effectively no reduction for these facilities from current haze-causing emissions. In fact, MPCA shows that for some test results on taconite facilities, the facilities emitted on average much lower than the emissions 'limits' set forth in the Supplement. This effectively means that for those facilities, the BART 'limit' will allow an increase in pollution emissions."

Response: As noted above, in response to this comment and comments 1-I and 2-I, the MPCA recalculated the limits by using the 95% UPL in setting the emissions limits. The limits are based on a 30-day rolling average, which the MPCA believes is the standard averaging time for BART limits across the country. It is also important to note that SIPs are developed and implemented based solely on allowable emissions, not actual emissions. NO_X emission limitations remain a relatively new phenomenon for this industry.

Comment 3-K: "[T]here is no evidence that the limits set will actually require use of the "good combustion practices" that MPCA claims are BART for the taconite industry. As noted above, there is no information or assurance provided to support the Supplement conclusions that the 150 hours provided by the taconite facilities are actually from when "good combustion practices" were being utilized at each furnace. If the only data MPCA has is the straight 150 hours of emissions data, then MPCA has no evidence that the data is representative of good combustion practices and therefore there is no evidence to support MPCA setting BART emissions limits for good combustion practices based on this data. Further, 150 hours of data, which does not even reflect one week's worth of operation, much less one 30-day period, is simply not long enough of a period to know whether it reflects good combustion practices.

Similarly, for the units where MPCA decided that fuel blending would be BART (Keetac, Minntac, Utac), MPCA provides no evidence that the 150 hours of data upon which it bases the emissions limits reflect any fuel blending done specifically to lower NO_X emissions. There is no way to tell whether the emissions limits reflect a valid connection to fuel blending that is to be used as BART."

Response: See response to Comment 1-H. As for fuel blending, use of various fuel blends is already in place as a standard operating scenario at these three facilities. The MPCA's BART determination is meant to ensure that this practice continue, not to mandate any specific fuel blend in order to reduce NO_X emissions. Blending solid fuel with natural gas serves to reduce NO_X emissions. The MPCA believes that the standard use of fuel blends was represented during the time when CEMS data was gathered to set limits.

Comment 3-L: "For the facilities that are not required to install continuous emission monitors, the emission limits are not enforceable and therefore are not approvable under the Clean Air Act…It is impossible for MPCA, without CEMS, to acquire data to make a 30-days rolling average assessment. No CEMS means that MPCA cannot assess compliance with emissions limits it is imposing, meaning in turn, the emission limits for the facilities without CEMS are unenforceable."

Response: The lack of CEMS does not mean that emission limits are unenforceable, either from a historical perspective or for BART. Emission limits are routinely enforced through the use of stack testing. Compliance with the limit is determined through the extended, 30-hour, Method 7E stack test required by the proposed Administrative Order. The MPCA is requiring this longer stack test on an annual basis in order to ensure it is taking an adequate look at each facility's compliance status.

In response to this comment, and other comments on the recordkeeping and reporting section of the Orders, the recordkeeping and reporting requirements have been changed. The MPCA has clarified what records need to be kept, including adding a requirement to continue to record the operating parameters that the facilities have been submitting over the past several years.

4. Sierra Club, Letter Received February 3, 2012

Comment 4-A: "The SIP Supplement cannot substitute CSAPR for BART while the D.C. Circuit continues the stay of CSAPR."

Response: See response to Comment 3-B.

Comment 4-B: "EPA regulations do not authorize the substitute of CSAPR for BART for a particular source if a Federal Land Manager has certified that visibility impairment is reasonably attributable to that source."

Response: See response to Comment 3-C.

Comment 4-C: "Minnesota failed to analyze whether CSAPR will achieve more visibility improvement at Minnesota's Class I Areas than source-specific BART and analysis by FLMs shows it will not."

Response: See Response to Comment 1-A.

5. Northern States Power Minnesota/Xcel Energy, Letter Received February 3, 2012

Comment 5-A: "We concur with MPCA that, that, if implemented, the Transport Rule (also known as the Cross-State Air Pollution Rule, or "CSAPR") will achieve greater environmental improvement than BART. Based on the emission reductions already achieved on NSPM's units, including emission controls installed on Units 1 and 2 at the Sherburne County Generating Station ("Sherco") and the broad reductions that will be achieved if CSAPR is implemented in Minnesota, we think it makes sense to conclude that compliance with CSAPR is superior to unit specific requirements under Section 169A. Nonetheless, because of the uncertain status of EPA's role makings and challenges to the CSAPR, we believe it is premature to rely solely on CSAPR for meeting BART requirements in Minnesota."

Response: Xcel's support of the CSAPR=BART is noted, as is the concern that the uncertain status of CSAPR makes it difficult for regulated parties to have the certainty of future regulations that would desirable.

Comment 5-B: " MPCA could eliminate the risks associated with…these rules not proceeding by retaining in its Regional Haze SIP both its source-specific BART determinations and the BART Alternative Compliance option. If the latter could not go forward for any reason, MPCA's Regional Haze SIP would still contain the source-specific BART determinations that sources such as Sherco Units 1 and 2 could use to satisfy their BART obligations without requiring MPCA to undertake further SIP revisions…Accordingly, the MPCA should clarify to EPA that the SIP Supplement is intended as a supplement to, and not a substitute for, its 2009 SIP submittal and that the MPCA intends to retain the source-specific BART determination for Sherco Units 1 and 2 in the Minnesota Regional Haze SIP."

Response: The MPCA believes that CSAPR=BART is the most appropriate determination for Minnesota's power plants. However, due to the concerns raised over the size of the emissions from Sherco and EPA's 2014 IPM emission projections for Sherco, the MPCA will include a source-specific Administrative Order for Sherco in the SIP. For the remaining facilities, the MPCA believes that developing and negotiating Administrative Orders cannot be completed in a timely enough fashion for that EPA Region 5 could meet its deadline of final approval of the Regional Haze SIP by May 30, 2012. If CSAPR is stayed or if EPA is unable to complete the CSAPR=BART rulemaking, EPA has the prior determinations and limits that were provided by the MPCA. EPA can then choose to issue a SIP call or to issue a FIP including those limits.

6. US Steel, Letter Received February 3, 2012

Comment 6-A: "MPCA has proposed to use Administrative Orders and Administrative Orders 'by consent' as a means to establish enforceable limitations as MPCA has unilaterally deemed necessary to satisfy BART. First, U.S. Steel would like to point out that the MPCA has not adequately worked with U.S. Steel on the administrative orders and, despite the Keetac order being referenced 'by consent,' by no means does U.S. Steel consent to the order as drafted…Furthermore, MPCA requires U.S. Steel's consent to use the Orders as part of the proposed SIP revisions, as the authority to impose the Order without consent, per 116.07 subd 9, is limited to enforce Chapters 116 and 114C of the Minnesota statutes, none of which includes BART or regional haze."

Response: The MPCA chose to draft some of the Orders as Orders by consent due to a belief that some companies prefer to enter into consent orders. The MPCA's intent is to work with the companies based on the comments received during the public notice period in order to reach agreement on the content of the Orders. The MPCA is prepared to issue either Orders by Consent or unilateral Administrative Orders.

The MPCA incorporated BART into the permitting rules at 7007.5000. This rule specifically requires subject-to-BART sources to submit BART analyses and to install and operate BART as a result. Under Minn. Stat. 116.07, Subd 4, "the Pollution Control Agency may adopt, amend and rescind rules and standards having the force of law relating to any purpose…for the prevention, abatement, or control of air pollution." The BART emission limits are such rules and standards and therefore MPCA has the authority to issue and enforce Orders. The MPCA has used Administrative Orders extensively in the past, particularly in the early 1990s, to implement SIP requirements.

Comment 6-B: "Since the SIP plan as submitted must contain emission limitations that represent BART and the BART process, to be complete, must be enforceable, this again supports the argument that the BART limitations, and thus the Administrative Orders, must be final and enforceable at the time the State submits the SIP revisions. While MPCA may anticipate that the Orders will be enforceable, the Orders are not currently enforceable and are inappropriately included as a proposed SIP revision until such Orders are indeed enforceable."

Response: The MPCA believes it is important that the public and the affected facilities have the opportunity for public comment on the emission limits and the compliance conditions prior to the submittal of the SIP. It is, for example, standard practice for the MPCA to place a draft/proposed Air Emission Permit on public notice as part of a proposed SIP revision. Once the permit is issued, the SIP revision is finalized and sent to EPA. In order to facilitate this review and comment, the Administrative Orders (and, indeed the entire SIP) were placed on notice as draft documents, which could more easily be modified in response to comments. Should the Board approve finalization of the Orders and submittal of the SIP, the Orders will be signed and become enforceable. They will then be submitted to EPA as part of the SIP revision.

Comment 6-C: "The draft Administrative Orders contain a requirement for 'permanent' recordkeeping... Such a requirement is unnecessary and onerous. Such records should only be required to be maintained until such limits and requirements are incorporated into a federally enforceable permit. In any case, a requirement to maintain records permanently, i.e., forever, is unreasonable."

Response: This permanent recordkeeping requirement was part of prior SIP Orders. The MCPCA discussed the issue with EPA Region 5 and determined that the five year recordkeeping requirements under the Title V program are sufficient. The Orders have been redrafted to more clearly define the recordkeeping requirements and require records to be kept for only five years.

Comment 6-D: "The proposed revisions inappropriately rely on the Cross State Air Pollution Rule (CSAPR)...MPCA has not substantiated its claim that it is appropriate to rely on controls at EGUs that the EGUs were planning to install in order to comply with CAIR (or CSAPR) since EGUs have challenged these rules...Because of the pending CSAPR litigation and remand of CAIR, U.S. Steel is concerned that non-EGUs, like Keetac and Minntac, could bear a disproportionate burden to satisfy MPCA's BART obligations."

Response: See response to Comment 1-A and 1-B. In response to the concern about non-EGUs bearing a disproportionate burden, it is important to note that BART determinations are source-specific. The BART determinations for the taconite facilities are not dependent on the BART determination or level of emissions reductions resulting from BART at the power plants.

Comment 6-E: "While MPCA has indicated that certain sources identified in the proposed SIP revisions are not included in the BART requirement, how MPCA came to such a conclusion is not clear in the proposed SIP revision. MPCA should provide its BART analysis in accordance with 40 CFR Part 51, Appendix Y.

Response: Some existing indurating lines at taconite facilities were not subject-to-BART. In most cases, this is because the source or unit commenced operation outside of the BART timeframe of 1962 – 1977. The MPCA's identification of BART-eligible sources and analysis of which sources should be subject-to-BART was provided in the December 2009 Regional Haze SIP, in the Appendices to Chapter 9.

Comment 6-F: "The MPCA unnecessarily and inappropriately requires the sources to comply with the emission limits during periods of start-up, shutdown, and malfunction (SSM). First…this is incorrect as to the derivation of the limits and confidence intervals, i.e., MPCA incorrectly assumed that the data included such events, as it is unclear how MPCA accounted for periods of SSM/bypass. Second, such a requirement and inclusion is inconsistent with EPA's BART Guidelines…which clearly states, '[t]he emission estimates used in the models are intended to reflect steady-state operating conditions during periods of high capacity utilization. We do not generally recommend that emissions reflecting periods of start-up, shutdown, and malfunction be used…We recommend that States use the 24-hour average actual emission rate from the highest emitting day of the meteorological period modeled, unless this rate reflects periods [of] start-up, shutdown, or malfunction.'…For this reason, U.S. Steel requests that the provision that the limits be met during periods of start-up, shutdown, or malfunction be removed from the proposed orders. In the alternative, U.S. Steel suggests that MPCA specifically include language in the Orders that would allow sources to assert the affirmative defense during such periods."

Response: The requirement that emission limits be met during periods of SSM is not in conflict with the BART *Guidelines*. The portion of the BART *Guidelines* quoted is from the section of the *Guidelines* relating to the kind of modeling to be used to determine which sources may not be subject-to-BART. It does not relate to setting emission limits. See response to Comment 1-I.

The MPCA's inclusion of the language stating that the limit applies during SSM is simply meant to emphasize that, as stated in the EPA Guidance Memorandum entitled *State Implementation Plans (SIPs): Policy Regarding Excess Emissions During Malfunctions, Startup, and Shutdown,*[1] "EPA views all excess emissions as violations of the applicable emission limitation." The MPCA is following EPA SIP guidance and clearly stating that the emission limitation applies at all times.

However, the memo also notes that "EPA recognizes that imposition of a penalty for sudden and unavoidable malfunctions caused by circumstances entirely beyond the control of the owner or operator may not be appropriate." The Administrative Orders include requirements for facilities to submit an Excess Emission Report or Semi-Annual Deviation Report. MPCA compliance and enforcement staff review these reports, and determine if any deviations or excess emissions have occurred and need enforcement action. Often, the MPCA asks for additional information from the facility concerning the deviation or excess emissions. The MPCA (and EPA) may exercise enforcement discretion and may allow facilities to provide an affirmative defense. This is standard procedure and does not need to be explicitly stated in the Administrative Order.

Comment 6-G: "Much of the CEMS data used to develop limits for the U.S. Steel facilities is based upon only six quarters of data during a time period that was not representative of optimum production. Due to economic conditions lines at Minntac were just restarting after idled periods and Keetac was not operating until January 2010. U.S. Steel is concerned that it could unreasonably be faced with non-compliance with the proposed Orders during periods of peak production since these periods are not represented in the data that MPCA used to develop the BART limits."

Response: Although the commenter states that the emission limits should take into account peak production, the commenter did not provide any recommendation on data that would provide information on peak production periods or provide any proposed emission limits. The MPCA believes that the use of a higher UPL in setting the limits for these facilities ensures that the limit can be met even under greater production, as does the change to a facility-wide limit for Minntac. In addition, the limits are based on application of good combustion practices. Given that Minntac and Keetac are installing Low NO_X burners and further optimizing their combustion practices, the MPCA believes the limits can be met.

[1] http://www.epa.gov/region07/air/title5/t5memos/excesem2.pdf

Comment 6-H: "While U.S. Steel appreciates that MPCA is relying on current controls for non-EGUs to satisfy its BART requirements, the BART limits are inconsistent among similar operations (based upon existing equipment and practices at such sources), which results in an inequitable burden among sources to satisfy the BART requirements…[S]ources that have historically performed superiorly in the past, should be granted more flexibility in its options to satisfy BART."

Response: The BART determinations are based on having all sources operate under good combustion practices. One of the required factors to consider when determining BART and associated emission limits is the existing pollution control equipment in use at the source. (See Comment Letter 10, from EPA Region 5, which raises the concern that the BART limits for Minntac do not take into account the installation of Low NO_X Burners.) Therefore, limits for sources that have better performance due to better controls or work practices need to take existing controls into account.

Comment 6-I: As part of the long-term strategy (LTS), the MPCA is requiring facilities to demonstrate attainment with the one-hour NAAQS for SO_2 and NO_X. Keetac has already demonstrated compliance with these standards for both the existing operations and the permitted expansion. U.S. Steel believes Keetac has fulfilled its obligations and no additional emission limits or requirements are necessary. U.S. Steel requests that the draft Order pertaining to Keetac be removed from the SIP, as there is already a federally enforceable permit with such limits and requirements.

Response: The MPCA agrees that the requirements to model and demonstrate compliance with the new one-hour NAAQS have already been met by the Keetac facility. These requirements will be removed from the Administrative Order. However, the portion of the Order requiring the BART emission limits must be maintained. EPA requires that limits incorporated into the SIP be permanent and non-expiring limits. Since Title V permits expire, although they are federally enforceable they do not meet the SIP requirements for permanence. MPCA and EPA have reached agreement allowing MPCA to include conditions from permits into the SIP, if they are identified as "Title I Condition: SIP for <pollutant>." This citation is not included in the Keetac permit. Therefore, the Order is needed to make the limits part of the SIP.

Comment 6-J: The facility name is Keetac, and any issued Order should reflect that.

Response: The MPCA will make this change, replacing any references to Keewatin Taconite with Keetac.

Comment 6-K: Since the Keetac facility has already demonstrated compliance with the one-hour NAAQS for SO_2 and NO_X, this requirement should be removed from the Order.

Response: The MPCA agrees and will remove the requirement.

Comment 6-L: The Order for Keetac incorrectly refers to the Keetac facility having multiple stacks.

Response: The MPCA will correct this error.

Comment 6-M: In parts of the Order, MPCA specifies that hours during which the subject emission unit does not operate are not included in the calculation of the rolling average, while periods of SSM are included. The data that the MPCA relied on used 30-day rolling sum for SO_2 and NO_X, supplied quarterly to MPCA by Minntac. These calculations include periods when the emission unit is not in operation, in addition to periods of SSM. Therefore, the emission limit should include all these periods. U.S. Steel requests that the method of calculation of the limits should be in accordance with 40 CFR Part 75.

Response: The MPCA made this correction in the Order. References to the times of operation and/or SSM were removed, and replaced with a requirement that the CEMS be operated in compliance for 40 CFR Part 75. However, as noted in the recordkeeping and reporting requirements and as described above, emission limits due need to be met at all times.

Comment 6-N: The Order establishes limits for each emission unit individually (Lines 3 – 7). U.S. Steel requests that MPCA establish a limit for the combination of the emission units for SO_2 and NO_X respectively, in order to provide operational flexibility without increasing overall emissions. Minntac has CEMS on all five lines. There is a potential for downtime at any CEMS to result in the need for data substitution procedures which could result in noncompliance for any individual line. In addition, U.S. Steel has or plans to install new control equipment; past experience indicates that a combined limit will allow for installation and shakedown of these new controls.

Response: The MPCA believes it is appropriate to consider this need for flexibility, and developed facility-wide emission limits for both NO_X and SO_2. Rather than simply summing the emission limits proposed in the Supplemental SIP, the MPCA re-examined the data. The days looked at were the subset of data used in the original BART calculations when all lines were operating and monitoring data (10/22/09 – 3/31/11 for NO_X data and 10/29/09 – 3/31/11 for SO_2 data; data from 1/01/10 through 3/31/10 was removed because Lines 3 and 4 were not operating during all or parts of that time period). The NO_X and SO_2 emissions from each line were summed on a daily basis. The 99% UPL was then used to derive a facility-wide emission limit. This resulted in emission limits of 33.89 tpd NO_X and 6.35 tpd SO_2. These are more stringent limits than if the originally proposed line-specific BART limits were simply added together. The proposed Order has been revised to reflect these new limits.

Comment 6-O: The Line 5 SO_2 limits for Minntac are inconsistent between the Order and the SIP text and BART determination memo. The limit should be corrected to 1.19 tons/day

Response: This change is no longer necessary, due to the move to the facility-wide emission limit.

Comment 6-P: The Order for Minntac incorrectly refers to the Minntac facility having multiple stacks per furnace.

Response: The MPCA will correct this error.

7. Arcelor Mittal, Letter Received February 3, 2012

Comment 7-A: "ArcelorMittal supports MPCA's decision to rely on the new NAAQS, instead of its 2009 Northeast Minnesota Plan for the taconite industry, to achieve the reasonable progress goals required in its Long-Term Strategy."

Response: The MPCA appreciates Arcelor's support of the proposed long-term strategy.

Comment 7-B: "While MPCA appropriately considers the effect of the new NAAQS on relevant emission reductions to help Minnesota meet its regional haze goals, it is not necessary or appropriate to adopt aspects of those other programs into the BART SIP as MPCA does by mandating NAAQS modeling for the taconite industry as part of its proposed AO for BART…NO_2 modeling is on a slower implementation schedule in part because the modeling must consider complex atmospheric interactions that convert some NO_X emitted into NO_2 downwind. Importantly, EPA is not currently requiring that states use modeling to set regulatory limits for NO_2. It is premature, therefore, for MPCA to include NO_2 modeling in the AO with the intent on relying on its result for making decision regarding emission controls at the end of 2012."

Response: The MPCA is requiring NO_2 and SO_2 modeling as part of the long-term strategy (LTS). States "must submit a long-term strategy that addresses regional haze visibility impairment…The long-term strategy must include enforceable emission limitations, compliance schedules, and other measures as necessary to achieve the reasonable progress goals." (40 CFR 51.308(d)(3)). The LTS is a separate portion of the Regional Haze program, and is not related to setting or meeting BART limits. The initial SIP must include measures for both BART and the LTS. The MPCA simply chose to use one Order to house enforceable measures for both BART and the LTS, though these are separate parts of the Regional Haze program.

Although EPA is not currently requiring that states use modeling to set regulatory limits for NO_2/NO_X in the SIP context (as they are for SO_2) by requiring modeling of existing facilities that are not undergoing modifications, any new permit or permit modification that triggered thresholds for Prevention of Significant Deterioration permitting would have to complete modeling for the new one-hour standard. Regulatory limits would then be applied to ensure the NAAQS are met. At least one taconite facility in Minnesota has already completed NO_2 modeling and demonstrated that it can achieve compliance with the NAAQS. This demonstrates that the modeling tools are available for this kind of analysis, and that it is being used to set regulatory limits. The MPCA believes that the facilities should be treated as equitably as possible, and therefore the timeline for NO_2 modeling should not be extended much further.

