414 Nicollet Mall
Minneapolis, Minnesota 55401

December 17, 2010

—VIA ELECTRONIC FILING—

Burl W. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101

RE: SITE PERMIT COMPLIANCE FILING
THERMAL DISCHARGE IMPACT STUDY OF ICE FORMATION ON LAKE PEPIN – DOCKET NO. E002/GS-08-690

Dear Dr. Haar:

Northern States Power Company, a Minnesota corporation ("Xcel Energy" or the "Company") submits this filing in compliance with the Minnesota Public Utilities Commission (the "Commission") December 18, 2009 *ORDER ACCEPTING ENVIRONMENTAL IMPACT STATEMENT, AND GRANTING CERTIFICATES OF NEED AND SITE PERMIT WITH CONDITIONS* in Docket No. E002/GS-08-690. As specified by the Order at Section 5B-e, Xcel Energy is to:

> "e. *Study the effect of thermal discharge on Lake Pepin, such that 1) Xcel would prepare a report which would, at a minimum, review the analysis of previous studies and current data and propose a plan of action, and 2) if the Commission determines that the initial report is insufficient and additional data collection is appropriate, Xcel would seek advice from the Minnesota Pollution Control Agency.*"

In this filing, we provide our study of the potential impact of the thermal discharge resulting from the extended power uprate of the Prairie Island Nuclear Generating Plant on ice formation on Lake Pepin. This report also includes a review and analysis of previous studies and current data along with our proposed action plan.

Copies of this filing have been served on the attached service list. If you have any questions or would like to discuss this filing in greater detail, please call me at: 612-330-5641 or brian.r.zelenak@xcelenergy.com.

Sincerely,

/s/

Brian R. Zelenak
Manager, Regulatory Administration

Attachment
cc: Service List

STATE OF MINNESOTA
BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

David Boyd	Chair
J. Dennis O'Brien	Commissioner
Thomas Pugh	Commissioner
Phyllis Reha	Commissioner
Betsy Wergin	Commissioner

In the Matter of the Application of Northern States Power Company, a Minnesota Corporation, for an LEPGP Site Permit for the Prairie Island Nuclear Generating Plant Extended Power Uprate	Docket No. E-002/GS-08-690 **COMPLIANCE FILING**

INTRODUCTION

Northern States Power Company, a Minnesota corporation ("Xcel Energy" or the "Company") submits to the Minnesota Public Utilities Commission (the "Commission") this compliance filing in the above-referenced matter. This filing is being made pursuant to the December 18, 2009 Order and Site Permit issued by the Commission in Docket No. E002/GS-08-690.

Paragraph 5.B.e of the above referenced Order approves the Large Energy Power Generating Plant Site Permit for the proposed extended power uprate of the Prairie Island Nuclear Generating Plant ("PINGP" or the "Plant") on the condition the Company Study the effect of thermal discharge on ice formation on Lake Pepin resulting from the extended power uprate, such that 1) Xcel would prepare a report which would, at a minimum, review the analysis of previous studies and current data and propose a plan of action, and 2) if the Commission determines that the initial report is insufficient and additional data collection is appropriate, Xcel would seek advice from the Minnesota Pollution Control Agency ("MPCA"). Paragraph IV.G of the Site Permit addresses the condition specified in Paragraph 5.B.e of the Order and directs Xcel Energy to file within 12 months of the date of the Order (December 18, 2010) a report on the potential impact of the PINGP's thermal discharge on the ice formation on Lake Pepin. The paragraph indicates the report shall include, at a minimum:

1) a review and analysis of previous studies and current data; and

2) a detailed plan of action if additional data collection is deemed necessary. The applicant shall seek advice from the MPCA in this evaluation and the development of a plan of action, if one is determined to be necessary.

Paragraph IV.G goes on to state that the MPCA is the state agency authorized to implement the National Pollutant Discharge Elimination System ("NPDES") Permit Programs and that regulates the PINGP's thermal discharges through the NPDES permit program. The permit also directs the applicant to submit the report to the Minnesota Department of Natural Resources ("MDNR") when the filing is made to the Commission.

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Section 1. Executive Summary

The thermal impact assessment performed in support of Prairie Island Nuclear Generating Plant's Extended Power Uprate ("EPU") Certificate of Need and Site Permit utilized bounding assumptions to determine if the increased thermal output of the plant under uprate conditions would challenge summertime thermal limits established in the current NPDES permit. Summer conditions limit the heat sink capacity of the river and have required occasional plant load reductions to ensure compliance with NPDES discharge thermal limits. The assessment indicated that even using very conservative assumptions, the temperature change at the NPDES compliance point – Lock and Dam #3 – no additional days of reduced plant operations would be expected with EPU operations.

A question regarding the affect of the EPU's increase in thermal discharge temperature on ice formation characteristics on Lake Pepin was first raised during the Advisory Task Force and was further addressed during the contested case proceeding. Prior to the Commission's Order in this docket, Xcel Energy began a process to evaluate the potential impact of the plant changes on Lake Pepin during the winter. In issuing the Site Permit for the EPU, the Commission subsequently included the condition that a formal assessment be conducted.

The Company conducted the assessment ("Thermal Study") which included an extensive literature review to identify available scientific data and reports that could have relevancy; development of a model to calculate the residual thermal energy reaching Lake Pepin and calibrate it to existing ice thickness data; use the model to predict the change in the anticipated residual thermal energy reaching Lake Pepin as a result of EPU; and examined factors beyond the plants impact on Lake Pepin.

Our analyses indicates that although some residual thermal energy from the plant could be transferred to Lake Pepin, other factors (air temperature, river flow) have a greater influence on the river temperature and ice formation to the head of Lake Pepin than the plant discharge.

Lake Pepin is a natural lake in the Mississippi River that continues to evolve and change due to natural and man-made influences (Senjem, 2009). Ice formation on Lake Pepin involves a complex interaction of prevailing air temperature, wind, precipitation, lake depth, current flow and flow velocity, river water temperature, and other natural and anthropogenic heat inputs.

