



414 Nicollet Mall
Minneapolis, Minnesota 55401

November 23, 2015

Mr. Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

—VIA ELECTRONIC FILING—

John Linc Stine
Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194

—VIA U.S. MAIL—

RE: COMPLIANCE FILING
MERCURY EMISSIONS REDUCTION PLAN FOR THE SHERBURNE COUNTY
GENERATING FACILITY'S UNIT 3
DOCKET NO. E002/M-07-1601

MERCURY EMISSIONS REDUCTION PLAN FOR THE ALLEN S. KING
GENERATING FACILITY
DOCKET NO. E002/M-07-1602

MERCURY EMISSIONS REDUCTION PLAN FOR THE SHERBURNE COUNTY
GENERATING FACILITY'S UNITS 1 AND 2
DOCKET NO. E002/M-09-1456

Dear Mr. Wolf and Commissioner Linc Stine:

On November 6, 2008, the Minnesota Public Utilities Commission (Commission) issued Orders approving Northern States Power Company's plans for mercury emissions reduction at our Allen S. King (King) and Sherburne County (Sherco) Unit 3 Generating Facilities.¹ The Orders set forth the following requirements:

¹ IN THE MATTER OF THE APPLICATION OF NORTHERN STATES POWER COMPANY D/B/A XCEL ENERGY FOR APPROVAL OF A MERCURY EMISSIONS REDUCTION PLAN FOR SHERBURNE COUNTY GENERATING FACILITY'S UNIT 3. Docket No. E002/M-07-1601. *Order Approving Mercury Emissions Reduction Plan, Requiring Implementation, Requiring*

2. *Xcel shall optimize the operation of the equipment installed under the plan approved herein to obtain maximum mercury reductions.*
3. *Xcel shall report annually to the Minnesota Pollution Control Agency on its optimization efforts under the preceding paragraph and on their results, until such time as the Minnesota Pollution Control Agency determines that this reporting is no longer necessary.*

On November 4, 2010, the Commission issued an Order approving our plan for mercury emissions reduction at the Sherco Units 1 and 2 Generating Facilities² and set forth the following requirement:

5. *During the period prior to construction of the planned mercury control system, Xcel Energy shall report annually to the Commission and the Minnesota Pollution Control Agency the status of its testing and monitoring programs described in its petition. If the Company's assessment indicates that modification of the planned mercury control system is warranted, the Company's report shall include a proposed process and schedule for revising its plan and obtaining approval of that plan.*

This filing constitutes our updates, as required above for each of these units.

I. Sherco Unit 3

The installation of the sorbent injection system on Sherco Unit 3 was completed on December 16, 2009, and the system was fully operational and in service on December 31, 2009.

As of Fall 2011, the mercury control equipment had been installed for nearly two years. On October 14, 2011, we provided the Minnesota Pollution Control Agency (MPCA) with updated information regarding our monitoring results and a recommended range to consider when setting the mercury limit to be incorporated into the air emission permit. The MPCA stated that they preferred to wait for the

Optimization of Equipment, and Requiring Annual Reporting (November 6, 2008); IN THE MATTER OF THE APPLICATION OF NORTHERN STATES POWER COMPANY D/B/A XCEL ENERGY FOR APPROVAL OF A MERCURY EMISSIONS REDUCTION PLAN FOR THE ALLEN S. KING GENERATING FACILITY. Docket No. E002/M-07-1602. *Order Approving Mercury Emissions Reduction Plan, Requiring Implementation, Requiring Optimization of Equipment, and Requiring Annual Reporting* (November 6, 2008).

² IN THE MATTER OF THE APPLICATION OF NORTHERN STATES POWER COMPANY D/B/A XCEL ENERGY FOR APPROVAL OF A MERCURY EMISSIONS REDUCTION PLAN FOR SHERBURNE COUNTY GENERATING FACILITY'S UNITS 1 AND 2. Docket No. E002/M-09-1456. *Order Approving Mercury Emissions Reduction Plan* (November 4, 2010).

Environmental Protection Agency (EPA) to issue federal rules regulating mercury emissions and to consider those requirements when establishing the appropriate limits.

Based on the operating history for this control system, we know that it is effective and significantly reduces mercury emissions. As pointed out in our October 14, 2011 letter to the MPCA, several issues remained to be resolved as part of the limit-setting process, including the difficulties in reliably measuring the small volume of mercury emissions during all operating conditions.

In 2011, we engaged the MPCA in preliminary discussions on establishing mercury emission limits for Sherco Unit 3. However, during the extended outage on Unit 3 no such discussions were pursued. On February 16, 2012, the EPA finalized the federal standards which regulate mercury emissions and require compliance by April 16, 2015. This regulation is referred to as the Mercury and Air Toxics Standards (MATS rule). The sorbent injection system and the continuous mercury monitoring system (CMMS) installed on Sherco Unit 3 for compliance with the Minnesota Mercury Emission Reduction Act of 2006 (MMERA) is also being utilized to demonstrate compliance with the MATS rule. We expect the permit limit discussions with the MPCA to resume in 2016 to incorporate both state and federal limits into the permit.

II. King

The sorbent injection system at the King facility has been in service since December 27, 2010. The MPCA incorporated mercury-specific permit limitations in the King Plant air emission permit issued on June 20, 2013. The renewed permit established mercury emission limits, pollution control equipment operating parameters and optimization evaluation and monitoring requirements.

On August 19, 2013, we submitted our mercury optimization control plan to the MPCA in accordance with permit requirements. The plan addressed mercury monitoring equipment, an evaluation of the impact of plant operations on the ability to capture mercury, monitoring of sorbent options in the marketplace, sorbent injection tuning, and the continued focus on fuel options at the plant.