The MPCA understands the commenter's concern about the continuing evolution of the tools for modeling NO_2/NO_X, and has made some adjustments to the modeling timeline laid out in the Orders. Protocols will be required by June 1, 2012. In addition, the MPCA will work with facilities to update protocols and modeling as needed in response to EPA guidance changes.

The MPCA is requiring modeling with emission limits that demonstrate compliance by the end of 2012, because we believe the industry needs to have a clear sense of the level of emission reductions needed to meet the NAAQS. Although MPCA has asked for this information by the end of 2012, compliance is not until the attainment date of 2017. If the models evolve such that the emission limits could be changed, the MPCA will be willing to discuss that with an affected facility at that time.

Without modeling, the MPCA cannot determine if the taconite facilities are in compliance with the NAAQS for NO_X, and therefore cannot determine if additional controls are needed. The MPCA believes it is likely that NAAQS compliance at these facilities will require new emission limits and new control technologies, particularly for NO_X. The timeline for the modeling is based on ensuring that the facilities will be in compliance with the NO_2 and SO_2 NAAQS by the federal attainment deadlines in 2017. Therefore, the MPCA believes the schedule is appropriate for compliance planning purposes.

Comment 7-C: "To the extent that MPCA chooses to require air dispersion modeling in its BART AOs, the schedules in the SIP Supplement must be adjusted to allow for pending model refinements…

ArcelorMittal and its industry group…have been engaged in discussions with EPA and its air modeling group to raise concerns about the accuracy of the current iterations of the AERMOD air dispersion model when predicting short-term ambient air quality impacts…The agency will be considering data and presentations at its 10th Modeling Conference this March on how to improve the accuracy of the AERMOD predictions in the vicinity of complex manufacturing facilities…This work must precede any use of the model to render regulatory decision on the level of emission reduction necessary to meet the national standards…A key component of the draft Administrative Order appended to the BART SIP Supplement is a requirement to submit modeling protocols by April 1, 2012 and modeled attainment demonstrations by December 15, 2012 for SO2 and NO2. This schedule must be extended to allow Minnesota facilities to benefit from the refinements to the model anticipated…Federal guidance arising from the Modeling Conference is anticipated in the late summer of 2012 and it is expected to address issues critical to improving the accuracy of the models".

Response: Based on these concerns, the MPCA will extend the deadline for modeling protocols to June 1, 2012 and the total facility modeling to December 31, 2012. As noted above, the MPCA will work with the facilities to make changes to protocols and modeling if EPA guidance changes.

Comment 7-D: The commenter raised several detailed technical and "specific concerns about the accuracy of air dispersion modeling for predicting ambient impacts that can be addressed, in part, at the State level using the discretion that EPA accords to states in implementing the models." These include:

- Representative AERMINUTE data is not available for all sources;
- Reasonable background values should be used for Northeastern Minnesota;
- Modeling the individual impact of indurating furnaces at each facility;
- Limit modeled receptors to those reasonably exposed;
- Exclude intermittent sources from one-hour NAAQS modeling inputs;
- Elevated ambient one-hour NO_2 concentrations are primarily an urban roadway corridor problem;
- The NO_2:NO_X default in-stack ratio of 0.5 leads to an unrealistically high modeled NO_2 concentrations;
- There should be streamlined approval of Tier 3 NO_2 modeling approaches for individual source modeling.

Response: The MPCA believes that many of these issues can be resolved in the development and approval of modeling protocols for each taconite facility. However, there are some issues that can be addressed generally.

- AERMINUTE data – Meteorological data processed using AERMINUTE does need to be used in dispersion modeling. The MPCA can work with facilities during the development of model protocols to determine the most appropriate data to be used if site-specific data is not available.
- Reasonable background values – It is the MPCA's practice to use the most recent and readily available representative background values. Recent EPA guidance is followed when adding background concentrations to modeled concentrations. Again, the MPCA can work with facilities during the development of model protocols to determine what constitutes a reasonable background concentration.
- In terms of modeling the individual impact of indurating furnaces at each facility, the commenter states that "modeling all emission sources at all facilities simultaneously at the potential to emit (PTE) is not representative of actual air quality due to the substantial difference between hourly PTE and actual emissions…we suggest modeling the impact of the indurating furnaces at a reasonable maximum operational rate and exclude any space heaters or other minor combustion sources. Also, the impact of Cliffs' emissions should not be combined with the emissions of other companies when evaluating receptor concentrations and emission reductions." If modeling is conducted at a reasonable maximum operational rate, then each facility must be prepared to take that maximum operational rate as a limit. Demonstrating compliance with a one-hour standard with a level of emissions that is less than what the facility is able to emit in one hour does not ensure that the NAAQS will be met at all times. Similarly, if nearby facilities have an impact on the same receptors, than compliance cannot be ensured unless the impact of the facilities is modeled together. It is standard to consider all contributing sources when modeling NAAQS compliance. The focus on the modeling should be on the indurating furnaces, but the decision of what other sources should be included is likely to be a source-specific one. The MPCA follows EPA guidelines for selecting modeling domains and recommends that facilities also follow these guidelines, which will help identify sources that should be explicitly modeled within a domain.

- The commenter also suggests that the MPCA limit modeled receptors to "reasonably exposed" receptors, excluding (for example) areas of steep slope, waterways, roadways, or trails where people would not normally be present for a full hour of exposure. The MPCA follows EPA's definition of ambient air. Air is either ambient air to which the public has access, in which case it should include modeling receptors, or it is not ambient air because the public does not have access. Receptors are not needed at areas that are not ambient air.
- The MPCA is and will continue to follow EPA guidance on excluding intermittent sources from one-hour NAAQS modeling inputs.
- The commenter states that elevated ambient one-hour NO_2 concentrations are primarily an urban roadway corridor problem. Although EPA has required new monitoring for the one-hour standard only at roadways, due to a belief that roadways are likely key areas of elevated NO_2 concentrations, the NAAQS represent standards that must be met in all areas of ambient air at all times.
- The commenter also states that the NO_2:NO_X default in-stack ratio of 0.5 leads to an unrealistically high modeled NO_2 concentrations. Again, during development of modeling protocols, the MPCA can discuss with facilities the need for developing and submitting source specific in-stack ratios.
- MPCA does review Tier 3 NO_2 modeling approaches for individual source modeling. The MPCA's model protocol form aids in streamlining modeling reviews for this kind of non-default modeling. Note that when EPA recommended default values are used for Tier 3 modeling, review/approval times typical decrease.

Comment 7-E: "Best Available Retrofit Technology means 'an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant which is emitted.'…BART does not require a redesign of the emission unit or a switch to a different fuel…BART does not require curtailments or compromise production rates. As the definition dictates, the BART NO_X emission limitation for an indurating furnace should reflect its full range of operating conditions when continuous good combustion practices are applies. This means that the numeric BART emission limitation cannot be lower than the highest NO_X rate measured…to the extent that the test did not reflect all operating conditions, a reasonable margin should be added to account for that variability. In the end, an appropriate BART analysis yields a NO_X emission limit that is no less stringent than the BACT limit already in its permit…In the early 1990s, a BACT analysis was conducted at the Minorca Mine, and the indurating furnace at the facility received an emissions limit of 1088 pounds NO_X per hour to represent the emission rate achieved by best available control technology for the indurating furnace at this facility…BACT was based on good combustion practices…MPCA should adopt the existing BACT limits (1088 lbs NO_X/hr) as BART instead of the proposed limit in the Supplemental SIP (1018 lbs NO_X/hr)."

Response: As shown in the graph in the response to Comment 2-K, the averaging time is a critical component of any emission limit. The BACT limit currently applicable to ArcelorMittal has an averaging time of three hours. The BART limit averaging time is much longer, and compliance is to be demonstrated over a 30-hour stack test. Therefore, it is appropriate that the BART limit be lower than the BACT limit. It certainly is not appropriate for the BART limit to be 10% higher than the limit calculated by MPCA, which would put it considerably higher than the BACT limit. Because of the data smoothing effect of a longer averaging period, the BART limit can have a lower numeric value, while still representing the fluctuating behavior of the emission data.

Comment 7-F: "[A] test conducted in one seven-day period cannot reflect the full range of operating parameters in the year prior to testing. Seasonal variations and ore variations that contribute to emission variability cannot be re-created for a testing period. Within this constraint, ArcelorMittal conducted the extended test to be representative of a range of operating conditions."

Response: Arcelor agreed to an Administrative Order that required the testing to reflect the full range of operating parameters in the year prior to testing. Arcelor's test report to the MPCA indicated that the primary variables were the green pellet feed rate, gas flows to the firing chamber and preheaters, firing chamber temperatures, and pellet tonnage. Arcelor looked at process data from January 2002 to March 2008 for day when more than 23.5 hours of operation was used. Upper and lower bounds for each parameter were then set using two standard deviations, with a goal of having the average values for the parameters be within that range. The MPCA believes that this long look at the parameters should adequately represent the operating conditions at the facility.

Furthermore, after the stack testing was conducted, Arcelor conducted analysis of the NO_X emission data. The required analysis demonstrated that the relative variability index (RVI) was 0.16. Arcelor therefore indicated to the MPCA that emissions from the facility were minimally variable, and that Arcelor merely needed to track relevant operating parameters to demonstrate that NO_X emissions remain comparable to the rate established during the test. Based on the proposal by Arcelor, the MPCA confirmed in 2009 that, for reporting purposes, an appropriate emission factor is 994 lbs NO_X/hour. Although an emission factor is different than a limit, the MPCA believes this further demonstrates that the proposed BART NO_X emission limit is appropriate and reasonable.

If Arcelor believed that the emissions were more variable, due to seasonal or ore variations, these should have been included in the report demonstrating a low RVI.

Comment 7-G: Arcelor "raised concerns to the MPCA that the database did not capture all seasonal and ore-related operating conditions. In response to this concern, MPCA used 'bootstrapping,' a resampling technique used for statistical inference. Using this method, the original data set is resampled multiple times by randomly drawing a set of data points for each replication, therefore allowing for a more robust estimation of the true standard error of the population…While bootstrapping can be an appropriate technique to estimate the true standard error of a population, the surrogate population used to calculate the standard error is based on the original limited data set and the erroneous assumption that the data were representative of all anticipated operating conditions. Furthermore, inherent in the bootstrap procedure is the main underlying assumption that each data point is an independent observation or sample unrelated to any other data point or sample. This is not the case for the underlying data set and it cannot be true for the extended data set when the same population is resampled multiple times. Although the bootstrap analysis increases the number of samples, it does not increase the amount of information in the original data set and is limited by the range of values in the original population (from the original 157 data points)."

Response: Although Arcelor (and the other facilities without CEMS) provided data on an hourly basis, viewing each data point as a discrete sample is not necessarily correct. Instead, each hourly data point represents part of a continuous data set. NO_X is formed due to natural gas combustion in the furnace. Because of the short residence time of the gas in the furnace, NO_X emissions are formed in these shorter (less than one hour) intervals. The MPCA believes that a full airing of all the issues surrounding the autocorrelation in the data requires some look at the furnace operation and chemistry that results in the emissions, not just a look at the resulting emission data.

The MPCA undertook an exercise to re-do the analysis for the three facilities without CEMS data (Arcelor, Hibbing Taconite, and Northshore Mining) with a correction for the autocorrelation. This analysis is shown in the attachment and in the individual facility BART determination memos. When combined with the move to the 95% UPL, the limit for Arcelor Mittal changes very slightly, going from 1018.0 to 1018.7. See response to Comment 9-Y.

The MPCA did not re-do the bootstrap analysis after taking account of the autocorrelation; accounting for the autocorrelation will, like the boostrapping, provide for a larger variance. While the bootstrapping is constrained to the space of the initial sample (which in this case is acting as the surrogate population), the technique does provide important information on the potential variability of population emissions. Each assumption made during data analysis, such as the independence of the data points in the limited NO_X emission data, does have some effect on the results. Positive autocorrelation will generally tend to make the estimate of the error variance too small, leading to narrow confidence intervals; negative autocorrelation will generally lead to larger confidence intervals.

Comment 7-H: “The MPCA AO for ArcelorMittal requires compliance with the NO_X limit during periods of startup, shutdown and malfunction (‘SSM’). The dataset used to set the emission limitation did not contain emission information for SSM events. Therefore, an upper predicted limit calculated from that dataset would not cover the variability introduced by SSM event. This provides additional justification for adding a margin of safety beyond the calculated BART limit in the proposed SIP Supplement.”

Response: See response to Comment 1-I and response to Comment 6-F.

Comment 7-I: “It is common practice to apply a factor of 10 percent or more to stack test values to accommodate normal source variability and the accuracy of the proposed compliance method when setting an enforceable emission limit…Ten percent is not a random value; it correlates to the standard performance test objective, which is to operation within 10% (at 90%) of rated capacity. Agencies recognize that operating at 100% capacity is not a realistic expectation during a given stack test because some variables are not within the company’s control during a test. Seasonal variations, common in Northeastern Minnesota, and ore variations common in any mining operation dictate that testing at or around 90% of capacity is all that can be expected for any given test. Therefore, test data will not reflect the true maximum capacity of the equipment and an upward adjustment is needed to ensure that equipment can use their full capacity when conditions allow without violating their emission limit.”

Response: The commenter refers to MPCA guidance for permitting synthetic minor sources, which states “Synthetic minor limits are set in order to ensure that a given operation does not trigger a regulatory requirement, therefore it is important that the proposed limit leave an adequate margin in order to account for the accuracy of the proposed compliance method and any emissions that may be left out of the on-going compliance tracking (e.g., insignificant activities). Facilities that propose a limit to avoid a threshold and hope to rely on general or non site-specific emissions factors typically receive limits with a margin of 10%. If you are willing to collect on-going site-specific data (e.g., continuous emissions monitoring, analyze contents of raw materials, etc.), a narrower margin might be appropriate." This guidance does not speak directly to stack tests or setting limits from stack tests. Given that the limits proposed here apply to individual units and do not include other activities, and the fact that the limits are set using site-specific data, the MPCA does not believe that a 10% margin is appropriate.

In a brief review of the case mentioned (re Prairie State, 13 E.A.D 1, 58), the MPCA found no indication of a specific 10% safety factor being a standard process. Instead, the Environmental Appeals Board recognized that states have an ability to include a safety factor if they believe it necessary. Furthermore, that case deals generally with control efficiencies, which are not at issue here because add-on controls are not being required.

Arcelor performed a calculation adding a 10% margin of safety to the MPCA's BART limit, resulting in an emission limit of 1119.8 lbs/hour. As Arcelor notes, this value is greater than the existing NO_X BACT determination already in Arcelor's permit, in which no averaging period is specified but compliance is demonstrated through a standard three-house stack test. As noted previously, in the response to Comment 7-F, a limit that is measured through a three-hour stack test must be higher to account for potential variability than a limit that is measured through a 30-hour stack test.

Comment 7-J: ArcelorMittal "cannot ensure continuous compliance with a numeric SO_2 limit when the sulfur content of the iron ore significantly increases. Sulfur content is a variable inherent to this mining operation that ArcelorMittal does not control…We propose the following solution to address this compliance concern…it is appropriate for MPCA to add 10% to the average value derived from the SO_2 stack test data (0.165 lbs/ltpf) when setting a limit that is achievable under all normal operating conditions…The proposed BART SO_2 limit should not apply to new ore mined from areas with higher sulfur levels. When higher sulfur ores are encountered, ArcelorMittal would initiate a procedure established in its AO for setting a new SO_2 BART emission limit for ores mined from that zone or area…the numeric SO_2 emission limit would need to be developed for the ore mined from the new high sulfur area based on a stack test conducted within 180 days after encountering the high sulfur ore.

Response: The SO_2 BART limits for facilities that burn only natural gas were set in the 2009 SIP Submittal. At that time, Arcelor provided additional data, which MPCA used to derive the proposed limit. The limit is based on the UPL, not the average value. At this time, Arcelor has not provided any additional information and therefore the MPCA does not believe it is necessary to change this limit. In addition, Arcelor provides no information as to how frequently the facility may be using different ore. The MPCA has heard that facilities may mine different ore bodies in the span of 30 to 60 days. Under these conditions, a stack test after 180 days would not be appropriate for testing.

Comment 7-K: "The draft AO states that the NO_X and SO_2 emission limit 'is effective on and after the date six months after the effective date of EPA's approval of this BART determination.' By contrast the federal rule requires that existing facilities install and operation BART 'no later than five years after plan approval.' See 40 CFR 51.302(c)(4)(iv). MPCA should allow affected sources the full amount of time established by Federal rule."

Response: The rule cited by the commenter refers to BART implementation under the RAVI program. The BART requirements for regional haze are found in 40 CFR 51.308(e). The full regulation requires that the states must submit a SIP containing "A requirement that each source subject to BART be required to install and operate BART *as expeditiously as practicable*, but in no event later than 5 years after approval of the implementation plan revision." (40 CFR 51.308(e)(1)(iv), emphasis added). Given that the BART limits were based on data from current operations, and the fact that the facility already utilizes good combustion practices, the MPCA believes that five years are not necessary in order to demonstrate compliance.

Comment 7-L: "The draft AO for ArcelorMittal requires that stack testing for NO_X and SO_2 be conducted every 12 months. We believe that the requirement for annual stack testing should be adjusted based on the stack test results as allowed under MPCA's test frequency guidance."

Response: Arcelor suggests that stack test results be used to set the frequency of future testing. Results less than 60% of the limit should lead to stack testing every five years, results between 60 and 90% of the limit should lead to stack testing every 36 months, and results greater than 90% of the limit should require stack testing annually. Since a prime goal of the BART process and the data gathering over the last few years has been to learn more about NO_X emissions and formation from the taconite industry, the MPCA believes that reducing the stack test frequency is inappropriate.

Comment 7-M: "The draft AO for ArcelorMittal requires that stack testing for NO_X and SO_2 be conducted every 12 months within 2 months of the anniversary date of the initial BART compliance test. The requirement is overly restrictive because it would limit the time-of-year in which the testing can take place and would therefore limit the operating conditions in which the testing could occur. It is also important to note that the taconite industry has historically experienced unpredictable market swings causing decreased production and extended downtime." The commenter suggests language that indicates that testing required every 12 months shall include a minimum of 6 months between tests and asks for automatic stack test extensions if a facility experiences an outage greater than 90 days.

Response: The MPCA has rewritten the stack testing language in the Order to indicate that the annual BART performance test shall be conducted once each calendar year and shall include a minimum of 6 months and a maximum of 18 months between tests. In order to address the issue of an outage, the MPCA has also added language to the Order based on 7017.2025, Subp 4., which sets forth conditions for requesting an extension.

Comment 7-N: "The draft AO for ArcelorMittal requires that stack testing for NO_X and SO_2 be conducted on all 4 stacks simultaneously for 30 consecutive hours. We believe that a 30-hour stack test is excessively long, particularly for ArcelorMittal's indurating furnace that demonstrated a low relative variability index (RVI) during its extended Method 7E test in March 2008." To address this concern, the stack test requirement should be written so that the initial BART performance test collects 30 hourly data points, while later tests may stop after collecting three hours of test data if the results are less than or equal to 90% of the emission limit.

Response: Because a main goal of the BART implementation is to gather better information on emissions from the taconite facilities, the MPCA feels that an annual 30 hour stack test is appropriate.

Comment 7-O: "The draft AO states that the SO_2 compliance test would be used to set the minimum scrubber water flow and pressure drop limits. These are the same scrubber parameters that are already set for the Taconite MACT…MPCA should not set new and potential different limits during the SO_2 test on the same control device."

Response: The MPCA agrees and will remove the language referencing the need to set scrubber parameters. The language requiring parameter monitoring will be changed to reflect the Taconite MACT.

Comment 7-P: "The AO includes a section entitled 'permanent records" that would mandate that ArcelorMittal permanently maintain 'information on the NO_X, SO_2 and PM emission limits and operation requirements imposed by this Order.' First, the 5-year recordkeeping requirement under the Title V program should be sufficient for any records required under the AO. Second, the language does not provide a clear indication of what records must be kept."

Response: See response to Comment 6-C. The Orders have been redrafted to more clearly define the recordkeeping requirements and require records to be kept for only five years.

Minnesota Pollution Control Agency

RESPONSES TO LATE COMMENTS ON THE SUPPLEMENTAL REGIONAL HAZE SIP

8. Minnesota Power

Comment 8-A: "Minnesota Power has been working cooperatively with the MPCA and other Minnesota stake holders to provide input to the Minnesota Regional Haze SIP development over the last five to seven years and is a strong supporter of the MPCA's Northeast Minnesota Plan."

Response: Comment noted.