Over the course of PINGP operations, there have been many studies done to evaluate the impact of plant operations on the Mississippi River. Studies of the thermal discharge revealed that while some residual heat from the plant remains downstream of the NPDES compliance point, the impact appears negligible (Stefan, 1987; Ickes, 1999). In 1987 following a multi-year study of the plant's thermal impact on ice on Lake Pepin, Minnesota DNR approved discontinuance of the ice study after concluding that the plant's residual heat was not having a significant impact on ice formation on the lake (MDNR, 1987).

During wintertime full-load plant operations, the EPU is predicted to increase the river temperature at the head of Lake Pepin by 0.1 to 0.4 degrees Celsius (Sargent and Lundy 2010). A comparative analysis was conducted to evaluate whether current plant operations could be negatively impacting ice formation characteristics on Lake Pepin such as ice-out date and maximum ice thickness. The comparative analysis concluded that prevailing meteorological conditions play the dominant role in determining the nature and extent of ice on Lake Pepin. Therefore, the small temperature addition due to EPU is not expected to alter the thermal effluent's impact on ice formation on Lake Pepin.

The Company provided a copy of the Thermal Study to the Minnesota Pollution Control Agency for review and comment following completion of the literature review and thermal analysis. MPCA's response to the report was that "The information submitted in the Thermal Study report, as well as past studies and environmental review documents, indicate that the water quality standards will continue to be met downstream from the compliance monitoring point…following a proposed extended power uprate at the PINGP facility." (See Attachment D)

At Xcel Energy's request, the MPCA coordinated a second meeting attended by MPCA, Xcel Energy, the Minnesota Department of Natural Resources ("MDNR") and the Office of Energy Security Facility Permitting Staff ("OES"). Copies of the report were provided to all agencies and discussed at the second meeting held on November 3. The MDNR provided comments regarding the Thermal Study in letter dated November 19, 2010. The MDNR stated a principle concern was, "…the effect of the thermal discharge regime on the ice cover conditions of Lake Pepin and the fact that ice conditions are not regulated by, or the results of violations of the state's water quality standards for temperature enforced by the PCA." (See Attachment E)

Based on the conclusions of the study and agency input, Xcel Energy plans to conduct the following actions.

1. Continue to monitor as required per their NPDES permit the temperatures at the compliance monitoring point (Lock and Dam No. 3) after EPU for each Unit and verify that temperatures remain within permit limits.

2. Consult with the appropriate state agency regarding the need and scope for additional study of the impacts to ice formation characteristics on Lake Pepin if Post-EPU Lock and Dam 3 temperatures are significantly greater than the expected temperature increase as a result of the EPU.

3. Initiate discussions with the MDNR regarding the feasibility of utilizing a Public Recreational Use Survey of Lake Pepin to assess the winter use on Lake Pepin based on the comments received by the MDNR regarding winter recreation and public safety due to the ice thickness on Lake Pepin.

4. Reassess the ice characteristic predictions to validate the EPU has not impacted the ice formation on Lake Pepin approximately five years after the second EPU is implemented (Unit 2 is scheduled for 2015)

Section 2. Description of Study Process

Xcel Energy undertook an extensive literature review to identify available scientific data and reports that could have relevancy to thermal impact of the PINGP EPU operations on the Mississippi River - in particular on the potential impact the temperature increase might have on ice formation on Lake Pepin. A listing of the literature and data reviewed are identified in Sections 3 and 4 of this report.

Following the literature review Xcel Energy contracted with Sargent and Lundy for a more extensive evaluation of the plant's thermal discharge to the Mississippi River utilizing references found during the literature review. This study was to examine the potential impact on ice formation on Lake Pepin from existing and proposed plant operations. Sargent and Lundy recreated the model developed by Dr. H. G. Stefan of the University of Minnesota Hydraulics Laboratory (Stefan, 1987) and evaluated historical Lake Pepin ice data to climatic correlations developed by the St. Anthony Falls Hydraulic Laboratory (Williams, 2004).

Simultaneously while Sargent and Lundy was conducting the more extensive evaluation of the plant's thermal discharge, Xcel Energy water quality staff deployed additional temperature monitoring equipment in the Mississippi River downstream of Lock and Dam No. 3 to the upper reach of Lake Pepin. The purpose of the monitoring was to validate the thermal model being used by the contractor as a part of the EPU thermal assessment.

As required by the Site Permit, the evaluation was submitted to the MPCA NPDES Permitting Engineer on September 22, 2010 for review. The report was also presented to the MPCA, MDNR staff, and staff from the Office of Energy Security on November 3, 2010. Comments regarding the evaluation of the EPU thermal impact on Lake Pepin during the winter were received by the MPCA and MDNR and are included as Attachments D and E. MPCA and MDNR comments are also summarized in Section 6 of the report.

Based on agency comments, Xcel Energy developed an action plan to monitor and review the post-EPU thermal discharge temperature at the NPDES permit compliance point (Section 8).

Section 3. Summary of Studies of the PINGP Thermal Discharge

Studies of the thermal impacts of heated water discharged to the Mississippi River from PINGP have been conducted over the four decades that the plant has been in operation. This section provides a brief description of each study.

1. Final Environmental Statement Related to the Prairie Island Nuclear Generating Plant (NSP, 1973). Site environmental review documentation, including analysis thermal impact to the river and a discussion of how any impact would be mitigated.

2. Thermal Discharge Analysis of Alternate Discharge Options (Stone and Webster, 1978). Stone and Webster was commissioned to evaluate options to modify the original intake and discharge design of PINGP. The study modeled the thermal plume in the river to Lock and Dam No. 3 under thirty two (32) different operational and environmental conditions.

3. Alternate Discharge Study for Prairie Island Nuclear Generating Plant (HDR Ecosciences, 1979). Utilizing data from Stone and Webster (1978), HDR Ecosciences (HDR) evaluated an alternative discharge design that involved moving the discharge nearly half a mile downstream of the original discharge point near the plant. The thermal impact of plant operations under the proposed alternative was modeled and impacts to aquatic biota were evaluated. The thermal assessment examined forty one (41) scenarios that included typical and extreme operating and environmental conditions.

