414 Nicollet Mall
Minneapolis, MN 55401

December 24, 2015

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

Re: REQUEST FOR EXTENSION OF THE START-UP PERIOD FOR THE MERCURY EMISSIONS REDUCTION SYSTEM AT THE SHERBURNE COUNTY GENERATING FACILITY'S UNITS 1 AND 2
DOCKET NO. E002/M-09-1456

Dear Mr. Wolf:

Pursuant to Minn. Stat. § 216B.68, subd. 7, Northern States Power Company, doing business as Xcel Energy ("Xcel Energy" or "Company"), respectfully requests an extension to the "start-up period" for the Mercury Emission Reduction System at our Sherburne County Generating Facility's Units 1 and 2 ("Sherco Units 1 and 2").

Under the Minnesota Mercury Emissions Reduction Act of 2006 ("MMERA"), Minn. Stat. § 216B.682, subd. 2(a), a public utility that owns a wet scrubbed unit at a qualifying facility was required to submit a plan by December 31, 2009, to employ the available technology most likely to result in removal of at least 90 percent of the mercury emitted from the unit. The Company filed a plan to reduce mercury emissions at Sherco Units 1 and 2 on December 21, 2009. The Minnesota Public Utilities Commission ("Commission") approved the plan in an order dated November 4, 2010 in Docket No. E002/M-09-1456.

We placed the mercury control equipment associated with Sherco Units 1 and 2 in service on December 29, 2014 on both units. That action began the "start-up period" as defined under Minn. Stat. § 216B.68, subd. 7:

> "Start-up period" means a period of one year after the date the mercury-control equipment is installed at a targeted unit under an approved mercury

> emissions reduction plan, or such longer period as the commission may approve after consultation with the Pollution Control Agency, if a longer period is necessary to optimize equipment performance for mercury reduction.

Once the start-up period is completed, under Minn. Stat. § 216B.687, subd. 2(b), the Minnesota Pollution Control Agency ("MPCA") "shall incorporate into the permit the mercury reduction reasonably expected to be achieved as each unit or facility as an enforceable state-only reduction." As of December 29, 2015, the mercury control equipment will have been installed for one year. However, for the reasons stated below, the Company believes we can better optimize the operation of the mercury control and monitoring systems, and respectfully requests to extend the start-up period 12 months until December 29, 2016 to allow additional time to determine the appropriate mercury limit to be incorporated into the air emission permit for Sherco Units 1 and 2.

Optimization Efforts to Date

As required by MMERA, the Company installed and operated a sorbent injection system for mercury emission control on Sherco Units 1 and 2 by December 31, 2014. Efforts to optimize operation of the sorbent injection system have occurred throughout 2015, which has expanded our operating knowledge. However, we believe several areas require further study to determine how best to optimize operation of the mercury control and monitoring systems.

We will continue to explore optimization efforts in 2016. Some of the items that we intend to address are:

- Continued work on mercury monitoring technology to better measure mercury emissions for compliance demonstration as well as for process control;
- 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; and
- Continued testing of alternate activated carbon sorbents, including non-brominated options and non-carbon sorbents.

Each of these items is discussed in detail below.

1. Mercury Monitoring Systems

The installation and operation of a Continuous Mercury Monitoring System ("CMMS") was required under the MMERA by July 1, 2007. A CMMS was installed and has been in operation since July 1, 2007 and was intended to be used for continued compliance with the MMERA requirements as well as monitoring requirements under the Federal Mercury and Air Toxics Standards ("MATS") rule.

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 worked to identify ways to get the CMMS to meet the MATS monitoring requirements as well as looked at 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, the decision was made 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.

The requested extension would provide the Company with additional time to identify monitoring solutions using the CMMS to allow it to be used, at a minimum, for the control of the activated carbon feed rate and hopefully, for compliance monitoring. .

2. Testing a New Activated Carbon Injection Lance Design

The Company installed a sorbent injection system in 2014 with activated carbon injection beginning at the end of the year. The sorbent injection system has a processed and an unprocessed distribution system, which are 100 percent redundant. The processed system is Alstom's Mer-Cure design, which utilizes steam to mill the activated carbon before it is injected into the economizer outlet ducts, upstream of the air heaters. The unprocessed system merely injects un-milled activated carbon directly into the economizer outlet ducts. Operation of both sorbent injection systems to date indicates that the processed system appears to remove mercury more efficiently than the unprocessed sorbent injection system. While this may be solely due to the activated carbon particle size reduction prior to injection, it is suspected that the processed sorbent injection system's ability to distribute the activated carbon more evenly across the duct than the unprocessed sorbent injection system may also be a factor. A more efficient lance distribution system has been designed for the unprocessed system, which was recently installed on one of the exhaust ducts to determine if the new design significantly improves the removal of mercury. Testing of the new unprocessed system lance distribution

design began in November 2015 and will extend into 2016. Overall, a significant amount of work has already been put into optimizing the sorbent injection system and there is additional work ahead to fully gain all the benefits from the system and achieve the most efficient mercury removal.

The requested extension would provide time for the Company to gain additional operational knowledge of the system and to investigate potential improvement in mercury removal.