Comment 8-B: "A key part of the Northeast Minnesota Plan involves the emission reductions that were delivered by Minnesota Power on our coal-fired generation units under the Arrowhead Regional Emissions Abatement (AREA) program, a voluntary emission reduction program facilitated by Minnesota regulators. These emission reductions have been supplemented by Minnesota Power's 2009 retrofit of Best Available Control Technology (BACT) style controls on our Boswell Energy Center Unit 3 and supplemental emission reductions for NO_X facilitated on Boswell Unit 4…As the MPCA has noted, such measures resulted in the Northeast Minnesota Plan already surpassing its 30% emission reduction goal for 2018 by over nine percent."

Response: Comment noted.

Comment 8-C: "Minnesota Power agrees with the MPCA and EPA in recognizing that CSAPR is better than BART and notes that the emission reductions already achieved by Minnesota Power units retrofit with controls are lower than the emissions associated with emissions that might have been designated for Minnesota Power BART eligible unit reductions." The commenter also provided other generally supportive comments.

Response: Comment noted.

9. Cliffs Natural Resources

Comment 9-A: "Cliffs supports MPCA's decision to use the CSAPR rule as BART for the Northshore Silver Bay Power Station."

Response: Comment noted.

Comment 9-B: "MPCA appropriately proposes changes to its long-term strategy for regional haze and the Northeast Minnesota Plan. MPCA reports that Minnesota has already surpassed its 2018 goal of a 30% reduction of combined SO_2 and NO_X emissions from sources that emit over 100 tons per year. Given this rapid decline in emissions, it is appropriate for MPCA to re-evaluate the second component of the Northeast Minnesota Plan, which was designed to investigate control measures and pollution prevention practices that could be applied to the taconite industry. These would be measures and practices above and beyond what MPCA established as BART for sources to be regulated under the Regional Haze Rule."

Response: The MPCA appreciates Cliffs' support of the proposed long-term strategy. However, it is important to note that the MPCA believes that relying on the NAAQS for the LTS will still require the industry to investigate control measures and pollution prevention practices. It simply offers a bright-line goal of compliance with the NAAQS rather than pilot testing. The desire to investigate control measures and pollution prevention practices from the industry has always been considered as separate to the 30% reduction goal. In addition, the LTS is intended to go above and beyond BART to establish other reasonable controls, and is a separate part of the Regional Haze Rule.

Comment 9-C: "While MPCA can appropriately consider the effect of the new NAAQS on relevant emission reductions to help Minnesota meet its regional haze goals, it is not necessary or appropriate to adopt the NAAQS obligations into the BART SIP, as MPCA does by mandating NAAQS modeling for the taconite industry as parts of its proposed Administrative Order (AO) for BART. NAAQS modeling is following an implementation schedule that is driven by federal requirements for establishing nonattainment areas and strategies to bring those areas into attainment…NO_2 modeling is on a slower implementation schedule in part because the modeling must consider complex atmospheric interactions that convert some NO_X emitted into NO_2 downwind. Importantly, EPA is not currently requiring that states use modeling to set regulatory limits for NO_2. It is premature, therefore, for MPCA to include NO_2 modeling in an AO with the intent of relying on its potentially erroneous and overly conservative results for making decisions regarding emission controls at the end of 2012."

Response: See response to comment 7-B.

Comment 9-D: "MPCA may rely on the benefits to be derived from meeting the one-hour NAAQS for NO_2 and SO_2 without arbitrarily expediting its implementation ahead of the refinements to the model expected from EPA…MPCA is relying on CAIR, CSAPR, NAAQS, and many other regulatory obligations to help reduce SO_2 and NO_X emissions without requiring or needing to adopt those obligations into AOs for affected facilities. Thus, it seems arbitrary to require the taconite industry sources to sign an Order mandating NAAQS modeling for NO_2 and SO_2. The NAAQS process will produce appropriate emission reductions on its own timeline, which can be relied upon to meet BART SIP limits without an Administrative Order."

Response: Again, the modeling for NAAQS compliance is part of the LTS, not BART. The MPCA does rely on emission reductions from CAIR/CSAPR in the SIP, but those rules are promulgated by EPA and enforceable through the federal process.

Although NAAQS are always enforceable on facilities, facilities usually only have to demonstrate compliance with the NAAQS if the MPCA has reason to believe that there is a potential violation or if the facility is increasing emissions of the relevant pollutant. This generally occurs on a case-by-case basis through the permitting process. The MPCA believes it is likely that the taconite facilities could cause or contribute to a violation of the one-hour NAAQS, particularly for NO_2. Therefore, we are requiring modeling for these NAAQS through the LTS; a main goal of the LTS is to evolve the available emission control measures and technologies. Establishing the requirement for modeling in the LTS also provides a level playing field for the industry, rather than having facilities model for compliance with these one-hour standards if a permitting action is underway. Without that modeling, it is unclear whether the NAAQS process will produce emission reductions.

Comment 9-E: "If MPCA insists on imposing a schedule for modeling in the BART AOs, the schedule must be extended beyond what has been proposed in the SIP Supplement to allow for improvements to the modeling being developed at the federal level…The agency will be considering data and presentations at its 10th Modeling Conference this March on how to improve the accuracy of the AERMOD predictions in the vicinity of complex manufacturing facilities…This work must precede any use of the model to render regulatory decision on the level of emission reduction necessary to meet the national standards because the substantial evidence of inaccuracy would make such decisions arbitrary and vulnerable to legal challenge."

Response: The commenter refers to a study in NW Indiana that compares predicted ambient impacts from the AERMOD model using a 2008 inventory of actual SO_2 emissions to actual ambient concentration, and states that the study concluded that the model over predicted the SO_2 ambient impacts by a factor of 10 for the form of the standard. The MPCA acknowledges that models tend to be conservative, and EPA's modeling guidance is constantly evolving. Nevertheless, many states (including

Minnesota) are already in process of using AERMOD to meet EPA's timelines for demonstrating attainment with the one-hour SO2 NAAQS. In addition, the existing models are already being used for demonstrating compliance with these standards in permitting. The MPCA understands the importance of the March modeling conference, and will extend the deadline for preparation of model protocols to June 1, 2012.

Comment 9-F: "The inaccuracy of model predictions is more significant now because models are being asked for the first time to predict one-hour impacts for SO_2 and NO_2. These short-term concentrations are significantly affected by meteorological variations that are discounted by AERMOD's assumption that wind direction is constant. The evidence indicates that AERMOD becomes less accurate during low wind periods when its assumptions about wind speed and wind direction run counter to documented observations…These obvious inaccuracies and strained assumptions are contributing to the over prediction increasingly demonstrated by model studies. EPA is expected to address some of these in modeling guidance after the 10th Modeling Conference.

Response: Regulatory models continually evolve according to the state-of-the-science. It would not be possible, or reasonable, to simply wait for a perfect model before completing modeling. MPCA believes that representative meteorological data is currently available for modeling the new short term standards. MPCA recently approved a modeling protocol for a mining project after an EPA decision which allowed the use of a low wind speed threshold of 0.5 m/sec, thus eliminating winds speeds that have been associated with potentially distorted maximum concentrations. Additionally, EPA is planning an update to the stage 3 AERMET program to accommodate such a threshold in the processing of meteorological data. MPCA believes that concerns over low wind speeds are addressed by this recent EPA decision.

Comment 9-G: "Unfortunately, the modeling schedules proposed by MPCA in the SIP Supplement AOs would not allow modeling protocols to incorporate EPA's final modeling guidance. A key component of the draft Administrative Order…is a requirement to submit modeling protocols by April 1, 2012 and modeled attainment demonstrations by December 15, 2012 for both SO_2 and NO_2. This schedule must be extended to allow Minnesota facilities to benefits from the refinements to the model anticipated from EPA's 10th Modeling Conference…Federal guidance arising from the Modeling Conference is anticipated in the late summer of 2012 and it is expected to address issues critical to improving the accuracy of the models for NO_2 and SO_2. If MPCA moves forward with its current schedule, the protocols submitted in April 2012 will have to be revised and resubmitted to address EPA's final guidance."

Response: The MPCA has revised the Orders to extend the deadlines to June 1, 2012 for protocols and December 31, 2012 for final modeling. The final modeling is meant to provide emission limits that will meet the NAAQS. Facilities will then need to spend time engineering and installing controls in order to meet the emission limits by 2017. If the modeling deadlines are pushed back too far, the facilities will have a difficult time engineering and installing controls by 2017. In addition, expecting EPA guidance on specific dates is difficult, so the MPCA does not believe that the submittal of modeling protocols should be dependent on EPA revising its modeling guidance. If EPA does revise its guidance or general procedures, the MPCA is willing to work with the facilities to determine how any appropriate revisions can be considered in final or additional modeling without completion of an additional protocol.

Comment 9-H: "MPCA's reliance on NAAQS compliance for its Long-Term Regional Haze Strategy should not expedite the timelines for implementing the NAAQS…MPCA should require SO_2 modeling protocols no sooner than 60 days after the federal guidance on SO_2 modeling is finalized with final results 90 days after MPCA approves the SO_2 modeling protocol. This helps to ensure that Cliffs will have the benefit of EPA's anticipated improvements to the model when we submit our modeling protocols.

Response: As the commenter states, EPA's improvements are merely "anticipated". Although MPCA is open to revising its strategy for the SO_2 NAAQS based on any changes to EPA's guidance, the June 2013 deadline to submit a SIP showing attainment with the one-hour SO_2 standard means that modeling is already underway. Indeed, other major SO_2 sources will be required to submit final modeling to the MPCA by the end of September 2012.

Comment 9-I: "EPA has not called for SIPs that use air dispersion modeling for NO_2. As a result, EPA is expected to continue to work on improvements to the NO_2 modeling after it releases the final SO_2 modeling guidance in 2012…Since MPCA does not have a current federally-imposed schedule for NO_2 modeling, Cliffs recommends that the schedule for NO_2 protocols begin after the SO_2 modeling results are submitted…MPCA should require NO_2 modeling protocols no earlier than the first quarter of 2013 with modeling results by the end of 2013. This is still plenty of time to have emission controls engineered and installed to meet the BART SIP goals for regional haze improvements. Minnesota should follow the federal timelines closely to ensure that Minnesota facilities are not burdened by using less accurate models for regulatory determinations than those used by other states."

Response: EPA is not calling for a general use of air dispersion modeling to develop SIPs to ensure attainment with the NO_2 NAAQS in all areas as they are for SO_2. The timeline for modeling and a description of appropriate emission limits is based on ensuring compliance with the NAAQS by the attainment date in 2017. Remember that the requirement to model for NAAQS compliance replaces the previous requirement to conduct pilot testing of emission controls at the facilities. The Regional Haze SIP 2009 submittal called for the facilities to undertake pilot testing during 2012, and for MPCA to develop enforceable documents to require additional controls by June 2014. In order to have solid emission limits by that time with compliance by 2017, the MPCA believes modeling is needed by the end of 2012. Again, if there are significant model changes after 2012 and prior to the adoption of any enforceable limits, the MPCA will work with the facilities to see if revisions to originally modeling emission limitations are necessary and appropriate.

Comment 9-J: The commenter raised several detailed technical and "specific concerns about the accuracy of air dispersion modeling for predicting ambient impacts that can be addressed, in part, at the State level using the discretion that EPA accords to states in implementing the models." These include:

- Representative AERMINUTE data is not available for all sources;
- Reasonable background values should be used for Northeastern Minnesota;
- Modeling the individual impact of indurating furnaces at each facility;
- Limit modeled receptors to those reasonably exposed;
- Exclude intermittent sources from one-hour NAAQS modeling inputs;
- Elevated ambient one-hour NO_2 concentrations are primarily an urban roadway corridor problem;
- The NO_2:NO_X default in-stack ratio of 0.5 leads to an unrealistically high modeled NO_2 concentrations;
- There should be streamlined approval of Tier 3 NO_2 modeling approaches for individual source modeling.

Response: See response to comment 7-D.

Comment 9-K: "Best Available Retrofit Technology means 'an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant which is emitted.'...BART does not require a redesign of the emission unit or a switch to a different fuel...BART does not require curtailments or compromise production rates. As the definition dictates, the BART NO_X emission limitation for an indurating furnace should reflect its full range of operating conditions when continuous good combustion practices are applies. This means that the numeric BART emission limitation should not be lower than the highest NO_X rate measured during a test that reflect continuous application of good combustion practices. Cliffs supports the use of a statistical method to predict the upper bound limit from the variability within the data set as a refined starting point for establishing a BART limit. Additional upward adjustments are necessary, however, to reflect operational variability that is not captured in the stack test data set. A reasonable safety margin should be added to the statistically derived limit to account for the following: the delta between the production rate during testing and the production capacity of the equipment; seasonal variations in temperature, humidity, and precipitation that affect emission rates; the variations in the ore that serves as the primary raw materials and variations in the product demands; Startup, Shutdown and Malfunction events; the inherent variability contributed by sampling and analysis equipment when using stack test data to establish emission limits."

Response: The AO under which the data was collected by the facilities required the facilities to conduct extended stack tests. The AO requires that "Any proposed testing shall comply with the requirements of Minn. R. 7017.2020, subp. 2, 7017.2030, 7017.2035, and 7017.2040." Minn. R. 7017.2030 explicitly states in Subp. 2 that "the performance test shall be conducted at worst case conditions for each air pollutant that is required to be tested unless: A. the applicable requirement or compliance document specifies alternative operating conditions for performance testing; B. the worst case condition is not known or calculable. In this case, worst case conditions shall be assumed to be the maximum achievable process or operating rate of the emissions units; or C. the owner or operator of the emission facility elects to conduct the performance test at conditions that are not worst case conditions." Under Minn. R. 7017.2030, Subp. 3.A., "if the owner or operator did not conduct the performance test at worst case conditions as required, or elected to conduct the performance test under alternative conditions…the affected emission unit shall not be operated at a process rate, operating rate, or regulated operating conditions that is closer to the worst case conditions than the actual conditions of the performance test."

The AO also requires that the facility collect "a minimum of 150 one-hour data points under the range of operating parameters that influence NO_X emissions. The range of each operating parameter during testing should be representative of the furnace's range for that parameter in the 12 months previous to testing." The facilities knew that MPCA was collecting this data in order to analyze emissions data and set BART limits, and therefore should have conducted testing that represented the full desired operational capacity of the furnace.

Comment 9-L: “It is common practice to apply a factor of 10 percent or more to stack test values to accommodate normal source variability not reflected in the stack test data set, and the inaccuracy of the proposed compliance method when setting an enforceable emission limit…Emission limitations that must be met continuously should use the ten percent factor to ensure that the variability external to the data set is accounted for in the enforceable limit… Ten percent is not a random value; it correlates to the standard performance test objective, which is to operation within 10% (at 90%) of rated capacity. Agencies recognize that operating at 100% capacity is not a realistic expectation during a given stack test because some variables are not within the company’s control during a test. Seasonal variations, common in Northeastern Minnesota, and ore variations common in any mining operation dictate that testing at or around 90% of capacity is all that can be expected for any given test. Therefore, test data will not reflect the true maximum capacity of the equipment and an upward adjustment is needed to ensure that equipment can use their full capacity when conditions allow without violating their emission limit. Therefore, it is appropriate for MPCA to add 10% to the value derived from the NO_X stack test data when setting a limit that must be achievable under all normal operating conditions.”

Response: See response to Comment 7-I.

Comment 9-M: “Cliffs cannot ensure continuous compliance with a numeric SO_2 limit when the sulfur content of the iron ore significantly increases. SO_2 emissions are generated from the sulfur content of the fuel and the sulfur content of the ore. The ore’s sulfur content is a variable inherent to mining operations that Cliffs does not control…the level of sulfur can increase as new zones of ore are excavated. To account for this variability, Cliffs generally recommends the use of an appropriate UPL based on available stack data plus a 10% margin of safety. However, even this adjustment may be insufficient to account for the potential increases in the sulfur content of ore in newly mined areas…Cliffs proposed to initiate a procedure to be established in its AOs for setting new SO_2 BART emission limits for ores mined from that zone or area…the numeric SO_2 emission limit would need to be developed for the ore mined from the new high sulfur area based on a stack test conducted within 180 days after encountering the high sulfur ore.

Response: See response to Comment 7-J.

Comment 9-N: "The draft AO states that the NO_X and SO_2 emission limits are 'effective on and after the date six months after the effective date of EPA's approval of this BART determination.' By contrast the federal rule requires that existing facilities install and operation BART 'no later than five years after plan approval.' See 40 CFR 51.302(c)(4)(iv). MPCA should allow affected sources the full amount of time established by Federal rule."

Response: See response to comment 7-K.

Comment 9-O: "The draft AOs require that stack testing for NO_X and SO_2 be conducted every 12 months. The requirement for annual stack testing should be adjusted based on the stack test results as allowed under MPCA's test frequency guidance."

Response: See response to Comment 7-L.

Comment 9-P: "The draft AOs require that stack testing for NO_X and SO_2 be conducted every 12 months within 2-months of the anniversary date of the initial BART compliance test. The requirement is overly restrictive because it would limit the time-of-year in which the testing can take place and would therefore limit the operating conditions in which the testing could occur. It is also important to note that the taconite industry has historically experienced unpredictable market swings causing decreased production and extended downtime." The commenter suggests language that indicates that testing required every 12 months shall include a minimum of 6 months between tests and asks for automatic stack test extensions if a facility experiences an outage greater than 90 days.

Response: See response to Comment 7-M.

Comment 9-Q: "The draft AOs for Cliffs facilities require that stack testing for NO_X and SO_2 be conducted simultaneously on all stacks for 30 consecutive hours. We believe that an annual 30-hour stack test is excessively long and burdensome." To address this concern, the stack test requirement should be written so that the initial BART performance test collects 30 hourly data points, while later tests may stop after collecting three hours of test data if the results are less than or equal to 90% of the emission limit.

Response: See response to Comment 7-N. In addition, note that in the Alternative Method Proposal for Northshore Mining submitted to MPCA in June 2008 and the Alternative Method Proposal submitted to MPCA in December 2010 for Hibbing Taconite, Cliffs suggested annual stack testing for 30 one-hour data points conducted once per calendar year.

Comment 9-R: “The draft AOs for Northshore and Hibbing Taconite state that the SO_2 compliance stack test would be used to set the minimum scrubber water flow and pressure drop limits for the existing wet scrubber system. These are the same scrubber parameters that are already set for the Taconite MACT…MPCA should not set new and potential different limits during the SO_2 test on the same control device.”

Response: See response to Comment 7-O.

Comment 9-S: “The AOs include a section entitled ‘permanent records” that would mandate that Cliffs permanently maintain ‘information on the NO_X, SO_2 and PM emission limits and operation requirements imposed by this Order.’ First, the 5-year recordkeeping requirement under the Title V program should be sufficient for any records required under the AO. Second, the language does not provide a clear indication of what records must be kept.”

Response: See response to Comment 7-P.

Comment 9-T: United Taconite proposed BART NO_X limits that are based on limits in the existing permit, which are on a 180 day rolling average basis. The MPCA indicated that shorter averaging time limits are standard for BART, and proposed tons per day limits on a 30-day rolling average basis. “The condensation of the limits to a daily value eliminates the very reason for the 180-day rolling sum. The 180-day rolling sum enables operationally crucial fuel flexibility while still providing overall lower emissions of SO_2 and NO_X. Allowing this fuel flexibility ultimately yields a ‘better than BART’ solution…United Taconite is permitted to burn a combination of solid and gaseous fuel on both Line 1 and Line 2 during normal operation…on a daily basis, 100% solid fuel combustion on both Lines 1 and 2 yields > 800 lb/hr lower combined SO_2 and NO_X emissions. However, arbitrarily reducing the averaging period…will make it impossible for UTAC to achieve compliance when the use of natural gas for an extended period of time is essential to furnace operations…The limits proposed…will result in the forced shutdown of United Taconite’s furnaces to comply with the NO_X limits. This forced shutdown could occur during any of the operationally crucial extended natural gas usage events”.

The facility uses 100% natural gas in several situations: startup (7 – 10 days), interruptions to the solid fuel delivery systems (both delays in the delivery to the plant and problems within the plant, and during precipitation events. The commenter recommends retaining the 180-day limits, or utilizing a 30-day limit that is reflective of the fuel flexibility. The commenter recommended 30-day limits are 18.68 tpd NO_X for Line 1 and 29.7 tpd NO_X for Line 2.

Response: The MPCA understands that the facility currently has and wishes to maintain the ability to operate on 100% natural gas. However, as this results in worst-case NO_X emissions, the MPCA believes it is appropriate to work towards limiting the amount of time the facility unnecessarily operates under these conditions. Therefore, the MPCA has chosen to retain the limits originally proposed as 30-day rolling averages, but to add limits that the facility can choose to comply with during periods of operation on 100% natural gas. If there is extensive reliance on 100% natural gas operation, the facility will be required to investigate the causes of such reliance.