4. Benthic Macroinvertebrate Study Report (Texas Instruments Ecological Services, 1980). The study examined the effects of PINGP's thermal discharge on benthic (bottom dwelling) organisms in the Mississippi River over a ten year period. The study compared data from before and after PINGP began operations.

5. Mississippi River Ice Cover Between Lock and Dam No. 3 and Lake Pepin (Stefan, 1980). The University study examined data from the winters of 1972/1973 through 1979/1980 attempting to determine what, if any, impact PINGP operations may have on ice cover between Lock and Dam No. 3 and Lake Pepin.

6. Model Studies of a Cooling Water Discharge Outlet Modification at Prairie Island Nuclear Generating Plant (Wetzel and Dahlin, 1981). The University of Minnesota created a physical model of the river and proposed discharge modifications at PINGP to evaluate flow characteristics from the proposed discharge structure. Variations in river flow were simulated to assess the effect on the discharge flow from the plant.

7. Thermal Effects and Ecological Monitoring Plan (NSP,1981). The company submitted a revised study plan as required by the PINGP NPDES permit issued January 19, 1981. The existing study plan was expanded to better monitor and assess the impact of the proposed discharge modifications. The study protocol change was approved and implemented before the plant's discharge structure was modified in 1983. The changes proposed and approved to the study plan included:

    i. Better evaluate spawning success of Walleye and Sauger;
    ii. Incorporation of Creel Census during winter (conducted by Minnesota DNR);
    iii. Collect additional water temperature and flow information;
    iv. Monitor the discharge modifications effects on algae;
    v. Evaluate fish impingement at proposed screenhouse improvements; and,
    vi. Continued fish population studies with technology changes to improve statistical quality of data collected.

8. Prairie Island Nuclear Generating Plant Environmental Monitoring and Ecological Studies Program Annual Reports 1981 through 1985 (NSP 1981-1985). Cooling water system modifications at PINGP were planned for 1983. Per Permit 80-5081, Special Provision #12, MDNR required the company to conduct monitoring of ice thickness and water temperatures in Lake Pepin. The company reported the results of the monitoring to MDNR via annual reports for the period of the study. In 1987, MDNR allowed Special Provision #12 to be discontinued upon determining that, "…that no statistically significant impacts on ice cover resulted from the thermal discharge of the plant."

9. Residual Heat Input from Mississippi River to Lake Pepin (Stefan, 1987). This study continued the previous study by the University of Minnesota (Stefan, 1980). This study evaluated the heated discharge from PINGP on

ice formation and ice characteristics on Lake Pepin. The study examined the effects of the discharge modifications by comparing predicted conditions pre-discharge system modifications (1981 data) and post-discharge system modifications (1986 data). The study considered river flow, meteorological data and water temperatures at Lock and Dam No. 3. A two-dimensional river model was developed to predict the impacts on Lake Pepin ice.

10. River Temperature Monitoring Study (Stone and Webster, 1992). The Company commissioned Stone and Webster to study and recommend a new temperature monitoring system for PINGP. The existing system was aging and was being evaluated for replacement. Stone and Webster reviewed various technologies and the environmental and operational conditions to which the equipment would be subjected and recommended the best appropriate technology and configuration for the installation. The system was designed to provide near-real-time monitoring and ensure operational compliance with plant's NPDES permit requirements.

11. Seasonal Distribution, Habitat Use, and Spawning Location of Walleye and Sauger in Pool 4 of the Upper Mississippi River with Special Emphasis on Winter Distribution Related to a Thermally Altered Environment. Minnesota Department of Natural Resources Investigational Report 481 (Ickes, 1999). Minnesota Department of Natural Resources initiated this study evaluating fish behavior in the lake to determine if the fish alter their preferred locations due to the presence of increased water temperature.

12. Prairie Island Nuclear Generating Plant Environmental Monitoring and Ecological Studies Program Annual Report (NSP, 1973 through 2009). The annual report provides information to the MPCA and MDNR on data collected by the ongoing ecological study at PINGP for a calendar year. Biological sampling in the river and plant operational data are presented with the report summarizing data from over thirty (30) years of monitoring Mississippi River biota.

13. Prairie Island Nuclear Generating Plant Units 1 and 2 Evaluation of the Cooling Towers, (Sargent and Lundy, 2006). The evaluation assessed the impact of EPU on summertime cooling tower operation and the thermal discharge to the Mississippi River. The study utilized bounding assumptions to estimate the most conservative summer conditions and assumed that any predicted river temperature in excess of the permit limit will result in

reduced plant operations, thus maintaining NPDES permit compliance.

14. Evaluation 2009-14662 The Effect of the Prairie Island Power Uprate on the Ice Thickness on Lake Pepin (Sargent and Lundy, 2010). The study utilized the thermal model developed by Stefan (University of Minnesota Hydraulics Laboratory, 1987) to evaluate the potential impact of existing operations and EPU operations. This study incorporated a number of other relevant studies in an attempt to more fully assess the impact of the plant on ice formation characteristics on Lake Pepin.

15. Winter River and Ice Monitoring (Xcel Energy Environmental Services Water Quality Group, 2009/2010). The Company monitored water temperature from Lock and Dam No. 3 to Lake Pepin during the winter of 2009/2010. The data is used in this report to validate assumptions made in Evaluation 2009-14662 (Sargent and Lundy, 2010) and to verify the thermal model predictions for residual heat input into Lake Pepin.

Section 4. Summary of Other Relevant Studies and Data

During the literature review for this report, the company discovered the following studies that appeared to have relevance or reference value in evaluating the influence of the heated thermal discharge from a power plant on lake ice formation.