On February 16, 2012, the EPA finalized the MATS rule which regulates mercury emissions and required compliance by April 16, 2015. The sorbent injection system and the CMMS installed at the King facility for compliance with the MMERA is also being used to demonstrate compliance with the MATS rule.

The sorbent injection system and CMMS have been installed and are functioning properly. The MPCA has also incorporated mercury permit limitations into the King plant permit. Therefore, we believe no further action is needed on the part of the Commission and request that the King docket be closed.

III. Sherco Units 1 and 2

The MMERA required the installation and operation of a sorbent injection system on Sherco Units 1 and 2 by December 31, 2014. The sorbent injection system was installed and placed in service on December 29, 2014 on both units. Efforts to optimize operation of the sorbent injection system have occurred throughout 2015, which has expanded our operating knowledge. We expect to continue to explore optimization efforts in 2016. Additionally, we plan to file a request for an extension of the start-up period for the sorbent injection systems on Sherco Units 1 and 2 in 2015 in order to continue our work to optimize the mercury reduction on these units. Some of the items that we intend to address in late 2015 and 2016 are:

- The testing of a new lance distribution design for the injection of unprocessed activated carbon;
- Continued research on the potential impact to the wet scrubber modules from an increase in halogen levels in the scrubber water which results from halogenated activated carbon injection;
- Continued testing of alternate activated carbon sorbents and non-carbon sorbents.

The installation and operation of a CMMS was required under the MMERA by July 1, 2007. A CMMS was installed and has been in operation since July 1, 2007. The CMMS was intended to be used for continued compliance with the MMERA requirements as well as MATS monitoring requirements.

The MATS rule requires affected units to demonstrate compliance with the mercury monitoring requirements within 180 days of April 16, 2015 or by October 13, 2015. Under the MATS rule, affected units must monitor mercury emissions by one of three methods: Periodic stack testing, the use of a CMMS or the use of a Sorbent Trap System (STS). By mid-2014, as MATS compliance preparations were underway, it was found that the CMMS was not able to meet the weekly system integrity check required by the MATS rule. As this problem is not exhibited on our dry scrubbed units (Sherco Unit 3 and King Unit 1), we believe it is related to the unique wet flue gas characteristics of Units 1 and 2. We have learned that other companies across the United States with wet control equipment systems have experienced similar issues with

the operation and accuracy of their CMMS. Through 2015, we have both worked to identify ways to get the CMMS to meet the MATS monitoring requirements and considered alternative mercury monitoring methods. The discussion below describes these efforts.

A. CMMS Probe Modifications

System diagnostics on the Sherco Units 1 and 2 CMMS showed that the issues are associated with the probe and not the mercury analyzer itself. Significant effort was invested with guidance from the vendor of the CMMS probe to get the original probe design to enable the CMMS to pass the weekly system integrity checks as required by the MATS rule. When these efforts were unsuccessful, the vendor provided an alternative probe that is currently being tested in the Units 1 and 2 common stack. If this probe fails to be successful, there is an additional probe design that we plan to evaluate as well. Our end goal is to find a probe solution that will allow the CMMS to be used for compliance monitoring as well as to control the activated carbon feed rate based on variable mercury inlet concentrations instead of a steady feed rate based on air flow. The experimentation with different CMMS probes will continue into 2016.

B. Sorbent Trap Monitoring

As the CMMS has not been able to meet all of the MATS monitoring requirements, we decided to install and certify an STS for continuous mercury monitoring. The STS was installed and began operation in early 2015. The initial system had significant operational problems. After multiple attempts to get the STS working as designed, a replacement STS was installed in May 2015 with some modifications made to the original design. The replacement system has proven to be accurate and reliable and passed the certification testing on August 11, 2015. The STS will be used for MMERA and MATS reporting purposes going forward.

C. Impact of Certain NO_x Reduction Actions on Native Mercury Removal

Another area that has been identified on Sherco Units 1 and 2 is the relationship between Nitrogen Oxide (NO_x) emission reduction efforts and the impact on mercury emissions. Analysis of emissions data indicates that certain actions intended for NO_x reduction appear to have also resulted in a corresponding increase in the native mercury removal. Native mercury removal is defined as mercury emissions reductions relative to the coal without the use of controls specifically designed for that purpose. The theory is that the coal mill and boiler tuning adjustments aimed at reducing NO_x

emissions is actually allowing more unburned coal particles to exit the boiler. These particles behave much like activated carbon by absorbing the mercury prior to removal in the downstream particulate removal devices. It appears that the NO_x reduction projects have also had a positive impact on native mercury removal.

IV. Conclusion

We appreciate the opportunity to provide this update on our optimization efforts. We also respectfully request that the Commission close the King docket, as no further action is needed on the part of the Commission.

We have electronically filed this document with the Commission, which also constitutes service on the Department of Commerce, Division of Energy Resources and the Office of the Attorney General. A copy of this filing has been served on all parties on the official service lists for the above-noted dockets.

Please contact me at (612) 330-7879 if you have any questions.

Sincerely,

/s/

RICHARD ROSVOLD
MANAGER, AIR QUALITY

cc: Service Lists

CERTIFICATE OF SERVICE

I, Jim Erickson, hereby certify that I have this day served copies or summaries of the foregoing documents on the attached list(s) of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States Mail at Minneapolis, Minnesota

xx electronic filing

Docket No. E002/M-07-1601

Docket No. E002/M-07-1602

Docket No. E002/M-09-1456

Dated this 23rd day of November 2015

/s/

Jim Erickson

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