The MPCA looked at data received from United Taconite for 2011, and pulled hours of 100% natural gas operation where production was over 100 tons per hour on Line 1 and 200 tons per hour on Line 2. A series of 24-hour rolling averages were derived from this hourly data. The 95% UPL was then used to predict the next 24-hour average.[2] The resulting limits are 1144.7 lbs/hour on a 24-hour basis for Line 1 and 1366.8 lbs/hour on a 24-hour basis for Line 2. United may choose to comply with these limits for any calendar day during which a line operates on 100% natural gas for at least one hour. These days must be recorded, and will then be removed from determining compliance with the 30-day rolling average limit. If United chooses to opt-in to these limits more than 10% of the time (measured as 9 days out of any 90 day rolling period), then United must conduct a root cause analysis in order to identify the causes of incidents that required the facility to operate burning 100% natural gas and measures to minimize the duration of operation on 100% natural gas. This analysis is to be submitted to MPCA along with the required Semi-Annual Deviation Report.

The MPCA also added a 1655 tons per year NO_X limit for Line 1 and a 3692 tons per year NO_X limit for Line 2 to the Administrative Order for United Taconite. Although this limit is already federally enforceable, it is not in the SIP. Since the determination that this BART alternative does result in greater emission reductions than the MPCA's original BART determination relies heavily on the total annual emissions, the MPCA feels it is important that the overall limit be in the SIP.

Comment 9-U: Cliffs is supportive of the SO_2 limits for the United Taconite facility. However, Cliffs does object to the characterization of "fuel blending" as part of the BART determination "because it suggests incorrectly that BART technology determinations can drive fuel choices for Cliffs. Please delete that characterization from the BART description."

[2] This data did not undergo the correction for autocorrelation because the correlation is lessened as the data is averaged up to longer time periods. In addition, particularly for Line 2, the hours of natural gas operation were not a continuous time series.

Response: The MPCA continues to believe that an emission limit based on a blend of fuels can be an appropriate BART determination, as repeatedly discussed during the preparation of the 2009 Regional Haze SIP submittal. The MPCA believes that a BART limit for Cliffs, or any other taconite facility, should be based on the current mix of fuels, and that in order to meet the proposed limit United Taconite does need to spend time burning a mix of gas and various solid fuels. Ultimately, the key component of BART is the limit rather than the technology or work practice description. Therefore, the MPCA does not feel it is necessary to change the description of the BART determination.

Comment 9-V: This comment relates to the NO_X limits proposed for Hibbing Taconite. "Taconite indurating furnaces are complicated combustion devices…There are a number of factors that lead to inevitable day-to-day, season-to-season and testing or monitoring variation that must be accounted for in establishment of an emissions limit as prescribed by BART. Those factors include: Changes in fuel efficiency before and after regularly scheduled maintenance outages…Furnace operating rates during the collection of available emissions test data not being reflective of furnace capacity…Operational ability to produce more than one type of pellet products and operational production plans as future demand for those pellet products changes. Changes in ore body and respective changes in furnace heat input required to initiate the exothermic conversation of magnetite to hematite. NO_X sample and analysis has inherent variability that should be recognized when using stack testing to establish emission limits."

Response: The MPCA understands that there are operational factors that lead to emission variability. However, Cliffs has provided to MPCA information documenting their belief that the furnaces at Hibbing Taconite have minimally variable emissions, particularly within production of each type of pellet product. Hibbing Taconite did provide the MPCA with data for production of two different types of pellet products, and this was taken into account.

As noted in the response to Comment 9-K, the AO under which the data was collected by the facilities required the facilities to conduct extended stack tests under variable operating parameters and following the stack test rules.

Comment 9-W: "Cliffs has been and continues to utilize good combustion practices (GCP) as part of its normal operations because process fuel represents a significant cost of operations…GCP represents a set of operations and maintenance activities that support optimized operation of the furnace fuel and air delivery systems, burners, and associated control systems. Cliffs' GCPs include the following:

- Daily monitoring of fuel use per ton of product produced and comparison against established targets.
- Routine monitoring of ore blends to anticipate potential changes to furnace heat load requirements.
- Established operational furnace settings understood to yield optimal conditions for combustion.
- Use of computer-driven control systems [to] maintain consistent combustion conditions in the furnace.
- Operational responses for instances where fuel use exceeds targets.
- Routine maintenance practices to ensure optimal condition of fuel delivery, air handling and combustion systems, and associated monitoring equipment.
- Availability of an array of diagnostic tools from infrared cameras to monitor flame characteristics to airflow surveys to watch for air losses.
- Monthly and annual review of fuel use to correct for longer term trends….

However, GCP is distinctly different from application of a control technology that is designed to deliver a precise emissions rate…GCP ensures that fuel and air use is monitored and responded to on a daily and monthly basis, thus ensuring as good a combustion environment as is practical, but lacking any direct numerical link to an emission rate."

Response: The MPCA appreciates this description of the good combustion practices that Cliffs undertakes at its facilities. However, BART requires the application of a numerical emission limit, and the MPCA believes that it is appropriate to set an emission limit that reflects the operation of these practices at the facilities. The MPCA believes these practices can be implemented on an hourly basis to reduce emissions.

Comment 9-X: "MPCA employs the Upper Predictive Limit (UPL) tool to derive its proposed limits and predicates its approach on the available emissions data as being fully representative of the entire range of permissible operating factors for the furnace. The UPL as applied by the MPCA is not appropriately reflective of furnace capability for the following reasons: While NO_X testing has been conducted over a *range of operating conditions* thought to influence NO_X, as outlined in the original BART Administrative Orders, it is inaccurate to characterize that this testing has encompassed the *range of NO_X emissions* for the facility. A correct application of the UPL must recognize the entire range of factors that could affect NO_X variability (not only the range of furnace operating conditions during the test). While the test conducted…improves understand of NO_X emissions from the furnaces, it does not account for those sources of variability outside the furnace (as described above), leading to an underestimate of the standard deviation, and an unrealistically low UPL".

Response: It is not clear what sources of variability outside the furnace the commenter is specifically referring to. The commenter has raised concerns about fuel efficiency surrounding maintenance outages, furnace operating rates, different pellet types, changes in ore body, and precipitation events as various factors that impact emission variability. However, the MPCA believes that many of these factors (operating rates, pellet type) can be considered furnace operating conditions, or are likely to be short-term events that will have relatively little effect on compliance with a 30-day rolling average. The bootstrapping technique used on the data was used specifically to determine the potential variance of a given data set, in order to ensure that the standard deviation/variance was not underestimated.

Comment 9-Y: "The methodology MPCA used to set up the UPL is statistically flawed as it does not recognize the fact that successive hourly emissions are highly correlated. The two-sample t-test depends critically on the assumption that the different observations in the emissions test data are mutually independent, a presumption which must also hold true for future test data...Ignoring this serial correlation as MPCA has done leads to invalid and unrealistically low UPL. It is in fact this interdependence that also draws question to MPCA's use of the 'bootstrapping' method to gauge future ability to comply…Because data here are time-dependent, bootstrapping as implemented by MPCA fails to reflect the time dependency of the actual data series, which inappropriately overstates the amount of information in the constructed datasets than from the sample set, yielding a false sense of ability to meet a given threshold. It is worth noting that the data interdependence demonstrated by these datasets also reinforces the understanding of relative stability of emissions from these units…it also shows that the rate of changes from these emission units is slow and emissions are stable because any single data point is in factor a strong predictor of the points before and after it."

Response: The MPCA undertook some additional analysis to investigate the potential impact of autocorrelation. The MPCA could not simply rely on the analysis provided by the commenter because of the move to 95% UPL, and the fact that the analysis did not include ArcelorMittal. The MPCA's analysis focused on ArcelorMittal, Hibbing Taconite, and Northshore Mining – the three taconite facilities that do not have CEMS. It was assumed, for simplicity, that the autocorrelation exhibited was first order autocorrelation – that is, that each data point is related only to the data point immediately ahead of it. The following equation, developed by Box and Jenkins and taken from Gilbert, R. O. (1987) *Statistical*

Methods for Environmental Pollution Monitoring, was used to estimate the magnitude of the autocorrelation coefficient:

$$\hat{\rho} = \sum_{t=1}^{n-1}(X_t - \bar{X})(X_{t+1} - \bar{X}) \,/\, \sum_{t=1}^{n}(X_t - \bar{X})^2$$

So, each set of data that was used to derive the limits was placed in a spreadsheet. The sample mean was subtracted from each data point and each lagged data point, and these were then summed. The sample mean was subtracted from each data point and squared, and these were also summed. The equation $n_{eff} = \frac{n(1-\rho)}{(1+\rho)}$ was then used to calculate the "Effective n" or the effective sample size based on the number of samples arising from the 150 hour stack test.[3]

Using the equation above, the MPCA did find autocorrelation coefficients ranging from 0.35 to 0.97. Admittedly, estimation in the presence of positive autocorrelation without accounting for that autocorrelation does tend to result in an underestimation of variance and therefore narrower confidence and predictive intervals.

The MPCA used the autocorrelation coefficient to change the effective sample size for both the sample data and the proposed compliance test, as suggested by the commenter. This analysis is shown in the attachment. Ultimately, this does result in higher UPLs at each confidence level (95% and 99%). When coupled with the move to the 95% interval, the resulting emission limits for the most part do not change dramatically.

Comment 9-Z: "As an example, a review of emissions data collected during 2010, with a 30-day rolling average applies, indicates the following: HTC Line 1 would have emissions in excess of the proposed limit 39% of the time during the duration of the test. HTC Line 2 would have emissions in excess of the proposed limit 100% of the time during the duration of the test. HTC Line 3 would have emissions in excess of the proposed limit 29% of the time during the duration of the test. Cliffs cannot accept limits that over-reach the intent of BART by being more prescriptive than the furnaces' present capability and for which it already has information suggesting it will not be able to reliably assure compliance with those limits." The commenter then proposes the following NO_X limits – Line 1: 565 lbs/hr; Line 2: 935 lbs/hr; and Line 3: 422 lbs/hr. These limits are based on a 10% margin of safety added to a correct UPL based on the comments provided in 9-Y.

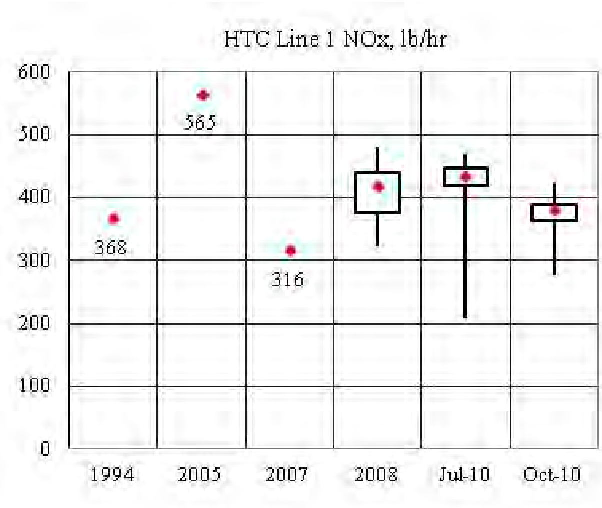
[3] http://www.climatescience.gov/Library/sap/sap1-1/third-draft/sap1-1-draft3-appA.pdf

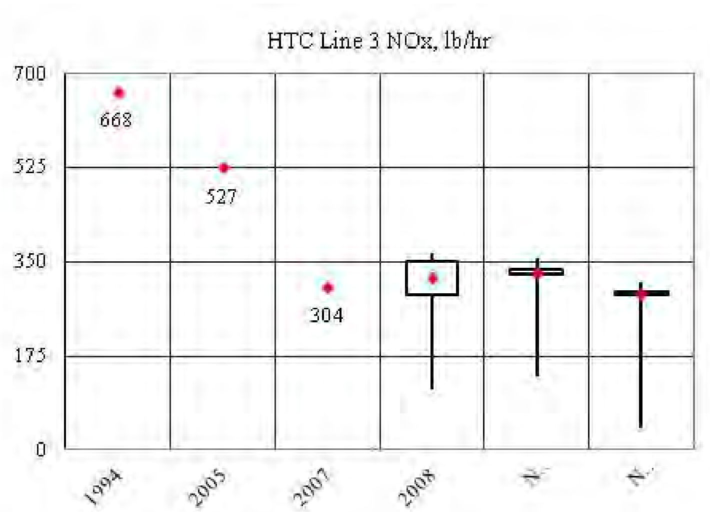
Response: The emission limits the MPCA has developed are meant to define the levels of emissions that are possible with good combustion practices. The MPCA does not believe that these limits over-reach the furnace's present capability. The MPCA believes that the data in the graphs below shows that good combustion practices can provide emission rates that meet the MPCA's limits; note that they also show the impact of Energy Efficiency Projects which in 2005/2006 added new (lower) burners within the combustion chamber and reduced NO_X emissions.

The MPCA has proposed new limits based on the revised analysis that accounts for the autocorrelation. As stated previously, the MPCA does not believe an additional 10% margin of compliance is necessary or appropriate. The new limits are 449.7 lbs NO_X/hr for Line 1 and 347.5 lbs NO_X/hr for Line 3.

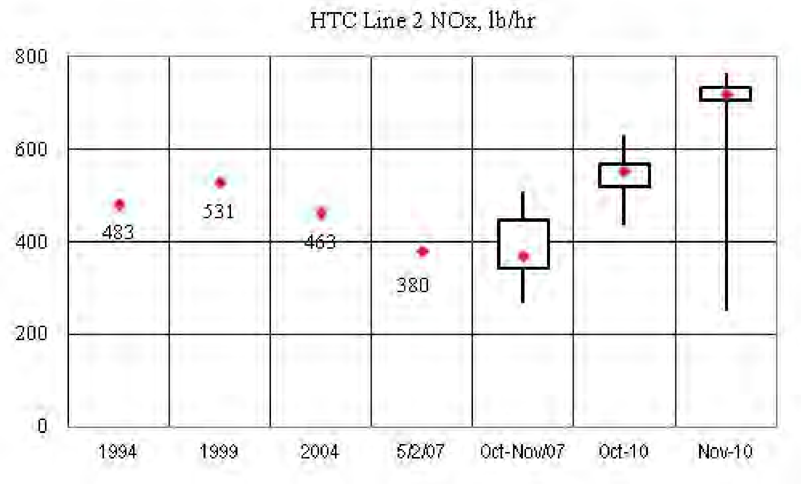
A different approach is being used for Line 2, due to concerns about unexpected and unexplained differences in emissions between the furnaces. The following graphs show emissions from HTC from the stack test information. The box-plots are one-hour averaged mass emission rates (lb/hr) based on the 150 hours simultaneous Method 7E sampling from all four stacks of each furnace line. The median is shown as a red diamond in the box. A red diamond without a box is for a three-hour Method 7E test conducted on each stack individually, and then added to give a rate for the entire furnace. The left most box-plot, from 2007 or 2008, is based on data collected when the furnace was making both high compression and standard pellets. The other two box-plots are separated by standard pellets or high compression pellets (the high compression pellets produce higher emissions).

Logically, the range of the left box-plot should cover the ranges of the other two box-plots, and this is generally seen for HTC Line 1 and Line 3.





However, this pattern does not hold for HTC Line 2. As shown below, the emissions when producing high compression pellets in November 2010 were considerably higher than those from prior tests.



Initially, the MPCA proposed to set a limit for Line 2 based on pooling all the data from the three 150-hour stack tests. We are requiring the installation of CEMS on Line 2. The commenter indicated that Line 2 would not be able to comply, at any time, with the proposed limit. Therefore, MPCA has decided to set limits on Line 2 for the two distinct operating situations – production of standard pellets (608.9 lbs/hr) and production of high compression pellets (894 lbs/hr). These limits were derived using the 95% UPL, corrected for autocorrelation, and the separate standard and high compression pellet data sets provided in 2010. Once CEMS are installed and certified, these limits automatically step down to the original limit proposed by MPCA (572 lbs/hr) unless the facility provides evidence supporting a higher limit. In that case, the higher dual limits continue to apply until the MPCA evaluated the data provided and revises the Order.

Comment 9-AA: "Sulfur is present in two key inputs to the furnaces: fuel and ore…Hibbing Taconite Company's air emissions permit ascribes a rate of sulfur dioxide emissions related specifically to the ore to be 0.75 lbs SO_2/mmbtu (at the stack, or post scrubber)…This value translates to 0.28 lb SO_2/LT….the numeric BART limit as proposed by MPCA does not represent the range of sulfur presently known to exist in Hibbing Taconite's ore body and thus represents an inappropriate BART limits…Considering all of the above information, Cliffs proposes that the SO_2 emissions limits be revised…Lines 1, 2, and 3 SO_2 emissions to be less than or equal to 0.28 lb SO_2/LT ore while combusting natural gas only."

Response: The numeric BART limits for SO_2 for Hibbing Taconite were set as part of the 2009 SIP submittal. The Supplemental SIP simply makes these limits enforceable, it does not revise the limits.

Comment 9-AB: This comment re-states some of the discussion of potential sources of emission variability and good combustion practices, and the general statistical concerns. Cliffs concurs with the MPCA's decision to set equal limits for Furnace 11 and Furnace 12. Cliffs proposes NO_X emission limits for Northshore of 141 lbs NO_X/hr, which includes a 10% margin of safety added to a revised 99% UPL.

Response: See response to Comment 9-Y. The limits for Northshore have been revised to 122.4 lbs NO_X/hr.

Comment 9-AC: The air permit "issued to Northshore Mining cites the following BACT-established SO_2 emissions limit:…less than or equal to 0.22 lbs/million Btu heat input for EU 100 and EU 110 individually; less than or equal to 0.074 lbs/million Btu heat input for EU 104 and EU 114 individually…Note that EU 100 and EU 110 represent the hood exhaust segments of Furnaces 11 and 12, respectively and EU 104 and EU 114 represent the waste gas segments of Furnaces 11 and 12 respectively. The combined hood exhaust and waste gas segments represent the total furnace emissions rate; in this case 0.22 lbs SO_2/mmBtu + 0.074 lbs SO_2 /mmbtu, or 0.29 lbs SO_2/mmbtu. This value translates to 0.15 lb SO_2/LT pellets…Cliffs proposes that the existing BACT SO_2 emission limits represent a reasonable emission limit…Cliffs further requests that the SIP expressly include a process for setting new SO_2 limits as described in the general comments".

Response: See Response to Comment 9-AA.

Minnesota Pollution Control Agency

RESPONSE TO EPA COMMENTS ON THE SUPPLEMENTAL REGIONAL HAZE SIP

10. EPA Region 5, Letter Received February 10, 2012

Comment 10-A: "We have reviewed MPCA's draft March 2012 Regional Haze State Implementation Plan Supplement and request that you consider the following information prior to setting the NO_X limits for Minnesota's taconite facilities…BART must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the sources, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology. Based upon these criteria, use of low NO_X burners could be considered to represent BART."

Response: A full BART determination would need to fully examine the factors described above. The MPCA believes that a determination of Low NO_X Burners as BART would be problematic when evaluating the very first factor – the technology available. The BART *Guidelines* at 40 CFR Part 51, Appendix Y, provide guidance for identifying available retrofit control technologies and determining which of those technologies are technically infeasible. In identifying available controls, the *Guidelines* state "Available retrofit control options are those air pollution control technologies with a practical potential for application to the emissions unit and the regulated pollutant under evaluation…The control alternatives can include not only existing controls for the source category in question but also take into account technology transfer of controls that have been applied to similar source categories and gas streams. Technologies which have not yet been applied to (or permitted for) full scale operations need not be considered as available; we do not expect the source owner to purchase or construct a process or control device that has not already been demonstrated in practice." When looking at feasible options, the *Guidelines* state that EPA does "not expect a source owner to conduct extended trials to learn how to apply a technology on a totally new and dissimilar source type. Consequently, you would not consider technologies in the pilot scale testing stages of development as ''available'' for purposes of BART review."

When the MPCA made the BART determinations in 2009, low NO_X burners (LNB) had not been tested on any existing taconite facility. BART analyses from the facility showed that LNB were likely feasible only in the pre-heat zones of the furnaces, not the indurating zone. The MPCA still believes that, as described further below, LNB remain in the pilot stage. Because of the lack of demonstrated feasible technologies, the MPCA chose to make a BART determination of "good combustion practices."

The MPCA understood the purpose of the Supplemental SIP was to establish emission limits that correspond to the previously determined BART technology. The MPCA does not believe that completing the emission limits is a vehicle for completely re-evaluating the BART determinations for the taconite facilities.

Comment 10-B: "Please share any information you may have regarding the potential use of low NO_X burners as BART at taconite facilities in Minnesota. U.S. Steel has demonstrated the development and use of low NO_X main burners that achieve 70% NO_X reduction on its indurating lines. This level of control is not reflected on any of the taconite indurating lines in Minnesota, including on the U.S. Steel lines on which this technology has, and presumably still is, being demonstrated. Installation of low NO_X main burners would therefore seem to have the potential of decreasing NO_X emissions by over 60 tons per day if applied across all of the taconite facilities in Minnesota."

Response: If the MPCA or EPA were to determine that low NO_X burners are BART, enforceable emission limitations would need to be developed. This would require gathering extensive additional emissions information, and this would likely take even longer than the two years needed to set emission limits for good combustion practices.