1. Winter-Regime Thermal Response of Heated Streams (Paily, 1974). Study evaluates the temperature distribution downstream from the point at which a thermal load is imposed and for the length of reach which will be kept ice-free by the heat input. The study develops a mathematical model to describe and predict the effects.

2. Long-Term Lake Water Temperature and Ice Cover Simulation/Measurements (Fang and Stefan, 1995). Study reviews modifications to an existing numerical model used to simulate vertical water temperature profiles in cold climate freshwater lakes. The revised model output is compared to actual results to demonstrate model performance.

3. Modeling of Lake Ice Characteristics in North America, University of Minnesota Supercomputing Institute Research Report UMSI 2002/137 (Williams and Stefan, 2002). Ice-in date, ice-out date and maximum thickness data were examined for 130 freshwater lakes in the United States and Canada. Records over thirty (30) years and thirty two (32) lakes were used to identify trends in ice-in date, ice-out date, maximum ice thickness and average air temperature over the period of record. The report discusses the most influential parameters that affect ice formation in lakes.

4. Dependence of Lake Ice Covers on Climatic, Geographic, and Bathymetric Variables (Williams, 2004). Lake ice data for 143 North American freshwater lakes were assembled and analyzed. Principal data observed were ice-in dates, ice-out dates, and ice thickness. The study then assesses and presents the effects of climate change on the observed ice characteristics.

5. Lake Ice Growth and Decay in Central Alaska, USA: Observations and Computer Simulations Compared (Jeffries, 2005). The study reviewed the performance of a computer simulation model that predicted ice thickness, freeze-up, break-up and ice duration with actual observations and recommended modifications to the model to improve prediction performance.

6. Potential Climate Change Effects on Ice Covers of Small Lakes in the Contiguous U.S., University of Minnesota Supercomputing Institute Research Report 97/136 (Fang and Stefan, 1997). The modeling exercise in this report simulated the effects of projected climate change on ice covers of small lakes in the northern contiguous U.S. The report documents the results of the simulation and projected effects from climate change.

7. Project Report #463: Indicators of Climate Warming in Water Resources Data from Minnesota (Johnson and Stefan, 2004). The report examines the changes in ice-in and ice-out dates for seventy three (73) Minnesota lakes over thirty eight (38) years of record and correlates this with other climatic data.

8. The Effects of Climate, Lake Morphometry, and Geographic Location on Freshwater Lake Ice Covers, Masters Thesis for University of Minnesota (Layman, 2001). Lake ice data for 143 freshwater lakes in the United States and Canada, not including the Great Lakes, were assembled. Specifically data collected included ice-in dates, ice-out dates, ice cover duration and maximum observed thickness. The data were analyzed for correlations with climate, lake morphometry and geographic location. The thesis goes on to infer the effects of climate warming on these parameters.

9. U.S. Army Corps of Engineers (USACE) Lake Pepin Ice Survey Measurements for Years 1999 through 2008 (Final Environmental Impact Statement (FEIS), PINGP Extended Power Uprate Project, 2009). Data on Lake Pepin Ice formation, thickness, and extent of coverage. River flow rates, ice thickness, and PINGP operational data were compared in the FEIS.

10. Minnesota State Climatology Working Group (MSCWG) Minnesota's Lake Ice-Out Status for Years 1998 through 2009 (MSCWG, 1998-2009). Data on actual ice-out dates for lakes across the state. Data downloaded from Minnesota State Climatology Working Group website.

11. Western Regional Climate Center (WRCC) Temperature Data for Southeastern Minnesota from 1896 through 2010 (WRCC, 2010). The WRCC summarizes temperature data for all sub-regions of the contiguous United States. The sub-regional data presented is for southeast Minnesota

and includes the Lake Pepin area.

12. U.S. Geological Survey (USGS), Upper Midwest Environmental Sciences Center Lake Pepin Water Quality Data (USGS, 2010). Downloaded water quality data for Field Station 1 at Lake City, Minnesota for use in this analysis.

13. Minnesota Pollution Control Agency (MPCA), Lake Pepin TMDL Project (Senjem, 2009). Lake Pepin is impaired by excess nutrients and is also affected by the turbidity impairment in the south metro Mississippi River. The turbidity impairment means that additional sediment is being transported to and filling in Lake Pepin.

Section 5. Review and Analysis of Studies and Data

Two studies of the proposed EPU have been completed to assess the impact of increased thermal output on the Mississippi River. The first study (Sargent and Lundy, 2006) predicted the summertime thermal temperature impacts of EPU operations on the river in relation to the NPDES permit limits. This study was a bounding (most conservative possible theoretical conditions) study that determined that the additional summertime, full-load thermal discharge as a result of EPU will not result in any additional months where the monthly average river temperature rise limit will be exceeded. This study provides the basis for our resulting conclusion that the EPU would not impact the existing parameters of the NPDES permit. The second study (Sargent and Lundy, 2010) evaluated the impact of the proposed EPU on winter ice formation on Lake Pepin and incorporated a number of the studies listed in Section 3 and 4 into the assessment. Both studies are reviewed below along with other studies that were incorporated into them.

<u>EPU Thermal Impacts and Their Relationship to the NPDES Limits</u>
In 2006, Sargent and Lundy assessed the impact that EPU would have on plant operations, summertime cooling tower operations and thermal impact to the Mississippi River (Sargent and Lundy, 2006). The purpose of the assessment was to determine if the proposed EPU would create difficulties in maintaining compliance with the plant's NPDES permit during the season NPDES thermal limitations would most likely impact plant operations. To conduct this assessment a critical assumption was made that the ten percent increase in thermal output of the reactor would result in a ten percent increase in the heat rejected to circulating water system (bounding assumption). By using this type of bounding assumption, Sargent and Lundy ensured that the study results would be conservative. The assessment also utilized actual operating and environmental data from April through November for the years 2002 through 2006 to conduct the evaluation.