3. Continued Research on the Potential Impact to the Wet Scrubber Modules from an Increase in Halogen Levels

Past testing has shown that the use of bromides in the activated carbon injected upstream of the wet scrubbers significantly improves mercury removal. The bromides, which are bonded to the activated carbon leach into the water once the flue gas passes through the wet scrubbers. The concern is that these bromides, combined with the chlorides introduced by the coal, will increase the combined halogen levels above the critical level in the scrubber water system, resulting in significant corrosion of the stainless steel components in the wet scrubbers. This corrosion could have a catastrophic impact on the wet scrubber's ability to function as designed. Since the start-up of the sorbent injection system, the halogen concentration (i.e., the bromide and chloride levels) has been tracked at various points in the scrubber water system. In addition the stainless steel wet scrubber components have been monitored for signs of corrosion. To date, the levels have been steadily rising with no indication of when they will level off or drop. Further observations and testing will continue in 2016. Along with observation and testing, the Company has been actively looking at ways to mitigate or eliminate this issue. These include the use of alternative sorbents that do not use bromine, minimizing the amount of brominated activated carbon necessary to achieve the mercury removal goals and/or developing additional outlets to remove the halogens from the scrubber water loop.

One potential outlet to remove halogens from the scrubber water loop is to use scrubber loop water in the Sherco Unit 3 spray dryer absorbers (SDAs). Sherco Unit 3 was initially designed to use scrubber solids pond water for its recycle ash slurry. The recycle ash slurry is combined with lime slurry prior to injection into the SDAs. It was ultimately decided to switch to the recycle ash slurry's water source to cooling tower circulating water in an effort to improve lime utilization.

The plan was to reintroduce just enough scrubber pond water into the recycle ash slurry to offset the amount of bromines added by the brominated activated carbon injection. Modifications have been made in order for this concept to be tested. The testing will study the potential impacts to operation of Sherco Unit 3.

The requested extension would provide the Company with additional knowledge and operational options to control the halogen levels in the scrubber water system.

4. Continued Testing of Alternate Sorbents

Various types of mercury sorbents are slated to be tested over the next year. During each of the test periods, sorbent trap data will be gathered to determine the resulting impact on mercury emissions. The mercury sorbents to be tested include "high-efficiency" activated carbons offered by the various activated carbon vendors. Mercury sorbents that do not rely on bromine or other halogens for mercury removal will also be tested, along with a non-carbon option.

The requested extension would provide the Company with additional knowledge on available sorbents in order to determine is the best sorbent option for the Sherco Unit 1 and 2 mercury control system.

Mercury Emissions Reduction Will Continue

If an extension of the start-up period is granted, the mercury control system will still continue to run at a high level of mercury control, except for any unpreventable control system downtime.

Please note that the Company has had discussions with MPCA staff regarding the need for a longer start-up period. MPCA staff indicated that they did not have any objections with a longer start-up period, as it would provide answers to existing system questions.

In summary, the Company has made considerable effort to meet the MMERA requirements for Sherco Units 1 and 2. We have completed the installation of, and continue to operate, a control system that significantly reduces mercury emissions. Several issues lead us to request an extension of the start-up period by 12 months as indicated above. The additional time will allow us to gain experience in operating the sorbent injection system, the continuous mercury monitoring system

and the sorbent trap system in order to determine the appropriate mercury emission limit to propose to the MPCA. We appreciate the Commission's consideration of this request for an extension.

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 list for this docket.

Please contact me at 612-330-7879 or at richard.a.rosvold@xcelenergy.com if you have any questions.

Sincerely,

/s/

RICHARD A. ROSVOLD
MANAGER, AIR QUALITY

Enclosures

cc: Jessica Keller
Ronald Brevig
Jonathan Amos
Anne Jackson, MPCA

CERTIFICATE OF SERVICE

I, Carl Cronin, hereby certify that I have this day served copies of the foregoing document on the attached list 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-09-1456

Dated this 24th day of December 2015

/s/

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Carl Cronin
Regulatory Administrator

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Julia	Anderson	Julia.Anderson@ag.state.mn.us	Office of the Attorney General-DOC	1800 BRM Tower 445 Minnesota St St. Paul, MN 551012134	Electronic Service	Yes	OFF_SL_9-1456_Official
Sharon	Ferguson	sharon.ferguson@state.mn.us	Department of Commerce	85 7th Place E Ste 500 Saint Paul, MN 551012198	Electronic Service	Yes	OFF_SL_9-1456_Official
Frank	Kohlasch	frank.kohlasch@state.mn.us	MN Pollution Control Agency	520 Lafayette Rd N. St. Paul, MN 55155	Electronic Service	No	OFF_SL_9-1456_Official
John	Lindell	agorud.ecf@ag.state.mn.us	Office of the Attorney General-RUD	1400 BRM Tower 445 Minnesota St St. Paul, MN 551012130	Electronic Service	Yes	OFF_SL_9-1456_Official
SaGonna	Thompson	Regulatory.records@xcelenergy.com	Xcel Energy	414 Nicollet Mall FL 7 Minneapolis, MN 554011993	Electronic Service	No	OFF_SL_9-1456_Official
Daniel P	Wolf	dan.wolf@state.mn.us	Public Utilities Commission	121 7th Place East Suite 350 St. Paul, MN 551012147	Electronic Service	Yes	OFF_SL_9-1456_Official