U.S. Steel Minntac has been in the process of testing the use of LNB in the indurating furnaces. In May 2011 and December 2011, Minntac submitted reports concerning the pilot testing of LNB on Line 6 and Line 7, respectively. The MPCA does not believe that these reports demonstrate that LNB with a 70% reduction in NO_X emissions are an appropriate BART determination and emission limitation across the industry.

First, these are pilot tests. Although they indicate a potential to reach a 70% reduction in NO_X emissions at the subject lines when the lines are running on natural gas, it is not clear that a 70% reduction is feasible at all times. There are concerns about the ability of LNB to meet Minntac's emission goals when using coal, and the burners have not been fully tested using biomass fuel blends. Blending natural gas with solid fuels is an important component of reducing NO_X emissions from these facilities. A further example is a recent permit issued to Keetac, which is reactivating an indurating furnace. The permit contains a combined NO_X limit for the existing and a reactivated furnace. As noted in the permit Technical Support Document, "Use of the reduced NO_X main burner may result in emissions below that represented by the combined NO_X emission limit. However, <u>the exact amount of reduction in NO_X</u>

emissions that can be attributed to the reduced NO_X burner is unknown at this time." The permit requirement is for US Steel to "install a low NO_X main burner on the Phase III (expansion) taconite indurating kiln that is designed to meet a goal of reducing NO_X emissions by a minimum of 30% to 50% from the uncontrolled NO_X emissions." This demonstrates the uncertainly surrounding the capability of LNB, which impacts limit setting.

Furthermore, LNB cannot simply be considered an add-on control that can be dropped into the furnace and immediately provide a substantial reduction in emissions. As noted in the Minntac reports, significant process optimization is also needed in order to reduce emissions when using the Low NO_X Burners. The MPCA's BART determination of good combustion practices requires facilities to understand their process and conduct process optimization with their existing burners. This understanding and ability to optimize the process is an important first step that should precede the installation of LNB and will allow the burners to be effective (and further optimized) once installed.

More critically, there are key differences between taconite furnaces. Minntac is a grate kiln system (which consists of a traveling grate, a rotary kiln furnace, and an annular cooler). Keetac operates a similar system. Northshore Mining operates a traditional straight-grate furnace, which places many burners along the length of the grate. Finally Hibbing Taconite and ArcelorMittal operate hybrid straight-grate pellet indurating furnaces. In addition to differences in process/construction, the facilities also make different pellets – both fully fluxed pellets and acid pellets (standard and high compression) – and use different fuels.

As shown, the available data and the differences between the facilities make it extremely difficult to determine an appropriate emission reduction level or emission limit corresponding to operation of LNB. Given the length of time that has already passed, the MPCA believes it is better to place the emission limits corresponding to BART determinations of good combustion practices than to spend anywhere from two to four years to see if LNB are feasible on all lines and collecting the needed data to set an enforceable BART limit.

The MPCA does believe that the industry is headed towards using LNB as NO_X emission controls. As part of the long-term strategy, the MPCA is requiring facilities to model for compliance with the new one-hour NO_2 NAAQS. We believe that this modeling will demonstrate that facilities will need to meet more stringent emission limits and thus will need to investigate emission controls, particularly for NO_X. We believe that this will drive facilities to learn more about their combustion processes and to install LNB or other controls. The MPCA is asking for facilities to develop limits to ensure compliance by the middle of 2017. If EPA must act by May 30, 2012, and makes a determination that LNB are BART, then compliance could be demonstrated as late as 2017. The MPCA believes that our LTS will likely provide LNB controls on the industry along the same time frame as a BART determination.

Comment 10-C: "In contrast, MPCA's approach to setting limits seems to have been to reflect the upper end of uncontrolled emission levels."

Response: The MPCA does not believe this is a fair characterization. As noted in Comments 6, 7, and 9, the emission limits proposed are not ones that will be simple for facilities to meet.

Comment 10-D: "The proposed SO_2 limit for United Taconite's Line 2 of 197 tons as a 30-day rolling sum appears inconsistent with your October 6, 2009 memorandum titled 'Sulfur Dioxide BART Determinations for United Taconites LLC's Indurating Furnaces,' which contains a table 'Sulfur Dioxide Removal Alternatives for United Taconite Line 2.' This table includes six alternatives, including fuel blend changes with a corresponding limit of 1.70 lbs/MMBtu (which forms the basis of the 197 tons as a 30-day rolling sum) and fuel blending plus polishing scrubber with a corresponding limit of 0.68 lb/MMBtu. The latter option will result in about 1,000 tons less SO_2 per year."

Response: The MPCA's baseline BART determination for Line 2 is a limit of 1.7 lbs/MMBtu. Comments about this limit were taken in 2009, and the MPCA determined that it remained an appropriate limit. Although EPA previously provided us with some comments on the BART determinations for power plants, the MPCA is unaware of EPA comments specifically supporting the 0.68 lb/MMBtu limit.

As noted in the memorandum, "United Taconite may choose to propose a BART Alternative project that is equivalent or better than BART." The limit that is proposed in the Supplemental SIP is based on a BART alternative approach. See response to Comment 1-J.

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414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

December 21, 2009

Ms. Catherine Neuschler
Environmental Analysis and Outcomes
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Re: Best Available Retrofit Technology ("BART") Determination for Sherburne County Generating Plant ("Sherco") Units 1 and 2

Dear Ms. Neuschler:

On October 21, 2009, the United States Department of Interior certified that a portion of the visibility impairment in Voyageurs and Isle Royale National Parks is reasonably attributable to pollution emissions from Xcel Energy's Sherco Plant (Units 1 and 2). The United States Environmental Protection Agency ("EPA") currently administers the 1980 Visibility Protection Rules for the State of Minnesota through a Federal Implementation Plan. As such, EPA Region 5 is required to make its own determination as to whether Sherco Units 1 and 2 cause or contribute to visibility impairment and if so, to determine the appropriate BART levels of control. As EPA begins asking the Minnesota Pollution Control Agency ("MPCA") questions regarding BART for Sherco Units 1 and 2, please keep in mind not only our willingness to provide additional information to the MPCA but also our hope for an opportunity to explain certain aspects directly to the EPA in a conference call or a meeting that includes MPCA. The following discussions address claims made by citizen groups, the federal land managers, or EPA regarding the Sherco BART analysis and Selective Catalytic Reduction ("SCR") technology.

1. Comment: Xcel Energy overestimated the cost for SCR.

Xcel Energy response: The SCR costs were not overestimated. The initial BART estimate, which was part of the BART analysis submitted to MPCA in October of 2006, was $86 million per unit. The estimates were based on EPA CUECost data with allowances for some site-specific aspects and retrofit factors, and should be considered as having initial conceptual level accuracy. The MPCA compared that estimated cost for installing SCR at Sherco to actual costs for the SCR at the Allen S. King plant. The Sherco estimate of $86 million in 2006 dollars lines up with the actual cost for the SCR at the King plant, which was $64 million for 2004-2005 contracts. Sherco Units 1 and 2 are each around 20 percent larger than the King plant unit. Actual reported escalation from 2004 to 2006 per the Chemical Engineering Plant Cost Index was 12.5 percent. On this basis, increasing the King cost of $64 million by 20 percent results in $76.8 million. Then adding the escalation of 12.5 percent results in $86.4 million.

SCR costs usually are much higher at existing units as compared to new construction. As EPA states in its "Guidelines for BART Determinations Under the Regional Haze Rule" (40 CFR 51, Appendix Y), "Physical modifications needed to resolve technical obstacles do not, in and of themselves, provide a justification for eliminating the control technique on the basis of technical infeasibility. However, you may consider the cost of such modifications in estimating costs. This, in turn, may form the basis for eliminating a control technology..."

Xcel Energy in late 2007 commissioned Sargent & Lundy, which provides engineering and design services to the power industry, to conduct an engineering study to further develop the overall scope, schedule, performance, and cost for a capacity increase and environmental emissions reduction program it proposed to the Minnesota Public Utilities Commission. As a part of that study effort Sargent & Lundy determined that installation of SCRs would be difficult due to space constraints from existing ductwork, coal handling conveyors, and wet scrubber facilities. Factors at Sherco that would add to SCR costs are: complications with structural support, interference with existing control equipment, staging installation on two units, and interference with other plant systems. The cost estimations from Sargent & Lundy were $100 million for Unit 1 and $105 million for Unit 2, in 2007 dollars.

Escalation of costs should be considered for SCR installations meeting commercial operation dates in the 2014-2015 timeframe. When the estimate was completed in late 2007 significant forward escalation in the industry was anticipated and a 5 percent per year rate was used. This resulted in the retrofit estimates being approximately $120 million per unit. Since then, major utility construction costs escalated upward from late 2007 through 2008 and went down in 2009, with the net result of nearly flat overall escalation from late 2007 to mid-2009 per the Chemical Engineering Plant Cost Index. Anticipated escalation from mid-2009 forward is now in the 2-3 percent per year range, so that the current capital cost estimate for SCR is approximately $110 to $122 million per unit.

The estimates developed in 2007 with Sargent & Lundy involved a significant amount of time and effort at the plant, and were developed with a much better level of detail than can occur with tools such as EPA's Control Cost Manual and CUECost. No design, however, was completed as part of this effort and the estimates should still be considered conceptual with regard to accuracy, likely in the $\pm$ 25 percent range.

2. Comment: MPCA has provided no rationale for allowing Xcel to avoid SCR installation at Sherco while requiring Minnesota Power to install SCR at its Boswell Unit 3.

<u>Xcel Energy response:</u> Minnesota Power volunteered to install an SCR for reasons beyond BART. The SCR is part of its Environmental Improvement Plan, which qualified for special rate recovery treatment. Minnesota Power's business decision to install SCR voluntarily does not mean SCR must be installed at Sherco.

3. Comment: Sherco can achieve 0.05 lb/mmBtu or lower with SCR.

<u>Xcel Energy response</u>: When comparing emission limits between different units, it is imperative to remember that each emissions unit is unique. Two tangentially fired boilers burning sub-bituminous coal and employing the same design of SCR will not necessarily have equal emissions rates. If emission limits are set without accounting for the emission rate variability that occurs when the unit and control equipment are properly run, then limits will not be met. Since BART limits are effective

during all times of operation, higher emissions during lower load operation and times of unit startup and shutdown are counted.

How a unit is operated, whether at steady state or continuously changing load to meet system demands, will also impact the performance of an SCR and the ability to meet permit limits. On a unit with SCR, it is very likely that the unit will be able to achieve relatively low NOx emissions if it operates at a steady load and is able to maintain optimal flue gas temperatures through an SCR. However, when a unit is called on to continuously change load to meet system demands, NOx emissions will be higher than at steady state operation. The cyclic operation brings a unit's flue gas out of the optimal temperature range of 700-780°F for SCR operation, significantly reducing NOx removal efficiency.

In 2009, Sherco Units 1 and 2 already cycle load many times each day to meet constantly changing customer demand and in response to wind variability. The available power from wind fluctuates greatly and Sherco is required to cycle up or down depending on the amount of wind on the system. Minnesota currently ranks first in the country with more than 7 percent of the state's power coming from wind energy. Minnesota statutes require Xcel Energy to further increase renewable energy on the system by generating 25 percent of its energy by wind energy conversion systems. Cycling therefore will increase substantially in the future, which will increase the difficulty in achieving low NOx emission rates. This operational reality drives the NOx emission rate higher as compared to a unit able to operate without cycling. NOx limits need to allow for how a unit must be operated to respond to continuous changes in electricity demand throughout the day and in available power from renewable energy, because electricity supply and demand must be balanced continuously.

4. Comment: Visibility impacts from Sherco on the Class I areas justify requiring SCR on these units.

Xcel Energy response: Xcel Energy performed visibility impact modeling for the proposed BART controls as well as for the SCR scenario. In this modeling, it was shown that at each Class I area the addition of SCR on both Units 1 and 2 would result in a visibility change of 0.16 to 0.28 deciviews ("dv") (defined as the 98th percentile delta dv). By definition, 1 dv is usually visually perceptible. Therefore a change of 0.16 to 0.28 dv is typically not perceptible, and spending hundreds of millions of dollars to achieve this level of visibility improvement does not make economic sense. EPA itself has recognized that where the reductions achievable by the best available technology are not sufficient to achieve any perceptible improvement in visibility, the State is not obligated to require such controls. *See* 45 Fed. Reg. 80084, 80087 (Dec. 2, 1980).

5. Comment: Xcel provided no reason why the technologies of Mobotec's Rotamix, LoTOx and ECOTUBE could not be transferred from similar, but smaller applications.

Xcel Energy response: Xcel Energy reviewed these technologies and determined that they had not yet been proven to be commercially available and not proven on Sherco-sized units. These technologies have not been successfully scaled up to 700+ MW units. Xcel Energy is committed to using commercially available, proven control technologies to maximize the investments made for our customers and shareholders. Xcel Energy's customers and shareholders should not be required to pay the development costs to scale up these technologies while other cost-effective, commercially proven technologies exist. In general, Xcel Energy considers scale-up of any technology more than two to three times what has achieved proven operation capability to be imprudent and very risky.

Please contact either me at 612-330-7879 or Nancy Glass of my staff at 612-330-5520 with any questions you have on our comments. Xcel Energy looks forward to the opportunity for further participation in the BART process with EPA, MPCA and the Federal Land Managers.

Sincerely,

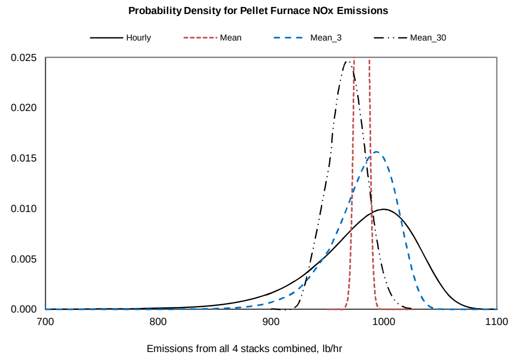
Richard Rosvold

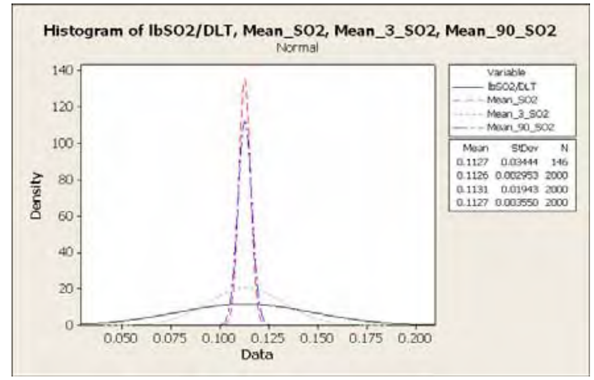
Richard Rosvold
Manager, Air Quality

C: Mary Dieltz
Nancy Glass
Environmental Services Record Center

NOx, lb/hr	Hourly	Mean	Mean_3	Mean_30	Z for 95% C.I. (of the Mean)	Z_{30_mean}
700	2.49E-06		2.31E-08			
725	6.20E-06		9.81E-08			
750	1.49E-05		3.96E-07			
775	3.50E-05		1.53E-06			
800	7.97E-05		5.63E-06			
825	1.77E-04		2.00E-05			
850	3.81E-04		6.82E-05			
875	7.97E-04		2.24E-04			
900	1.61E-03		7.06E-04	3.65E-06		-4.2
925	3.08E-03		2.11E-03	7.30E-04		-2.7
950	5.43E-03	1.62E-13	5.71E-03	1.34E-02	-7.4	-1.1
955	5.99E-03	6.09E-10	6.83E-03	1.79E-02	-6.1	-0.8
960	6.58E-03	5.19E-07	8.09E-03	2.19E-02	-4.9	-0.5
965	7.17E-03	1.00E-04	9.47E-03	2.43E-02	-3.7	-0.2
968	7.53E-03	1.15E-03	1.03E-02	2.47E-02	-3.0	0.0
970	7.76E-03	4.37E-03	1.09E-02	2.45E-02	-2.5	0.1
972	7.99E-03	1.31E-02	1.15E-02	2.39E-02	-2.0	0.3
974	8.21E-03	3.08E-02	1.21E-02	2.30E-02	-1.5	0.4
976	8.43E-03	5.73E-02	1.26E-02	2.18E-02	-1.0	0.5
978	8.63E-03	8.40E-02	1.32E-02	2.03E-02	-0.5	0.6
979	8.74E-03	9.30E-02	1.34E-02	1.95E-02	-0.3	0.7
980	8.83E-03	9.71E-02	1.37E-02	1.87E-02	-0.1	0.7
980.2	8.86E-03	9.72E-02	1.38E-02	1.85E-02	0.0	0.8
981	8.93E-03	9.55E-02	1.39E-02	1.78E-02	0.2	0.8
982	9.02E-03	8.85E-02	1.42E-02	1.69E-02	0.4	0.9
984	9.20E-03	6.36E-02	1.46E-02	1.50E-02	0.9	1.0
986	9.36E-03	3.60E-02	1.50E-02	1.32E-02	1.4	1.1
988	9.50E-03	1.61E-02	1.53E-02	1.14E-02	1.9	1.2
990	9.63E-03	5.68E-03	1.55E-02	9.70E-03	2.4	1.4
992	9.73E-03	1.58E-03	1.56E-02	8.13E-03	2.9	1.5
993.2	9.79E-03	6.36E-04	**1.56E-02**	7.23E-03	3.2	1.6
995	9.85E-03	1.48E-04	1.56E-02	6.06E-03	3.6	1.7
997	9.90E-03	2.27E-05	1.54E-02	4.89E-03	4.1	1.8
999.6	**9.92E-03**	1.41E-06	1.50E-02	3.62E-03	4.7	2.0
1000	9.92E-03	8.74E-07	1.49E-02	3.44E-03	4.8	2.0
1004	9.85E-03	4.94E-09	1.39E-02	2.04E-03	5.8	2.2
1008	9.66E-03	1.08E-11	1.23E-02	1.14E-03	6.8	2.5
1012	9.34E-03	9.14E-15	1.04E-02	5.98E-04	7.7	2.7
1016	8.90E-03	2.99E-18	8.32E-03	2.96E-04	8.7	3.0
1020	8.34E-03	3.78E-22	6.19E-03	1.37E-04	9.7	3.2
1025	7.50E-03	1.33E-27	3.82E-03	4.83E-05	10.9	3.5
1030	6.52E-03		2.02E-03			
1035	5.47E-03		8.85E-04			
1040	4.41E-03		3.10E-04			
1045	3.39E-03		8.25E-05			
1050	2.47E-03		1.58E-05			
1055	1.70E-03		2.01E-06			
1060	1.10E-03		1.58E-07			
1070	3.64E-04		1.49E-10			
1080	8.28E-05		4.41E-15			
1090	1.18E-05		8.72E-22			
1100	9.29E-07		1.22E-31			

Two types of curves *
Hourly: Weibull Distribution
Mean: Normal Distribution
Mean_3: Weibull Distribution
Mean_30: ~ Normal Distribution
* Last 3 curves by bootstrapping.





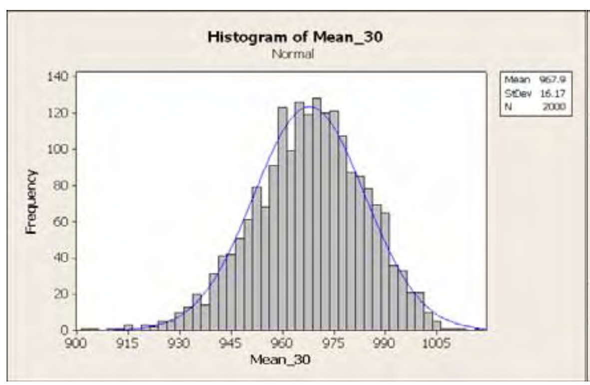
The graph above is for SO2 data from the same furnace....