The assessment predicted that if the plant had been operating at EPU conditions during the summers between 2002 and 2006 there would have been no increases in the number of days where the plant was predicted to exceed the NPDES thermal limit at Lock and Dam No. 3. This first assessment indicates that EPU will not significantly increase the plant's thermal impact to the Mississippi River since the temperature at the NPDES permit compliance point is not expected to exceed the permit limits.

EPU Thermal Impacts on Ice Formation on Lake Pepin

Because the first study did not evaluate the issue raised in the CON of ice formation on Lake Pepin, in the fall of 2009, the Company requested Sargent and Lundy to conduct a more extensive study of the proposed EPU impacts to river temperature and influence on ice formation on Lake Pepin (Sargent and Lundy 2010). This study also continued the assumption concerning the amount of additional heat rejected to the river as a result of the EPU namely that a ten percent increase in reactor power translates to a ten percent increase in thermal heat to the river. This "bounding" assumption assumes that there is no heat loss due to inefficiency in any of the heat transfer processes at the plant.

This study incorporated information from a number of company and academic sources. The thermal model developed by Dr. H. G. Stefan (Stefan, 1987) was re-created to predict residual plant heat that would reach Lake Pepin. Dr. Stefan's model was used because it was developed specifically for this section of the Mississippi River. In addition to utilizing Dr. Stefan's research, information and ice prediction models based solely on climatic variables from three other academic studies (Layman, 2001), (Williams, 2004), and (Paily, 1974), were incorporated into the assessment. By drawing in the additional scientific work that had been conducted over the decades of the plant's operation, it was felt that the relationships between climate, residual plant heat, and ice formation changes on the lake could be better understood.

The academic studies provided new predictive tools that were not available when Dr. Stefan studied the plant's effect on Lake Pepin in the 1980's (Stefan, 1980 and 1987). Since the tools developed by the university researchers predicted ice formation characteristics (ice-in date, ice-out date, and maximum ice thickness) based solely on meteorological conditions and latitude, it is reasonable to compare the predictions with actual ice observations for Lake Pepin. If the observed data varied significantly from the prediction results, and that shift was to either shorten the ice cover season or reduce the maximum ice thickness, then we could potentially infer that the residual heat from the plant might be impacting ice formation on the lake.

Sargent and Lundy synthesized the studies and data together to better understand the plant's impact (Sargent and Lundy, 2010). The first step was to use Stefan's model (Stefan, 1987) to predict the residual temperature remaining from current PINGP operations at the entrance to Lake Pepin (a distance of approximately 13 miles) and then compare the results to actual temperature measurements. The

actual temperature measurements were taken by the Minnesota Department of Natural Resources during the winter of 1998/1999 (Minnesota Department of Natural Resources, 1999). Table 6-3 in Attachment B graphically shows the relationship between predicted versus actual temperatures (Sargent and Lundy, 2010). The MDNR noted that PINGP appeared to increase the river temperature at the entrance to Lake Pepin by between 0.37ºC to 0.84ºC when both units are online (Ickes, 1999). The Stefan equation consistently predicted higher values to the point that Sargent and Lundy concluded based on the DNR data that "The thermal model results in temperature trends similar to the physical data and on average over-predicts the water temperature when there is a disagreement with the physical data" (Sargent and Lundy 2010).

With the validation of the Stefan model completed, Sargent and Lundy estimated the increase in residual heat input to Lake Pepin due to EPU operations. Using results of the initial EPU thermal assessment (Sargent and Lundy, 2006), EPU heat rejection values were input into the Stefan model which predicted the amount of temperature increase that would occur at the head of Lake Pepin. The model estimated that if the plant operated at two-unit, full load EPU conditions, the additional temperature increase at the headwaters of Lake Pepin would be between 0.1ºC to 0.4ºC depending on river flow rate (with a mean of 0.2ºC). This means that EPU may result in a slight increase during the winter months at the entrance to Lake Pepin (Sargent and Lundy 2010). Based on model results, Sargent and Lundy noted that when air temperatures are -18ºC or less, all the residual heat from PINGP operations (even at EPU levels) is dissipated before reaching the lake (Sargent and Lundy 2010).

The Sargent and Lundy (2010) Report conclusion is consistent with the 1987 Stefan report conclusion: that the increase in temperature of the incoming water to the lake due to the plant is so small, that there are likely other drivers that influence ice formation characteristics on Lake Pepin. To assess the influence of climate on the ice formation and to assess whether current plant operations are impacting ice formation characteristics on Lake Pepin, prediction methodologies developed in other studies were incorporated into this assessment. Williams (2004) and Layman (2001) developed predictive tools to evaluate the effect of climate variables on ice formation. If ice formation characteristics on Lake Pepin appear to follow the general climate inputs for the area, then we can conclude the plant's operations are not significantly changing the natural ice formation processes in the lake.

Stefan (1987) concluded that residual heat from the plant reached the lake; that

weather variables were a significant factor in ice formation characteristics on the lake; and, that the small amount of heat remaining from the plant might pass through the lake well below the ice cover as an interflow which may or may not alter ice formation characteristics. He made these observations before the science of climate change was very well developed. In the intervening period, the science of climate assessment has expanded and multiple studies of the effects of climate variability on lakes have been published. All but one of the references in Section 4 represents scientific research on climate change. These studies all suggest that historical ice formation patterns on lakes, including lakes in Minnesota and Wisconsin, are changing and are expected to continue to respond to changing climatic conditions.

Several studies developed tools based on meteorological and geographic variables that could reasonably predict ice formation characteristics such as ice-in date, ice-out date, and maximum ice thickness (Layman, 2001; Williams, Layman, and Stefan, 2004; Jeffries, 2005; Williams, 2004). Sargent and Lundy incorporated the ice-out date and ice thickness prediction methodologies from these studies to determine if there is a relationship between perceived changes in the ice on Lake Pepin and recorded weather conditions for the area (Sargent and Lundy, 2010). Since the prediction methodologies only considered meteorological variables, a comparison could be made between the predicted results and actual observations. If the actual observations were consistently and significantly sooner (for ice-out dates) or thinner (for maximum ice thickness) then it would appear that the residual heat from current plant operations may be impacting ice formation characteristics on Lake Pepin. However, if the difference between the observed versus the predicted values is within the range of error for the predictive equations then it would appear that the residual heat from the plant has not had a significant impact on ice formation in the lake.

It is important to note that the predictive tools developed by the university researchers are limited to predicting only general ice characteristics for the lake. They are not able to predict ice formation at the head of the lake versus another location further downstream. For the comparison of predicted results to the observed data to be valid, a location representative of the latitude and bathymetric variables used in the equations must be selected. This location for Lake Pepin is near Lake City. It is not possible to use the upper end of the lake since the infilling of the lake with sediment is most pronounced at this location (Senjem, 2009) making the bathymetry misrepresentative of the rest of the lake. In addition, the significant reduction in water depth alters ice formation characteristics due to

increased channelization and highly variable current flow thus making the output from the predictions invalid for comparative purposes and not representative of the lake as a whole.

Sargent and Lundy predicted ice-out dates and compared the predicted values with actual values from four sources: U.S. Army Corps of Engineers Lake Pepin Ice Survey measurements (USACE, 2000-2008), the Minnesota State Climatology Working Group Minnesota's Lake Ice-Out Status (MSCWG, 1998-2009), U.S. Geological Survey Upper Midwest Environmental Sciences Center Lake Pepin Water Quality Data (USGS, 2010), and (Layman, 2001; table D-1). These data are compared to the ice-out predictions in Table 6-3 (Sargent and Lundy, 2010). Sargent and Lundy concluded that "correlations based on average air temperature, geographic, an bathymetric variables alone predict the ice-out date for Lake Pepin four to six days later than the actual ice-out date on average over the years 1992 to 2008 and since the difference in ice out date is within the standard error of the correlations, it does not demonstrate that Prairie Island has a significant effect on ice out date of Lake Pepin" (Sargent and Lundy, 2010).

In conjunction with evaluating ice-out dates, maximum ice thickness was considered. The difference between predicted ice thickness and actual ice thickness was then compared to the standard errors for the equation to determine if the difference was significant. The results from the four different prediction methodologies and the recorded ice thickness data (see Attachment B, Table 6-4). The prediction methodologies consistently under-predict ice thickness when compared to actual data which suggests that the thermal discharge from PINGP has not had a significant impact on maximum ice thickness on Lake Pepin.

The analysis conducted by Sargent and Lundy (2010) resulted in the conclusion that while some residual thermal energy from the plant is transferred to Lake Pepin, the ice cover on the lake is "dominated by the average air temperature". The analysis indicates that historical plant operations have not had a significant impact, if any, on ice formation on the lake. Since EPU may result in only a fractional increase in temperature at the entrance to the lake, it is reasonable to assume that this minimal increase is not likely to significantly impact ice characteristics.

<u>Supporting Independent Analyses</u>

The analysis by Sargent and Lundy (2010) was conducted assuming two-unit operation under full load, maximum heat rejection conditions. Others had noted that the amount of residual heat from the plant reaching the lake varied depending

on the plant's operational status (Ickes, 1999). The Sargent and Lundy study also utilized predictive tools that were designed to assess the impacts due to climate variability. To assess the validity of the results from the Sargent and Lundy study, the Company conducted three independent assessments:

i. A comparison of USACE ice data to plant operational status to see if ice thickness appeared to respond to changes in plant operations;
ii. Compare temperature records for the region of Minnesota that includes Lake Pepin to ice characteristics to determine if there is a relationship between climatic conditions (average temperature from December through March) and ice characteristics on Lake Pepin; and,
iii. Winter in-stream river temperature monitoring to compare with the output from the Stefan model used in Sargent and Lundy's 2010 study.

<u>A Comparison of Plant Operations and Lake Pepin Ice Thickness</u>
Table 1 below depicts the average river flow rate at Lock and Dam No. 3 for the three month period from January through March; the thickness of ice at Lake Pepin (mile marker 770) when the thickest ice measurement was taken; and when plant unit outages occurred (reducing heat input from plant operations to the river). There are four years shown on the table (2000, 2004, 2005 and 2006) where there were no winter refueling outages at the PINGP and thus were representative of maximum heat being discharged to the river. If there were a direct correlation between plant operation and ice thickness, it is expected that the thinnest ice should occur during years when there were no refueling outages. In two of the years (2000 and 2006) ice thickness was below average and in two years (2004 and 2005) ice thickness was above average.

The ice thickness in 2005 was the second thickest (25 inches) during the 10 year period. The ice was also 25 inches thick in 2003, a year in which there was a refueling outage on Unit 1 from mid-November to mid-December, 2002. The ice was 26 inches thick in 2008, a year in which there was a refueling outage on Unit 1 from mid-February to mid-March. These results (from 1999 to 2008) tend to support the Sargent and Lundy (2010) study conclusion that meteorological variables and not heat rejected by the plant are the controlling variables in ice formation on Lake Pepin.

Table 1. Summary of Weekly Ice thickness measurements for Lake Pepin and PINGP operational status. (Source: USACE and FEIS, 2009)

Year	Average Flow Rate Jan-Mar (cfs)	Ice Thickness (inches) Fourth Week of February	Thinnest Ice Measured (inches)	Thickest Ice Measured (inches)	Date Thickest Measured Ice	Outage Start	Outage End	Unit
1999	13,798	18	15	18	Feb W4	11/9/1998	1/1/1999	Unit 2
2000	13,669	10	7	14	Feb W2 & 3	None		
2001	9,153	21	19	26	Mar W5	1/19/2001	2/25/2001	Unit 1
2002	10,869	11	10	13	Mar W2	2/1/2002	3/2/2002	Unit 2
2003	10,178	25	12	25	Feb W4 & Mar W2	11/15/2002	12/6/2002	Unit 1
2004	9,452	21	19	21	Feb W4 & Mar W1	None		
2005	12,068	25	23	25	Feb W3 thru Mar W1	None		
2006	18,941	17	12	17	Feb W4	None		
2007	12,138	13	10	14	Mar W1	11/14/2006	12/15/2006	Unit 2
2008	8,405	26	23	28	Mar W2	2/13/2008	3/23/2008	Unit 1
Ten-year average	11,867	19	15	20				