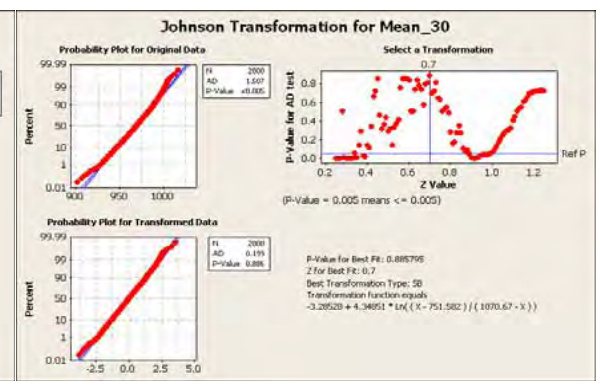
NOx, lb/hr	Hourly	Mean	Mean_3	Mean_30		
Parameter 1	26.97	980.2	42.15	967.9	<== Paramter 1	
Parameter 2	1001	4.10	993.8	16.17	<== Paramter 2	
		972.3	922.0	967.0	Left 0.025 calc from Hourly, assuming a normal distribution	
		988.2	1038.6	993.5	Right 0.025 calc from Hourly, assuming a normal distribution	
	873.0	972.2	910.4	936.2	Left 0.025 with bootstrap outcome	934.5
	1051.1	988.3	1025.2	999.6	Right 0.025 with bootstrap outcome	997.5
Actual min	732.1	965.0	848.0	902.0	Actual min in bootstrap data	Improved estimates
Actual max	1060.4	995.9	1044.8	1016.3	Actual max in bootstrap data	with a Johnson
Distribution	Weibull	Normal	Weibull	Normal	These were determined using Minitab 15	Transformation
		B=1500	B=2000	B=2000	Bootstrap sample sizes used	

lbSO2/DLT	Hourly	Mean	Mean_3	Mean_30	
Parameter 1	0.113	0.113	0.113	0.113	<== Paramter 1
Parameter 2	0.034	0.003	0.019	0.004	<== Paramter 2
		0.107	0.073	0.104	Left 0.025 calc from Hourly, assuming a normal distribution
		0.118	0.152	0.122	Right 0.025 calc from Hourly, assuming a normal distribution
	0.044	0.107	0.075	0.106	Left 0.025 with bootstrap outcome
	0.181	0.118	0.151	0.120	Right 0.025 with bootstrap outcome
Actual min	0.038	0.104	0.055	0.102	Actual min in bootstrap data
Actual max	0.206	0.122	0.172	0.124	Actual max in bootstrap data
Distribution	Normal	Normal	Normal	Normal	These were determined using Minitab 15
		B=2000	B=2000	B=2000	Bootstrap sample sizes used

References

1. "An Introduction to the Bootstrap," by Efron and Tibshirani. © 1993, by Chapman & Hall.
2. For Johnson Transformation, see "Statistical Models in Engineering," by Hahn and Shapiro. © 1967, by John Wiley & Sons, pp. 198-220.





Minnesota Pollution Control Agency
520 Lafayette Road North | St. Paul, MN 55155-4194 | 651-296-6300 | 800-675-3843 | 651-282-5332 TTY | www.pca.state.mn.us

October 20, 2009

Mr. Jonathan Holmes
Vice President / Operations Manager
ArcelorMittal Minorca Mine
5950 Old Highway 53 North
Virginia, MN 55792

RE: Alternative Method Proposal

Dear Mr. Holmes:

The Minnesota Pollution Control Agency (MPCA) and ArcelorMittal Minorca Mine, Inc. (ArcelorMittal) signed an Administrative Order by Consent (AO) to address the methods to monitor emissions of Nitrogen Oxides (NO_X). This AO took effect on January 22, 2009.

As required by the AO, ArcelorMittal submitted its Alternative Method Proposal which the MPCA received on February 20, 2009. With this letter, the MPCA responds to this proposal. The MPCA:

- Acknowledges that ArcelorMittal submitted an Alternative Method proposal for its pellet furnace within 30 days of the effective date of the AO.
- Agrees that the relative variability index (RVI) is low.
- Agrees with the emission factor of 994 lb NO_X per hour for the purpose of reporting ArcelorMittal's NO_X emissions in compliance with the Administrative Order." (This agreement does not authorize ArcelorMittal use of this emission factor for other purposes; those approvals must be sought separately.)

Paragraph 10(e) of the AO requires a description of and a schedule for quality assurance and quality control methods by which the ArcelorMittal will ensure the continuing validity of the data collected for the RVI determination. This includes (a) the confirmation of the NO_X emission factor with a standard three-hour stack test once every two years; and (b) the quarterly submittal of relevant hourly average operating parameters to demonstrate that operating conditions continue to be within the range established using operating parameter data collected during testing under paragraph 10.

As an initial step toward fulfilling item (a), ArcelorMittal conducted a performance tests for NO_X emissions from its indurating furnace between March 31, 2009, and April 2, 2009. These tests resulted in an average emission rate of 813 lb NO_X/hr. ArcelorMittal shall continue to confirm the NO_X emission factor of 994 lb/hr with a standard three-hour stack test by June 29, 2011, and every two years thereafter. (This also fulfills a requirement in Air Emission Permit No. 13700062-002 for ArcelorMittal's facility.) To address item (b), ArcelorMittal committed to monitoring the Firing Chamber Gas Flow Rate (A+B) and the Preheat Gas Flow Rate (both in mmcf/hr) in the letter received by the MPCA on February 20, 2009. ArcelorMittal should continue to monitor these parameters for the life of the AO.

Please refer to paragraph 12.a) – c) of the AO for other ongoing requirements. If you have any comments or questions, please contact Dick Cordes by telephone at 651-757-2291 or by electronic mail at richard.cordes@state.mn.us. Thank you.

Sincerely,

Richard Cordes

Richard Cordes, P.E.
Senior Engineer
Metallic Mining Sector
Industrial Division

RC:rm

cc: Jaime Bagenstoss, ArcelorMittal
Mike Long, ArcelorMittal
Bob Beresford, MPCA-Duluth
Andy Place, MPCA
Hongming Jiang, MPCA
Catherine Neuschler, MPCA
AQD File No. 257

HIBBING TACONITE COMPANY
Managed by Cliffs Mining Company
4950 County Highway 5 North, PO Box 589, Hibbing, MN 55746-0589
P 218.262.5950 cliffsnaturalresources.com

December 30, 2010 Certified Mail # 7004 1350 0001 2783 9440

Ms. Catherine Neuschler
Environmental Analysis & Outcomes Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Re: Revised Alternative Method Proposal for Hibbing Taconite Company Furnace Lines 1-3

Dear Ms. Neuschler:

The purpose of this letter is to provide the Minnesota Pollution Control Agency (MPCA) with Hibbing Taconite Company's (HTC's) revised Alternative Method Proposal for Furnace Lines 1-3.

In accordance with terms of the Administrative Order by Consent effective March 3, 2008, HTC had previously submitted Alternative Method Proposals for each furnace line to the MPCA. The proposals were based upon completion of a 150-hour continuous NOx performance test for each furnace line under a range of predetermined operating conditions. In particular, HTC selected a series of 7-12 operating conditions for testing on each furnace line, with each condition ranging in duration from 8 to 24 hours. Selection of the specific operating conditions took place in order to force NOx emission variability for purposes of establishing a predictive emission monitoring system. Also, it should be noted that operating the furnace lines under some of the selected conditions resulted in an inability to maintain HTC's fired pellet quality specifications.

Recognizing the fact that the 2008 Alternative Method Proposals were formulated based upon forced NOx emission variability not typically observed during normal operation of Furnace Lines 1-3, during 2010 HTC communicated to the MPCA a request to complete additional NOx performance testing in order to accurately determine NOx emission variability under normal furnace operating conditions. Following approval of a performance test plan by MPCA, HTC tested each furnace line while producing both standard and high compression pellets, which are HTC's two normal furnace operating conditions. In total, testing of Furnace Lines 1-3 resulted in the collection of 343, 231, and 320 validated hourly data points, respectively, which included 71-172 hourly data points for each operating condition. As expected, completion of the aforementioned testing has allowed HTC to demonstrate that normal furnace line operations are associated with low NOx emission variability.

The enclosed Alternative Method Proposal contains a detailed summary of the recently completed NOx performance testing, as well as HTC's determination of low NOx emission variability for each furnace line as defined by the Administrative Order by Consent.

If you have any questions regarding this matter, please contact me at (218) 262-5970 or andrew.mcdowell@cliffsnr.com.

Sincerely,
Hibbing Taconite Company

Andrew S. McDowell

Andrew S. McDowell
Environmental Manager

Cc: Ed LaTendresse, HTC
Scott Gischia, Cliffs
Andy Place, MPCA

Enclosure

HIBBING TACONITE COMPANY
Managed by Cliffs Mining Company
4950 County Highway 5 North, PO Box 589, Hibbing, MN 55746-0589
P 218.262.5950 cliffsnaturalresources.com

Revised Alternative Method Proposal for Hibbing Taconite Company Furnace Lines 1-3

Revision Date: December 30, 2010

The Administrative Order by Consent, effective March 3, 2008, signed by the Minnesota Pollution Control Agency (MPCA) and Hibbing Taconite Company (HTC) states under item # 8:

Hibtac agrees to undertake the testing and analyses set forth below to provide the MPCA with data to determine whether an Alternative NOx Emissions Measurement Method is approvable by the MPCA and agrees to implement the Alternative Method, if it is approved by the MPCA.

This document serves as HTC's revised Alternative Method Proposal for Furnace Lines 1-3, as defined in items 10.a-g of the Administrative Order by Consent.

Administrative Order Part l0.a:

The data points recorded during emissions testing conducted for these parameters at a minimum: ferrous iron content of the feed materials, pellet type, production rate, heat input, stack gas flow rate, and combustion zone temperature. Data for other parameters shall be submitted if Hibtac determines they are relevant to NOx formation. If the MPCA determines that any further parameters that are currently measured are relevant to NOx formation, those parameters shall be added to the list of operating parameters recorded and submitted.

Administrative Order Part l0.b:

Hibtac shall submit all results of the testing to the MPCA. If Hibtac believes that any data resulting from the testing is not valid, Hibtac shall include an explanation of why it believes the data is not valid with the test report and test data. All data shall be provided in an unlocked electronic spreadsheet.

The spreadsheets on the enclosed CD-ROM titled "Line 1 NOx Hourly Data.xlsx", "Line 2 NOx Hourly Data.xlsx", and "Line 3 NOx Hourly Data.xlsx" contain the NOx emission data from Barr Engineering Company (Barr), as well as HTC's internally recorded process data. Rows highlighted in yellow indicate periods when Barr personnel were completing calibrations, moisture checks, and other minor equipment maintenance during the course of performance testing, as well as any notable process upsets. Rows highlighted in red indicate periods of process upsets associated with abnormal furnace operating conditions, with this data classified as non-representative and excluded from further calculations.

Within each spreadsheet tab titled “Standard Pellet Data” and “High Compression Data”, columns C-CC contain the NOx emission data from Barr, while columns CG-DJ contain the parameters measured internally by HTC. It should be noted that all data was reduced from one-minute to hourly averages, with validated hourly data points marked with a “Yes” in column A. HTC has considered a valid hour of data to be: where the furnace is operating in controlled (not upset) conditions and where valid NOx data is collected.

As detailed in the Alternative Method Proposals submitted to and approved by the MPCA in 2008, HTC originally completed a 150-hour continuous NOx performance test for each furnace line under a range of predetermined operating conditions. In particular, HTC selected a series of 7-12 operating conditions for testing on each furnace line, with each condition ranging in duration from 8 to 24 hours. Selection of the specific operating conditions took place in order to force NOx emission rate variability for purposes of establishing a predictive emission monitoring system. Also, it should be noted that operating the furnace lines under some of the conditions resulted in an inability to maintain fired pellet quality specifications.

In 2010 HTC communicated to the MPCA a request to complete additional NOx performance testing in order to accurately determine NOx emission variability under normal furnace operating conditions. Following approval of a performance test plan by MPCA, HTC selected two operating conditions (standard and high compression pellet production modes) for testing on each furnace line, with each condition ranging in duration from 71-172 hours.

As previously mentioned, the test scenarios for each furnace line were defined as follows:

1. Standard Pellet Production Mode
2. High Compression Pellet Production Mode

Overall, considerably more than the requisite 150 hourly data points were collected for each furnace line, with 343, 231, and 320 hourly data points collected for Furnace Lines 1-3, respectively. Also, the testing for each furnace line was completed without any major challenges, with the exception of an extended process upset that occurred midway through the Furnace Line 2 standard pellet test.

Administrative Order Part l0.c:

Hibtac shall analyze the calculated hourly NOx concentration for each furnace weighted by stack flow rate and determine the relative variability index (RVI) for the data set. The variability of the stack-flow weighted NOx concentration for each furnace will be quantified by a RVI, which is defined by the MPCA as the ratio of the width of a 95 percent prediction interval to the center of the interval. The stack-flow weighted NOx concentration for each hourly data point shall be calculated as follows:

$$[NOx]_{F,j} = \frac{\sum_{i=1}^{4} [NOx]_{i,j} \ flow_{i,j}}{\sum_{i=1}^{4} flow_{i,j}}$$

Where:
$[NOx]_{F,j}$ is the flow-weighted concentration, ppmvd, at the j^{th} hour, j = 1, 2, …, 150 or higher;
$[NOx]_{i,j}$ is the measured concentration, ppmvd, of the i^{th} stack at the j^{th} hour, i = 1 to 4;
$flow_{i,j}$ is the measured gas flow rate in dscfm of the i^{th} stack at the j^{th} hour, i = 1 to 4.

As discussed above relative to Part 10.a and 10.b, testing occurred while each furnace line was operating in standard and high compression pellet production modes, which represent HTC's two distinct current and historical operating conditions. Consequently, separate RVIs were calculated for each production mode on each furnace line. The RVI calculations are contained within the spreadsheet tabs titled "Standard Pellet RVI" and "High Compression Pellet RVI", with results for all three furnace line summarized as follows:

Operating Scenario	Parameter	Furnace Line 1	Furnace Line 2	Furnace Line 3
Standard Pellet Production	Furnace Flow Weighted NOx Concentration	76.69	125.03	62.36
	95% Prediction Interval	6.70	8.15	2.74
	Relative Variability Index	0.17	0.13	0.09
High Compression Pellet Production	Furnace Flow Weighted NOx Concentration	92.75	157.47	70.75
	95% Prediction Interval	7.14	6.77	3.53
	Relative Variability Index	0.15	0.09	0.10

Based on the information presented above, the RVI is considered to be low for Furnace Lines 1-3.

Administrative Order Part l0.d:

If the RVI for the data is high, then Hibtac may evaluate whether operating parameters (predictors) can be used to predict NOx concentration for each stack, from which hourly mass rate emissions in pounds per hour can be calculated using hourly stack gas flow rate measurement. The MPCA will accept a multiple regression-based predictive equation for each stack for NOx emission calculation, if: 1) the residual standard deviation of the random *differences between the actual measured concentration and the regression equation predicted value divided by the average NOx concentration is less than or equal to 0.09 at the midpoint of the predicted concentration; 2) the predictors used in the regression equations incorporate, either directly or by proxy, significant plant parameters that could affect the NOx concentration; and 3) the leverage is not large, as determined by the MPCA (leverage is a measure used by statisticians to identify the extent to which the predictors are extrapolations). All supporting calculations and data used in developing the predictive equation shall be provided to the MPCA.*

As presented in Part 10.c, the RVI is low for Furnace Lines 1-3 and as such, a predictive equation approach is not required.

Administrative Order Part l0.e:

A description of and schedule for quality assurance and quality control methods by which Hibtac will ensure the continuing validity of the data collected for RVI determination or for the calibration of the predictive equation. The description shall include at a minimum: annual extended method 7E emissions testing with justification for the proposed duration of testing, and the quarterly submittal of relevant hourly operating parameters to demonstrate that operating conditions continue to be 1) within the range of the data collected during testing under Part 10, if the RVI is low or 2) within the range of data collected during calibration testing of a predictive equation, if the RVI is high. If the RVI is high and a predictive equation is used, Hibtac shall provide a protocol consistent with U.S. EPA's monitoring protocol for an industrial furnace Predictive Emission Monitoring System. The protocol is available at: http://www.epa.gov/ttn/emc/cem/furnace.pdf.

Quality Control Methods

Annually Required Retesting

Stacks: Furnace Lines 1, 2, and 3 (Continuous Testing of All Four Stacks per Line)

Method: Method 7E (Modified for Extended Duration)

Duration: 30 One-Hour Data Points

Justification: Standard statistical methods require a 30-point dataset of ‘continuous’ data from which to draw meaningful statistical information.

Frequency: Once per Calendar Year

Submittals

- Operating parameter summaries will continue to be submitted quarterly. Summaries shall describe the typical operating ranges of Furnace Lines 1-3.

- Performance test data will be submitted to the MPCA within 60 days of completion of the annually required retesting. The test report will include a comparison of data collected during the test to past extended test data.

Administrative Order Part l0.f:

A schedule for installation and certification of permanent stack gas flow monitors such that installation and certification occurs no later than November 30, 2008.

Currently the MPCA has approved an extension of the flow monitor installation / certification deadline to occur by December 31, 2010, to allow for completion of the aforementioned NOx performance testing as well as further investigation regarding the technical feasibility of stack gas flow monitors. In a letter dated December 14, 2010, HTC requested an extension of the December 31, 2010 deadline; MPCA consideration of HTC's extension request is currently in progress.

Administrative Order Part l0.g:

If the RVI is high and a predictive equation is used, a schedule for installation of a readout in the pellet furnace operator control room with the predicted hourly NOx emissions such that installation occurs no later than November 30, 2008.

Please see discussion under Part 10.c. The RVI is low for Furnace Lines 1-3 and as such, a predictive equation is not required.

Similar to the terms of the Administrative Order, HTC will abide by the conditions of this proposal, upon approval from MPCA, until these conditions, or appropriate alternatives, are incorporated into HTC's Title V air permit. Also, any conditions in this proposal may be amended by the written agreement of both MPCA and HTC.

Cleveland-Cliffs

June 30, 2008

Mr. Robert Beresford
Minnesota Pollution Control Agency
525 Lake Avenue South
Suite 400
Duluth, MN 55802

Re: Alternative Method Proposal for Furnaces 11 and 12

Dear Mr. Beresford,

The *Administrative Order by Consent*, effective April 7, 2008, signed by the Minnesota Pollution Control Agency (MPCA) and Northshore Mining Company (NSM), states under item # 8:

The Regulated Party agrees to undertake the testing and analyses set forth below to provide the MPCA with data to determine whether an Alternative NOx Emissions Measurement Method is approvable by the MPCA and agrees to implement the Alternative Method, if it is approved by the MPCA.

This document serves as the *Alternative Method Proposal* for Furnaces 11 and 12, as defined in items 10.a.-g. of the *Administrative Order by Consent*.

Administrative Order Part 10a:

The data points recorded during emissions testing conducted for these parameters at a minimum: ferrous iron content of the feed materials, pellet type, production rate, heat input, stack gas flow rate, and combustion zone temperature. Data for other parameters shall be submitted if the Regulated Party determines they are relevant to NOx formation. If the MPCA determines that any further parameters that are currently measured are relevant to NOx formation, those parameters shall be added to the list of operating parameters recorded and submitted.

Northshore Mining Company
10 Outer Drive
Silver Bay, MN 55614

218.226.4125 PH
218.226.6037 FAX

Administrative Order Part 10b:

The Regulated Party shall submit all results of the testing to the MPCA. If the Regulated Party believes that any data resulting from the testing is not valid, the Regulated Party shall include an explanation of why it believes the data is not valid with the test report and test data. All data shall be provided in an unlocked electronic spreadsheet.

The spreadsheet on the enclosed CD-ROM titled *Barr 2008 Fce 11 and 12 data.xls* represents the dataset from Barr Engineering. Column X indicates data flags that indicate periods when Barr Engineering personnel were completing calibrations, moisture checks, and other minor equipment maintenance in the middle of stack testing, as well as any notable process upsets. Rows highlighted yellow in these datasets are ones that have been excluded from further calculations as non-representative due to process upsets where the furnace operations were temporarily halted.

The parameters measured internally at Northshore during the stack test can be found in the spreadsheet on the same CD-ROM titled *Hourly Validated Process Data.xls*. In these spreadsheets, relevant process data has been summarized for valid periods of NOx data collection. Northshore has considered a valid hour of data to be: Where the furnace is operating in controlled (not upset) conditions and where valid NOx data is being collected.

To determine the sources of variation within the NOx emissions, it was necessary for Northshore to introduce controlled variation into the seven day test. Controlled variation was introduced through implementation of the eight scenarios below. Northshore ran each scenario for approximately 12-18 hours. In between each condition on the spreadsheet, there may be a section noted as "Transition" rather than a condition number. These periods represent the time required to re-stabilize the furnace operations after a condition change. Actual transitions in the furnace are relatively uncommon and in terms of actual operations, make up an insignificant amount of operating time. For this reason, transition periods were not included in RVI calculations.

The test scenarios were defined as follows:

1. High Temperature
2. Low Temperature
3. High Tonnage
4. Low Tonnage
5. Thick bed depth
6. Thin bed depth
7. High Firebox Pressure
8. Low Firebox Pressure

Overall, more than the requisite 150 data points were collected for each furnace. The Furnace 12 test ran very smoothly overall. The Furnace 11 test was challenged by some operating issues outside the control of the test that made it difficult to maintain the scenarios as evenly as during the Furnace 12 test.

Administrative Order Part 10.c:

The Regulated Party shall analyze the calculated hourly NOx concentration for each furnace weighted by stack flow rate and determine the relative variability index (RVI) for the data set. The variability of the stack-flow weighted NOx concentration for each furnace will be quantified by a RVI, which is defined by the MPCA as the ratio of the width of a 95 percent prediction interval to the center of the interval. The stack-flow weighted NOx concentration for each hourly data point shall be calculated as follows:

$$[NOx]_{F,j} = \frac{\sum_{i=1}^{4} [NOx]_{i,j}\ flow_{i,j}}{\sum_{i=1}^{4} flow_{i,j}}$$

Where:
$[NOx]_{F,j}$ is the flow-weighted concentration, ppmvd, at the j^{th} hour, j = 1, 2, ..., 150 or higher;
$[NOx]_{i,j}$ is the measured concentration, ppmvd, of the i^{th} stack at the j^{th} hour, i = 1 to 4;
$flow_{i,j}$ is the measured gas flow rate in dscfm of the i^{th} stack at the j^{th} hour, i = 1 to 4.

If the RVI for the $[NOx]_{Fj}$ data is less than or equal to 0.20, then variability will be considered to be "low". If the relative variability is greater than 0.20, then variability will be considered to be "high".

As discussed above relative to Part 10.a and 10.b, Northshore intentionally introduced controlled variation into the extended test period to attempt to determine the sources of NOx variation in the furnaces. Also, as discussed above, introduction of controlled variation during the 7-day test period represented a much higher degree of change to furnace operations than is normally seen. As such, the RVI was calculated for each scenario rather than the entire span of data which would be non-representative of actual operations. The RVI data are presented below in Table 10.c.1.

Table 10.c.1: Furnace RVI Calculations

Scenario	Value	Furnace 11	Furnace 12
1	FWA Concentration	52	56
	PI	4	4
	RVI	0.14	0.14
2	FWA Concentration	45	45
	PI	3	3
	RVI	0.14	0.12
3	FWA Concentration	48	43
	PI	3	2
	RVI	0.14	0.09

4	FWA Concentration	45	43
	PI	4	2
	RVI	0.17	0.09
5	FWA Concentration	44	43
	PI	4	1
	RVI	0.17	0.04
6	FWA Concentration	50	48
	PI	5	2
	RVI	0.20	0.07
7	FWA Concentration	47	47
	PI	3	3
	RVI	0.13	0.12
8	FWA Concentration	46	45
	PI	2	2
	RVI	0.11	0.11

Based on the information presented above, the RVI is considered to be low for both Furnaces 11 and 12.

Administrative Order Part 10d:

If the RVI for the data is high, then the Regulated Party may evaluate whether operating parameters (predictors) can be used to predict NOx concentration for each stack, from which hourly mass rate emissions in pounds per hour can be calculated using hourly stack gas flow rate measurement. The MPCA will accept a multiple regression-based predictive equation for each stack for NOx emission calculation, if: 1) the residual standard deviation of the random differences between the actual measured concentration and the regression equation predicted value divided by the average NOx concentration is less than or equal to 0.09 at the midpoint of the predicted concentration; 2) the predictors used in the regression equations incorporate, either directly or by proxy, significant plant parameters that could affect the NOx concentration; and 3) the leverage is not large, as determined by the MPCA (leverage is a measure used by statisticians to identify the extent to which the predictors are extrapolations). All supporting calculations and data used in developing the predictive equation shall be provided to the MPCA.

As presented in Part 10.c, the RVI is low for both Furnaces 11 and 12 and as such, a predictive equation approach is not required.

Administrative Order Part 10e:

A description of and schedule for quality assurance and quality control methods by which the Regulated Party will ensure the continuing validity of the data collected for RVI determination or for the calibration of the predictive equation. The description shall include at a minimum: annual extended method 7E emissions testing with justification for the proposed duration of testing, and the quarterly submittal of relevant hourly operating parameters to demonstrate that operating conditions continue to be 1) within the range of the data collected during testing under Part 10, if the RVI is low or 2) within the range of data collected during calibration testing of a predictive equation, if the RVI is high. If the RVI is high and a predictive equation is used, the Regulated Party shall provide a protocol consistent with US EPA's monitoring protocol for an industrial furnace Predictive Emission Monitoring System. The protocol is available at: http://www.epa/gov/ttn/emc/furnace.pdf.

Quality Control Methods

Annually Required Retesting:

Stacks:	Furnace 11 and 12 waste gas stacks (1104, 1105, 1204, 1205)
Method:	Modified Method 7E (modified for extended duration)
Duration:	30 1-hour datapoints
Justification:	Standard statistical methods require a 30-point dataset of 'continuous' data from which to draw meaningful statistical information.
Frequency:	Once per calendar year

Submittals:

- Operating parameter summaries will be submitted quarterly, beginning with data from the 3rd quarter of 2008. Summaries will be submitted no later than 30 days after the end of quarter. Summaries shall describe the typical operating ranges of Furnaces 11 and 12 with respect to furnace operating temperature and fuel consumption.

- Stack testing data will be submitted to the MPCA within 60 days of completion of the annually required retesting. The test report will include a comparison of data collected during the test to past extended test data.

Administrative Order Part 10f:

A schedule for installation and certification of permanent stack gas flow monitors such that installation and certification occurs no later than November 30, 2008.

The proposed schedule for acquisition and installation of the airflow monitors required for Furnaces 11 and 12 is as follows:

Project Planning

Project Approval: Complete

Equipment Selection:	Complete
Device Purchase and Acquisition:	Flowmeters to be ordered during week of June 30, 2008. Expected arrival around September 1, 2008.

Installation and Commissioning

Conduit and Wiring:	August 2008
Ports / Mounting Flanges:	Install during week of October 6 (plant outage)
Airflow monitors:	Install during week of October 13
Startup:	October 15, 2008
Verification Testing:	November 2008

Administrative Order Part 10g:

If the RVI is high and a predictive equation is used, a schedule for installation of a readout in the pellet furnace operator control room with the predicted hourly NOx emissions such that installation occurs no later than November 30, 2008.

Please see discussion under Part 10.c. The RVI is low for Furnaces 11 and 12 and as such, a predictive equation is not required.

Similar to the terms of the Administrative Order, Northshore will abide by the conditions of this proposal, upon approval from MPCA, until these conditions, or appropriate alternatives, are incorporated into Northshore's air permit. Also, any conditions in this proposal may be amended by the written agreement of both MPCA and Northshore.

It is understood by Northshore Mining Company that the MPCA will either approve or disapprove the use of this Alternative Method Proposal by August 31, 2008.

If you have any questions regarding the information in this letter, please contact me at your convenience.

Sincerely,

Scott A. Gischia, P.E.
Section Manager, Environmental Services

Cc: Michael Mlinar, Northshore
David Cartella, Cleveland-Cliffs

Arcelor Mittal Mining - Data for NO_X BART Limit on Indurating Furn		
	Original Data	Correction
Average	994.1	994.1
St Dev	31.2	31.2
Max	1060.5	1060.4
Min	909.4	909.4
Count	157	39
$t_{0.05, c-1}$	1.98	2.02
UPL 95%	1006.405	1018.654
$t_{0.01, c-1}$	2.61	2.71
UPL 99%	1010.341	1026.986
Auto Correlation	0.6	
"Effective N"	39.3	
"Effective M"	7.5	

Hibbing Taconite - Data for NO_X BART Limit on Indurating Furnaces

Line 1 - High Compression				Line 2 - High Compression				Line 3 - High Compression		
	Original Data	Correction			Original Data	Correction			Original Data	Correction
Average	428.02	428.02		Average	711.46	711.46		Average	326.25	326.25
St Dev	37.95	37.95		St Dev	51.35	51.35		St Dev	23.41	23.41
Max	470.84	470.84		Max	765.20	765.20		Max	355.76	355.76
Min	207.96	207.96		Min	249.00	249.00		Min	134.97	134.97
Count	190	91		Count	179	4		Count	178	33
$t_{0.05, c-1}$	1.973	1.99		$t_{0.05, c-1}$	1.973	3.18		$t_{0.05, c-1}$	1.97	2.04
UPL 95%	442.73	449.66		UPL 95%	719.92	894.17		UPL 95%	335.37	347.46
$t_{0.01, c-1}$	2.602	2.63		$t_{0.01, c-1}$	2.604	3.50		$t_{0.01, c-1}$	2.60	2.63
UPL 99%	447.42	456.69		UPL 99%	722.63	912.37		UPL 99%	338.28	353.59
Autocorrelation		0.35		Autocorrelation		0.96		Autocorrelation		0.69
Effective "N"		91.48		Effective "N"		3.65		Effective "N"		32.65
Effective "M"		14.44		Effective "M"		0.61		Effective "M"		5.50
Line 1 - Standard				Line 2 - Standard				Line 3 - Standard		
	Original Data	Correction			Original Data	Correction			Original Data	Correction
Average	376.10	376.10		Average	545.98	545.98		Average	285.69	285.69
St Dev	23.53	23.53		St Dev	38.04	38.04		St Dev	30.76	30.76
Max	423.20	423.20		Max	630.71	630.71		Max	423.20	423.20
Min	275.72	275.72		Min	437.07	437.07		Min	275.72	275.72
Count	198	26		Count	162	13		Count	193	59
$t_{0.05, c-1}$	1.973	2.06		$t_{0.05, c-1}$	1.973	2.18		$t_{0.05, c-1}$	1.973	2.00
UPL 95%	385.19	402.18		UPL 95%	719.92	608.93		UPL 95%	297.60	307.72
$t_{0.01, c-1}$	2.602	2.80		$t_{0.01, c-1}$	2.604	3.05		$t_{0.01, c-1}$	2.604	2.66
UPL 99%	388.09	411.44		UPL 99%	722.63	634.24		UPL 99%	301.41	315.01
Autocorrelation		0.77		Autocorrelation		0.85		Autocorrelation		0.53
Effective "N"		25.73		Effective "N"		13.14		Effective "N"		59.29
Effective "M"		3.90		Effective "M"		2.43		Effective "M"		9.22
				Line 2 - All Data						
					Original Data	Correction				
				Average	550.70	550.70				
				St Dev	141.90	141.90				
				Max	765.20	765.20				
				Min	249.00	249.00				
				Count	518	11				
				$t_{0.05, c-1}$	1.965	2.36				
				UPL 95%	566.76	906.59				
				$t_{0.01, c-1}$	2.604	3.50				
				UPL 99%	571.99	1077.40				
				Autocorrelation		0.97				
				Effective "N"		7.89				
				Effective "M"		0.61				

Northshore Mining - Data for NO_X BART Limit on Indurating Furnaces						
		Furnace 11			Furnace 12	
		Original Data	Correction		Original Data	Correction
	Average	111.1	111.1		97.8	97.8
	St Dev	8.7	8.7		10.3	10.3
	Max	130.4	130.4		130	130
	Min	73.5	73.5		87.5	87.5
	Count	176	20		158	16
	$t_{0.05, c-1}$	1.97	2.09		1.98	2.13
	UPL 95%	114.492	122.374		101.852	111.612
	$t_{0.01, c-1}$	2.60	2.86		2.61	2.95
	UPL 99%	115.575	126.510		103.149	116.896
	Auto Correlation	0.8			0.82	
	"Effective N"	19.6			15.6	
	"Effective M"	3.3			3.0	

Attachment C: Comments Submitted to MPCA Citizens' Board

Dear MPCA Citizens Board Members:

The Forest Service appreciates the attention you have paid to address the issues related to the Minnesota Regional Haze Plan. At the Board meeting last month a number of questions were raised concerning the Plan. We thought it would be useful to you if we provided some additional information in an effort to help answer these questions and to provide you our perspective on them.

A key piece of new information since the last Board meeting is that EPA's May deadline is no longer a concern since EPA recently announced the negotiation of a final deadline of July 13 to propose, and November 15, 2012 to finish, the taconite BART determinations (the balance of Minnesota's Plan is still due on May 30, 2012). The taconite facilities will then have 5 years to implement the BART determinations. We remain committed to work with the MPCA and the EPA especially now that we have more time.

TACONITE INDUSTRY

Issue 1: At this time the MPCA is only "filling in the numerical limits" for the BART determinations for the taconite plants. The actual BART control technology decision was made in the previous version of the plan.

USFS perspective: The MPCA appears to not want to consider new information relative to the taconite plants, however it did in regards to the power plants when it proposed to adopt the CSAPR rule in lieu of source-by-source BART based on a December 2011 proposal by EPA. We believe it is important for the MPCA to consider all available information so that the best possible decision is made.

LOW-NOx BURNERS (LNBs)

Issue 2: LNBs have only been "trialed" as a retrofit at only one facility. MPCA stated they do not have enough information to set LNBs as BART and that the time needed to collect data to develop limits for LNBs would be more than 2 years and delay the implementation of BART. MPCA indicated that they must help EPA meet their May 2012 consent decree timeline by finishing the plan and submitting it now.

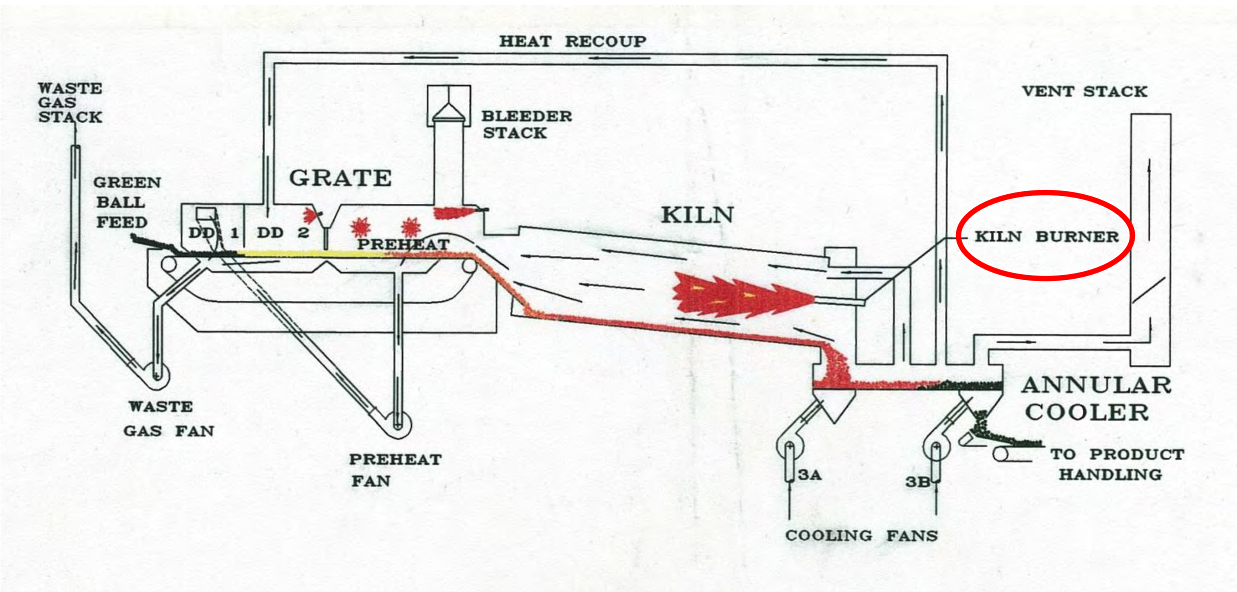
USFS perspective: During the last Board meeting a number of inaccurate statements were made concerning the state of low-NOx burners in the taconite industry. The following is a more complete summary of the current state of the technology.

- May 2010 - LNB installed on existing line 7 at US Steel Minntac
- April 2011 - LNB installed on existing line 6 at US Steel Minntac
- June 2011 - LNB performance confirmed on ¼ scale taconite furnace built to support Essar permit (now issued)
- December 2011 - permit issued for US Steel Keetac expansion. The permit includes application of a LNB to reconstructed furnace
- April 2012 - LNB proposed by Magnetation for their taconite furnace

As you can see, US Steel has worked to upgrade its air pollution equipment on its existing plants. They have developed and retrofitted a LNB for their grate-kilns furnaces. Essar Steel will operate the other type of furnace used on the Range, a straight-grate. They built a quarter-scale model of a taconite furnace to prove out low NOx burners for this type of furnace. Magnetation is also proposing to install LNBs for their taconite plant. All of these plants will be using modern continuous emission monitors (CEMs) to monitor and optimize control equipment performance. LNBs are being applied to both new and existing furnaces and on both types of furnaces on the Iron Range.

The replacement of the main kiln burner at Minntac is not a "trial" or "pilot test." Trials or pilot tests are often done on a small slip stream of exhaust gas drawn out of boiler or furnace that can be easily stopped. In this case the entire burner is replaced during the annual maintenance outage. As you can see in Figure 1 - the main kiln burner is a large, integral part of the furnace and replacing it is not easily undone and should not be characterized as a "pilot test" or "trial".

Figure 1 – Drawing of Minntac Grate-Kiln Furnace



As with any new technology there is a certain amount of shakedown necessary but this does not make the technology technical infeasible as some have suggested. These shakedown issues are not insurmountable – Minntac has dealt with them. Other than vague references to every furnace being different - the specific differences that cause issues with the application of LNBs at the other facilities have not been specified. LNBs are being applied to grate-kilns and straight grates - the two types of furnaces on the Range. They are being applied to both existing and new furnaces. According to EPA BART guidelines (FR, 7/6/05, 39165):

> *Control technologies are technically feasible if either (1) they have been installed and operated successfully for the type of source under review under similar conditions, or (2) the technology could be applied to the source under review. Two key concepts are important in determining*

whether a technology could be applied: ''availability'' and ''applicability.'' As explained in more detail below, a technology is considered ''available'' if the source owner may obtain it through commercial channels, or it is otherwise available within the common sense meaning of the term. An available technology is ''applicable'' if it can reasonably be installed and operated on the source type under consideration. A technology that is available and applicable is technically feasible.
Also, "In general, a commercially available control option will be presumed applicable if it has been used on the same or a similar source type."

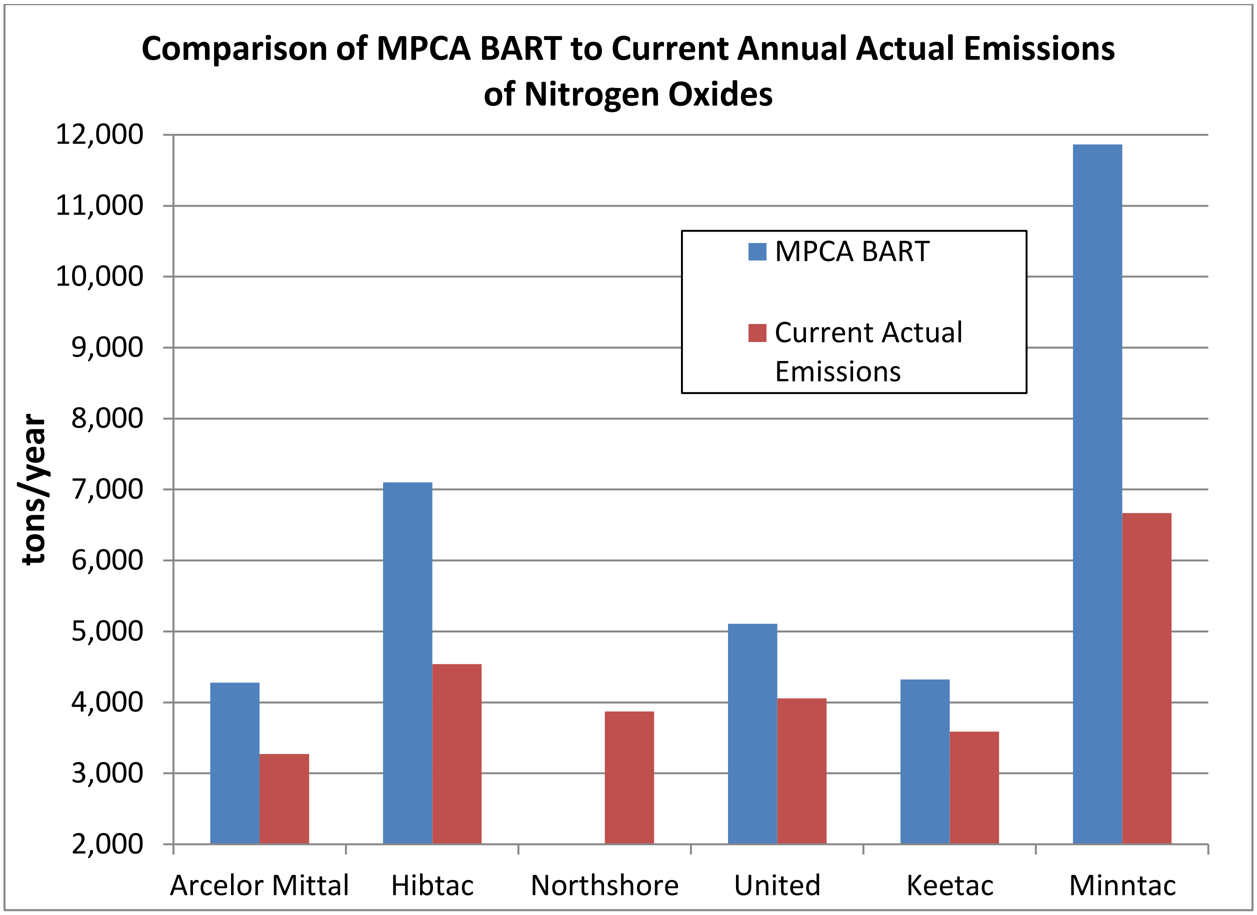
It is unclear to us what information is missing and why it would take MPCA staff so long to develop limits for the application of LNBs. They have already developed limits for LNBs for the Essar and Keetac permits and it did not take over 2 years. The emissions data from the lines at Minntac that have LNBs are currently available. It would be helpful if the MPCA would provide a list of the necessary missing information. EPA has indicated it will be able to develop these limits by the new July 13, 2012 deadline.