Ice Formation Characteristics and Climate Conditions

Ice cover forms in response to meteorological conditions. Ice formation is usually associated with the coldest water temperature in a lake, calm winds, and low air temperatures (Stefan and Fang, 1997). Historical records show that recent air temperatures are increasing more rapidly during the winter months than other times of the year (Johnson and Stefan, 2004). Of the top twenty warmest January to March periods observed since 1895, eleven occurred within the last twenty years. Also, minimum daily winter temperatures show a greater increase than maximum daily temperatures (Johnson and Stefan, 2004). Ice-out and spring runoff dates appear to be shifting to earlier days in the spring, stream water temperatures appear to be rising, and ice-in dates appear to be moving to later dates in the year. All this would suggest that climatic variables are impacting the nature and occurrence of ice formation on Lake Pepin.

To determine what climate variability has occurred, climate data from 1896 through 2010 for the Southeast Minnesota Area from the National Oceanic and Atmospheric Administration Western Regional Climate Center was graphed in Figure 1. Data plotted included four month averaged temperature (December through March) and five year running mean temperature for the four month period. Multiple statistical analyses of the data show a clear positive trend in the winter average temperatures of the area. Based on the trend lines plotted on Figure

1 it is evident that winter temperatures are cyclic but overall exhibit an upward trend since 1896. It should be noted that since the plant modified intake and discharge design configurations in the early 1980s an increasing trend in air temperature has been observed for Southeast Minnesota. While the trend was present prior to the 1980s, the trend from the 1980s to present is most pronounced beyond what appears to be the normal historical variation.

To relate this increasing trend in air temperatures, maximum observed ice thickness data for Lake Pepin was plotted on Figure 1. Lake Pepin ice thickness data was obtained from NSP, USGS, and USACE ice data summarized from Table 6-4 in the Sargent and Lundy (2010) evaluation (Attachment B). Data was available from 1982 to 2008 for Lake Pepin. Ice thickness data plotted with the air temperature data displays an inverse trend with air temperatures for the past 25 years. Overall, as average winter air temperatures increased maximum Lake Pepin ice thickness has decreased. The impact of the residual heat from the plant on ice formation on Lake Pepin, if any, appears to be negligible compared to the influence of prevailing meteorological conditions.

Analysis of Data Collected During the Winter of 2009/2010

During the winter of 2009/2010, remote temperature data loggers were deployed at six locations in the Mississippi River downstream of Lock and Dam No. 3 to the head of Lake Pepin (see Figure 2). Data loggers were set at the following river mile locations.

Table 2: 2009/2010 Data Logger Results

Data Logger Location	**River Mile**
Upper Back Channel	792.5
Red Wing High Bridge	790.6
Lower Back Channel	786.0
Green Daymark	786.2
Head of Lake Pepin	785.2
Point No Point	782.0
Reference Location	
Prairie Island Plant	798.0
Lock & Dam No. 3	797.0

Data loggers were deployed on December 22, 2009 and retrieved mid-March 2010. Data loggers recorded river temperature every 15 minutes.

Daily average river temperatures were plotted with daily average air temperatures and are presented in Figures 3 to 8. It is noted on these figures that river temperature measured at six downstream locations varied throughout the 2009 winter and exhibit similar trends as air temperature.

Various parameters were analyzed with regression analysis to examine relationships between measured river temperatures, plant discharge temperatures, flows, and meteorological conditions. Similar to the trend figures, air temperatures exhibited a positive relationship with river temperatures measured at all data logger locations. The relationship was generally greater the further downstream of Lock and Dam No. 3 or the closer to the head of Lake Pepin. This relationship is similar to the stream temperature relationship analyzed by Mohensi and Stefan (1999). They determined that the upstream portions of stream temperature profile are most influenced by an upstream input (i.e. groundwater, industrial, snowmelt) and the effect of this input is depreciated as distance increases downstream. Mohensi and Stefan (1999) also state that when travel times are short, the effect of weather is negligible, whereas after extended downstream travel memory of the upstream temperature is lost and weather becomes the controlling factor of water temperature.

River temperature measured at Lock and Dam No. 3 was significantly correlated to river temperatures measured at all temperature data logger locations from RM 792.5 to 782. As a result, river temperatures measured at Lock and Dam No. 3 can then be utilized to predict downstream temperatures to the head of Lake Pepin. Lock and Dam No. 3 is the NPDES permit compliance point that is monitored for PINGP. Per the PINGP NPDES permit, during the winter period plant thermal discharges shall be limited by ambient river temperature as follows:

"Once the daily average ambient river temperature falls below 43 degrees F for five consecutive days, the Permittee shall not raise the temperature of the receiving water immediately below Lock and Dam No. 3 above 43 degree F for an extended period of time."

The following equation was developed from the regression figure utilizing average temperatures measured from December 22, 2009 to March 16, 2010 at Lock and Dam No. 3 and at River Mile 782 (Figure 9):

$$y = 1.4141x - 15.142 \ (R^2 = 0.9366)$$

This equation was used to compare the model results of the Sargent and Lundy study. Lock and Dam No. 3 water temperatures used to predict the Lower Mainstem (Head of Lake Pepin) temperatures in the Sargent and Lundy study were used in the above regression equation. Figure 10 presents the temperatures predicted by the regression equation plotted with the temperatures calculated from the Sargent and Lundy study. The predicted temperatures and Sargent and Lundy temperatures were similar and generally exhibited the same patterns, with the exception of temperatures for days 90 to 100 (mid-February). During this period the Sargent and Lundy study calculated water temperatures of less than 32°F. Measured river temperatures ranged from a minimum of 33.79°F to a maximum of 39.45°F at Lock and Dam No. 3 and from 32.64°F to 40.23°F at RM 782. It is not expected that river temperatures at the head of Lake Pepin would measure less than 32°F.