Regardless of the outcome of the Plan at the April Board meeting, we ask that you please direct the MPCA staff to make themselves available to the EPA to assist them in their review of the taconite BART limits through the November deadline.

Issue 3: The taconite BART limits proposed by the MPCA represent the status quo. Currently the MPCA indicates that the taconite plants are operating under good combustion practices (GCPs) – meaning essentially well-tuned furnaces.

USFS perspective: The current emissions from the plants (2010 for all except Hibbing Taconite which we used 2008 since 2010 was a low production year for that plant) were compared to the proposed BART limits assuming a 2 week annual maintenance outage at each plant. It can be seen in Figure 2 that the proposed BART limits are indeed above current actual emissions.

Figure 2 – MPCA Taconite BART Emissions and Current Annual Actual Emissions

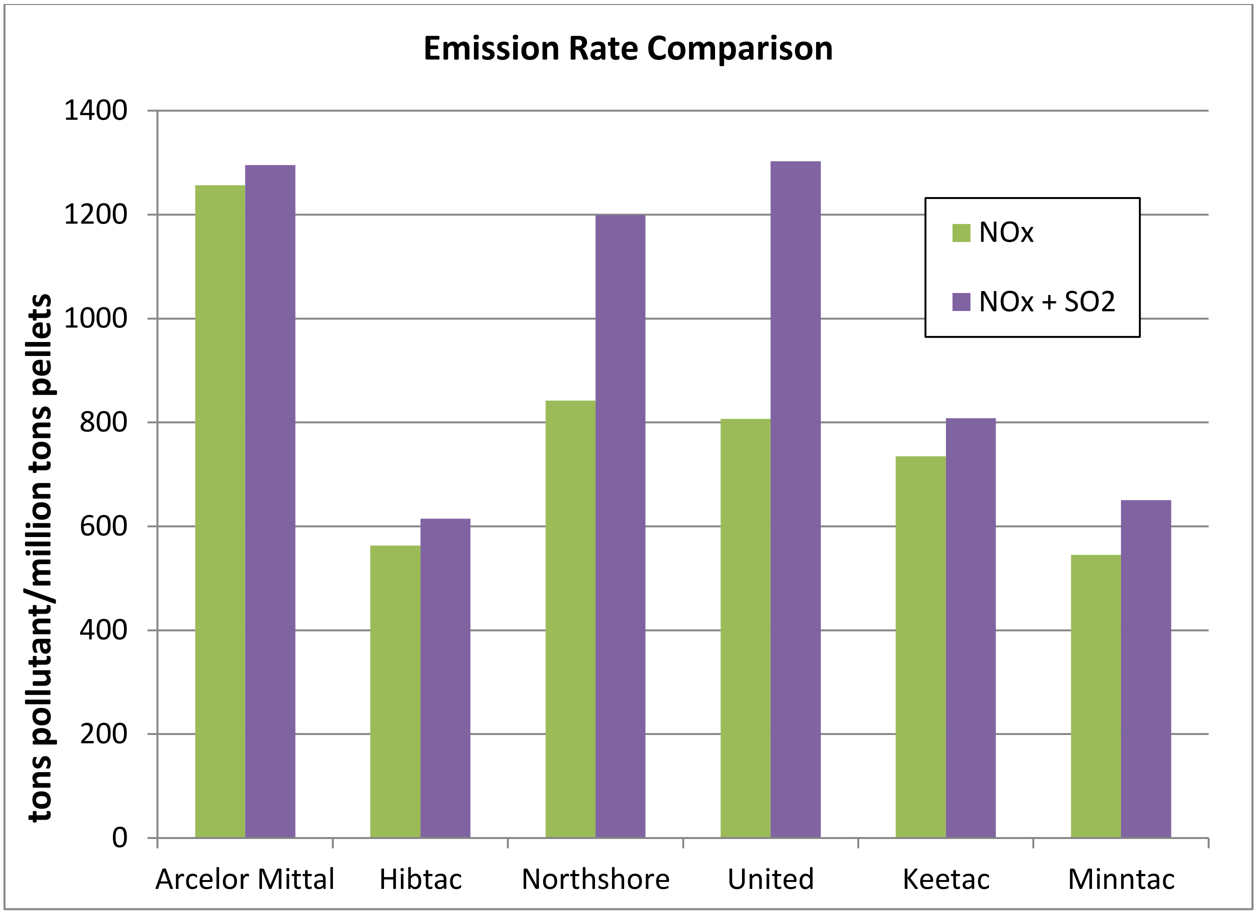


*NOTE: Northshore is not included under BART because BART only applied to some of the lines at the facility and we only had actual emission for the entire facility

Note that the proposed BART limits used in the graph were those proposed at the March Board meeting and do not reflect any further increase that may have happened since that time.

Since the plants have different levels of production we were interested in the emission level per ton of production to better aid in comparing the facilities (Figure 3). In addition to nitrogen oxides, we also added a set of bars that show sulfur dioxide plus nitrogen oxide emissions since the burning of coal can serve to reduce nitrogen oxide emissions, but will also increase sulfur dioxide emissions. The graph shows that some facilities emit twice as much haze-causing pollution as others on a per ton basis. As the US Steel facilities (Minntac and Keetac) continue to add LNBs and sulfur controls, their emissions will continue to decrease. Why can't the other plants reduce their emissions to similar levels?

Figure 3 – Taconite Industry Emission Rate Comparison



As mentioned above, the MPCA BART determination for the taconite industry was good combustion practices (GCPs). The three main variables controlled with GCPs are: time, temperature and turbulence in the furnace. At the March Board meeting Cliffs testified that they were operating under GCPs to meet the federal taconite air toxics rules. These rules apply to all the taconite plants. The air toxic pollutants controlled under this rule by GCPs are generally termed products of incomplete combustion – essentially partially burned fuel. GCPs are used to manipulate the time, temperature and turbulence in the furnace to minimize these pollutants. GCPs can also be used to minimize nitrogen oxides as suggested by the MPCA in their BART determinations. The problem is that GCPs generally manipulate the time, temperature and turbulence for NOx control in the *opposite* direction than they do for products of incomplete combustion under the air toxics rule. Essentially you can't control both sets of pollutants at the same time using GCPs. Note the following from the taconite air toxics rule (FR, 10/30/03, pg. 61883):

> *Although all indurating furnaces need to use GCP to minimize PIC (products of incomplete combustion) emissions, determining what precisely is GCP involves site-specific determinations for each furnace. For example, some indurating furnaces have*

been required to install NOx emission controls such as low NOx burners. The basic method used in reducing NOx emissions is a reduction in combustion temperature, which is the opposite strategy needed for minimizing PIC (i.e., increasing combustion temperature).

OTHER ISSUES

Issue 4: This plan is only the first step in a long term program.

USFS perspective: The next Plan is not due until 2018, with required pollution controls installed many years later. This Plan was originally due in 2007. It has been delayed 5 years with any controls due 5 years from now. If history is used as a guide, waiting until the 2018 Plan would result in controls that are not installed until 2028. We think it is important to act now to reduce haze causing emissions and not use the fact that this is a long term program as an excuse for inaction.

Issue 5: EPA gave the states the option to substitute CSAPR for BART.

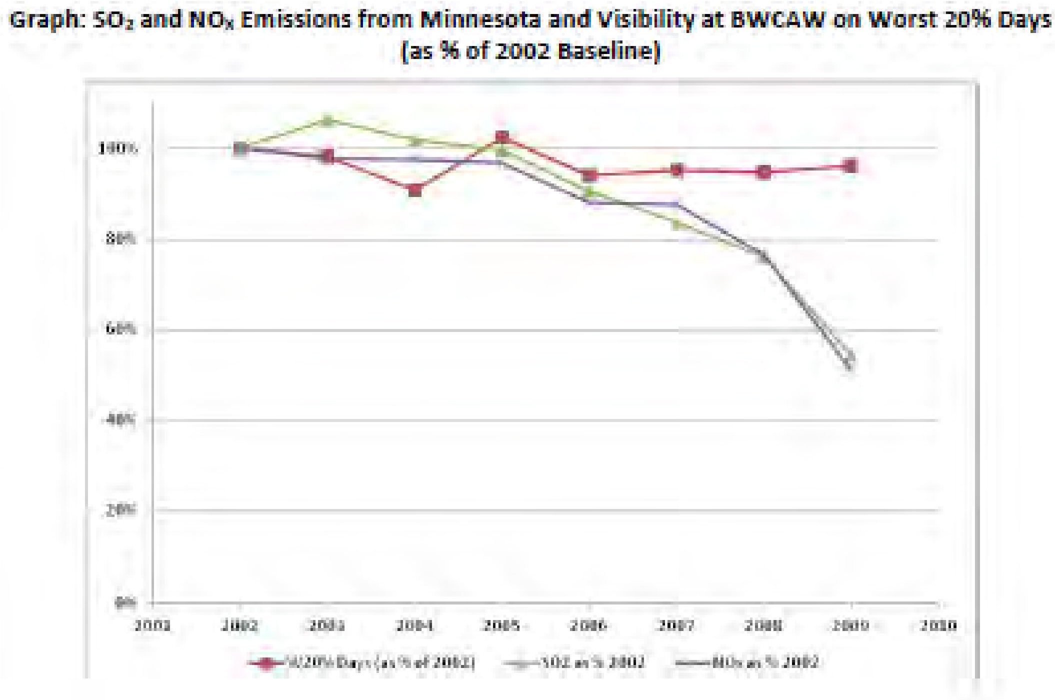
USFS perspective: It indeed gave the states the *option* to go with CSAPR. While this may be a good idea in some parts of the country, we believe the data we presented, along with MPCA data, show it is NOT a good idea in Minnesota because it is projected to result in fewer emission reductions overall. We continue to urge the Board to direct staff back to the source-appropriate BART approach that they were prepared to finalize in 2009.

Issue 6: A Board member asked why changes in visibility beyond the length one can see due to the curvature of the earth are important.

USFS perspective: Visual range is just one metric used to describe visibility. Contrast and color of every scenic element are also important. For example a cloud will appear browner and more washed out as visual range decreases even when the visual range is much greater than the distance to the cloud. Similarly the sky appears increasingly hazy as visual range decreases even if the horizon is closer than the calculated visual range. The view of the stars, moon and northern lights can also be affected.

Issue 7: In the Board packet and at the meeting, MPCA staff showed a graph of Minnesota emissions of nitrogen oxides (NOx) and sulfur dioxide (SO_2) versus measured visibility on the 20% haziest days in the Boundary Waters (BWCAW) and implied that what Minnesota does in relation to emission reductions from its sources does not matter to visibility in the BWCAW.

Figure 4 – MPCA Graph of Minnesota SO2 and NOx Emissions Versus the Worst 20% Days



USFS perspective: We are concerned that the importance of Minnesota sources is discounted by the staff's graph. The MPCA shows in the regional haze plan that Minnesota is the highest contributor to haze in the BWCAW at about 30%. The very nature of the regional haze problem is that many states and sources contribute.

It is important to remember that haze is caused by a number of different chemicals including: sulfates, nitrates, organic and elemental carbon, soil and others. The MPCA graph takes NOx and SO2 emissions and compares them to the 20% haziest days. Using the 20% haziest days is a relatively poor metric to gauge the effect of Minnesota point source emission reductions on visibility at Boundary Waters because many of the small subset of days may not be related to SO2 and NOx emissions. These days could be due to sulfates and nitrates, but they could just as well be due to other sources of impairment such as organics - most of which are uncontrollable and not related to NOx or SO2 emissions.

Xcel Energy®
RESPONSIBLE BY NATURE™

414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

April 18, 2012

Submitted via Electronic Mail

Catherine Neuschler
Environmental Analysis and Outcomes Division
Minnesota Pollution Control Agency
520 Lafayette Road North
Saint, Paul, MN 55155-4194

Re: Additional Comments on MPCA's Supplemental Notice on BART Determination for Units 1 and 2 at the Sherburne County Generating Station, Minnesota Regional Haze State Implementation Plan

Dear Ms. Neuschler:

Northern States Power Company-Minnesota d/b/a Xcel Energy (NSPM) is providing these additional comments on the Minnesota Pollution Control Agency's Regional Haze State Implementation Plan (SIP) process as a result of the public comments raised at the MPCA Citizens Board Meeting on March 27, 2012. This letter does not raise any new issues; rather it provides linkage to MPCA staff's previous response to the same or similar issues that are already in the public record. NSPM submits this letter as a way to clarify the public record of this proceeding, specifically about comments made at the MPCA Board's March 27, 2012 meeting related to Units 1 and 2 at the Sherburne County Generating Station (Sherco 1&2). NSPM specifically asks that this letter be added to the public record of this proceeding and presented to the MPCA Board.

1. Several speakers claimed that Sherburne County Units 1 & 2 are the #1 source of visibility impairment in Minnesota.

NSPM wishes to clarify this allegation to reflect what the SIP record already shows. On page 68 of the December 2009 Regional Haze SIP, the MPCA documents the modeled impacts of facilities with units subject to Best Available Retrofit Technology (BART). Table 9.2 shows the maximum number of modeled days of greater than a 0.5 deciview (dv) impact for 2002 through 2004 for these units. This data shows that five other facilities have higher modeled impacts than Sherco 1&2. In addition, a study of the data presented on pages 715 through 933 of this same report shows three other facilities have higher modeled impacts than Sherco 1&2 in terms of 98th percentile dv. In summary, the MPCA's modeling data does not support the allegation that Sherco 1&2 are the number one source of visibility impairment in Minnesota.

2. ***Multiple speakers commented that CSAPR=BART does not protect the Class I areas in Minnesota and that unit-by-unit BART is preferable.***

The board packet for the March 27, 2012 MPCA Citizens' Board meeting included MPCA staff's response to comments to the Supplemental Regional Haze SIP (found in Attachment B1 of this document). Comments 1-A and 1-B clearly stated that CSAPR=BART applies only to the Electric Generating Units ("EGUs") in Minnesota. MPCA staff also clearly stated that the remaining sources subject to BART, the taconite facilities, will all have unit-by-unit BART limits, independent of the CSAPR=BART approach for EGUs.

As CSAPR=BART applies only to EGUs, MPCA staff provided a table on page 4 of Attachment B1 comparing EGU emissions under various scenarios. This table included 2010 actual emissions, MPCA source-specific BART emissions, CSAPR allocations, and 2014 modeled CSAPR+BART Projections. MPCA's conclusion from this comparison is found on page 5 and states:

> *"With the addition of enforceable limits on Sherco, the MPCA believes the SIP clearly demonstrates that the five subject-to-BART power plants will reduce their emissions to levels that will allow Minnesota to meet the goals of the Regional Haze program."*

This could be more clearly shown if MPCA amended the table and showed a CSAPR+BART combined summary for NOx and SO2. This summary would show that source specific BART limits exist for Minnesota Power Boswell Unit 3, Rochester Public Utilities Silver Lake Unit 3 and 4, and Xcel Energy Sherco Units 1 and 2. The summary would show the CSAPR allocations for Minnesota Power Taconite Harbor Unit 3 and Northshore Mining Silver Bay Power Units 1 and 2. The combined emissions from these units are lower than any of the other scenarios presented (2010 actual emissions, MPCA source-specific BART emissions, CSAPR allocations, and 2014 modeled CSAPR+BART Projections). A table showing this restatement of the data is included as Exhibit A. Based on this data, it is clear that MPCA staff's proposed strategy of using a combination of CSAPR=BART and source-specific emission limits results in lower emissions than source-specific BART emissions alone.

3. ***Several commenters raised the issue of Reasonably Achievable Visibility Improvement ("RAVI") certification for Sherco 1&2 and how this is dealt with in the MPCA's Supplemental Regional Haze SIP.***

In Attachment B1, page 19 in the response to comments to the Supplemental Regional Haze SIP, MPCA staff noted that this SIP deals with the Regional Haze Rule and does not address what may be required under a separate EPA proceeding to consider whether any sources in Minnesota contribute to RAVI. MPCA staff is clear that this issue will be dealt with by the EPA under a RAVI proceeding. Furthermore, MPCA has acted to obtain emissions reductions for Sherco 1&2 by determining source-specific BART emission limits under this Regional Haze SIP. NSPM notes that RAVI is a separate visibility program with its own regulations, which focuses on whether the presence of a specifically identified plume blight can be established.

The assertion by some commenters that the Federal Land Manager (FLM) and EPA have already ruled that SCRs are BART for Sherco 1&2 is not true. The FLMs have submitted comment letters to the MPCA advocating this result, but FLMs do not have authority to establish BART limits under any visibility program regulations. EPA has also submitted comment letters to MPCA expressing their opinion on BART limits based on their review of the proposed SIP, however, the MPCA staff's analysis and the MPCA Board's 2009 BART determination examined the evidence and found the BART limits for Sherco 1&2 to be appropriate. Under the Clean Air Act, states have the primary role in determining BART limits for their sources subject to BART.

4. ***The concept that Regional Haze is a long-term program was not recognized by some commenters.***

The MPCA clearly stated on page 3 of the March 27, 2012 Board packet that the Regional Haze Rule sets a goal of restoring natural visibility conditions to Class I areas by 2064. MPCA further addresses the long-term strategy on page 13 of this same document, clarifying how Minnesota will work to achieve this goal through progress assessments and SIP updates. The nature of the program is to take multiple steps at regular intervals to realize the visibility goal and that the first step in the process does not need to resolve every issue identified by all commenters. The MPCA has a long-term plan to achieve these visibility goals and is taking an appropriate first step through the Regional Haze SIP proposal.

The MPCA's board packet for the March 27, 2012 MPCA Citizens' Board meeting contains on page 2 of Attachment B1, a graph showing SO2 and NOx emissions from Minnesota and the visibility at BWCAW on the Worst 20% Days. This table shows significant emissions reductions have already occurred in Minnesota, yet also shows no decernible visibility improvement to date. MPCA notes in the response to comment 1-B:

> *"...there is not necessarily a direct and simple correlation between emissions within Minnesota and visibility at Minnesota's Class I areas."*

By noting this lack of correlation at this time, MPCA staff frames the discussion for future SIP updates on regional haze that will decide what further actions should be taken to achieve the ultimate goal of improving visibility.

The attachment to this letter provides further support for the clarifications provided above. Please do not hesitate to contact if me if you would like to discuss any of these matters in greater detail. I can be reached at 612-330-7879 or at richard.a.rosvold@xcelenergy.com.

Sincerely,

Richard A. Rosvold

Richard A. Rosvold
Air Quality Manager

Attachment

cc: Environmental Policy & Services Record Center

Exhibit A. EGU Emissions Under Various Scenarios

		2010 Actual Emissions		MPCA Source-Specific BART		CSAPR Allocations		2014 IPM CSAPR + BART Projection		Supplemental SIP [BART & CSAPR Combined] a	
Facility	Unit	NOx (tpy)	SO2 (ton/yr)	NOx (tpy)	SO2 (ton/yr)	NOx (tpy)	SO2 (ton/yr)	NOx (tpy)	SO2 (ton/yr)	NOx (tpy)	SO2 (ton/yr)
Minnesota Power Boswell	3	890	258	988	1,270	2,142	2,174	991	884	988	1,270
Minnesota Power Taconite Harbor	3	931	1,512	568	1,135	431	639	846	604	431	639
Northshore Mining Silver Bay Power	1	985	615	800	800	296	439	325	1,299	296	439
Northshore Mining Silver Bay Power	2	1,525	1,017	1,045	1,254	396	587	597	2,490	396	587
Rochester Public Utilities Silver Lake	3	183	204	-	1,645	-	-	-	-	-	1,645
Rochester Public Utilities Silver Lake	4	12	19	573	239	145	215	238	229	573	239
Xcel Energy Sherco	1	3,866	6,233	3,862	3,089	3,908	5,790	4,713	7,822	3,862	3,089
Xcel Energy Sherco	2	3,220	5,192	3,861	3,089	3,907	5,789	4,582	7,604	3,861	3,089
TOTAL		**11,612**	**15,050**	**11,697**	**12,521**	**11,225**	**15,633**	**12,292**	**20,932**	**10,407**	**10,997**

a - MPCA Source-Specific BART Limits for Minnesota Power-Boswell 3, Rochester Public Utilities-Silver Lake 3&4, and Xcel Energy-Sherco 1&2; plus CSAPR Allocations for Minnesota Power-Taconite Harbor 3 and Northshore Mining-Silver Bay Power 1&2.