Figure 11 plots the daily average air temperature, daily average river temperature at Lock and Dam No. 3, daily average river temperature measured at RM 782 and the difference in temperature between Lock and Dam No. 3 and RM 782. During the months of December, January, and February the delta T (difference in temperature) between Lock and Dam No. 3 and RM 782 is typically greater than zero and is inversely related to air temperature (i.e., when air temperatures are colder or less the delta T is greater). During these months air temperatures are having a cooling effect on the river between Lock and Dam No. 3 and RM 782. However, during the first two weeks in March the daily average water temperatures measured at Lock and Dam No. 3 were less than river temperatures measured at RM 782 (delta T was negative). During this period, it is noted that either air temperatures and/or increased river flows from snow melt are adding heat to the river between Lock and Dam No. 3 and RM 782. The PINGP discharge does not add heat to the river downstream of Lock and Dam No. 3, but river temperatures are influenced by other factors during winter-spring transition.

The Sargent and Lundy (2010) study determined that if the air temperature is approximately 21C below the temperature of the water, the entire heat load discharged into the river from both units of Prairie Island can be dissipated from the surface of the water between Lock and Dam No. 3 and the head waters of Lake Pepin. The daily delta T in river temperatures measured at RM 782 were plotted with daily air temperature delta T measured at the Red Wing airport (Figure 12). Based on the polynomial equation from this plot, the entire heat load would be dissipated (i.e., no change in temperature over the period of one day) when the air

temperature is approximately 19°C (R^2=0.25) below the river temperature. The results using measured data is similar to the results calculated by Sargent and Lundy.

In summary, the trends and regression analysis display the relationship between air temperature and river temperature to the head of Lake Pepin and show that the plant has minimal impact, if any, on Lake Pepin ice thickness. We also conclude that the river temperature data measured during the winter of 2009/2010 validate the accuracy of the Sargent and Lundy evaluation using the Stefan model. Lastly, we conclude that the changes in the delta T between Lock and Dam No. 3 and the head of Lake Pepin (RM 782) demonstrate that other factors (air temperature, river flow) have a greater influence on the river temperature to the head of Lake Pepin than the plant discharge.

Other Factors

As the preceding discussion suggests, ice formation characteristics on Lake Pepin is a complicated natural process. River flow, ambient environmental conditions, lake bathymetry, and river temperature all interact to determine when and where ice will form and to what extent. As research studies show, lake bathymetry plays an important role in a static lake. Within Lake Pepin, where there is flowing water, changing bathymetry plays an important role in altering the historical ice pattern on the lake. In areas where the river gets shallow, the flowing water will create preferred flow paths and may increase in flow velocity altering ice formation processes and potentially reducing the potential for the water to freeze.

The Minnesota Pollution Control Agency has been leading a study of the impacts of certain contaminants on the water quality of Lake Pepin. One issue of major concern is the amount of sediment being transported to the lake. Sediment transported to the lake settles out in the lake causing the lake to gradually be filled (Figure 13). The rate of sediment influx to the lake has substantially increased over the last 100 years (Senjem, 2009). The current predictions are that the upper third of the lake will be filled in within approximately 100 years (Senjem, 2009). Currently bathymetric data from USGS (Figure 14) shows the area of the lake that comprises the upper third of the lake.

While the upper third of the lake may experience some increase in water temperature above ambient river conditions due to the plant's discharge, it has also experienced significant infilling. It is difficult to determine whether a slight increase in water temperature, the reduction in depth, and/or regional climatic

variation plays the more significant role in this area of the lake. However, since the regional climatic conditions impact all areas of the lake equally, it would seem that the bathymetric changes brought on by the sediment settling in the lake are potentially affecting ice formation characteristics in the upper third of the lake.

Section 6. Summary of Meetings and Comments

As specified in the Site Permit, Xcel Energy coordinated a meeting with the MPCA and submitted the Lake Pepin Thermal Discharge Study on September 22, 2010 for review and comment (see MPCA letter dated November 17, 2010-Attachment D).

The MPCA determined that "the information currently available adequately demonstrates that the conditions of the NPDES/SDS permit, which are based on applicable water quality standards, are met by the discharge of heated effluent from PINGP" and "the water quality standards will continue to be met downstream from the compliance monitoring point.". The MPCA also states that the protection of ice thickness for recreational purposes falls outside the scope of the NPDES permit.

Xcel Energy also met with staff from the MPCA, MDNR, and Office of Energy Security on November 3, 2010 to present and discuss the Thermal Study. All three agencies were provided a copy of the Thermal Study and supporting documents for review and comment.

The MDNR provided comments regarding the Thermal Study in letter dated November 19, 2010 (see Attachment E). The MDNR's stated a principle concern of theirs is the effect of the thermal discharge regime on the ice cover conditions of Lake Pepin and decreased winter recreation opportunities in the upper extent of the lake due to a temperature increase from the power uprate and additional affects to ice conditions.

The MDNR letter includes comparisons of 2010 water temperatures measured upstream of the plant (Diamond Bluff), at Lock and Dam 3, and two locations within the upper end of Lake Pepin. The Thermal Study included a similar comparison that was conducted by Sargent and Lundy (2010) (Attachment B) utilizing 2006-2007 water temperatures. Figures 6-5 and 6-6 in Attachment B compare temperatures measured at Diamond Bluff and Lock and Dam 3 during the winter of 2006/2007 and thermal model results for Upstream Mainstem, Downstream Mainstem, and Wisconsin Channel <u>with</u> and <u>without</u> the power uprate. The study model predicts that power uprate will add between 0.1°C to 0.4°C to the water temperature of Lake Pepin dependent upon river flow.

MDNR expressed concern regarding the ice formation for the upper 3 to 5 miles of Lake Pepin and that the Thermal Study focuses on climate change on the ice

thickness from the mid to lower segments of the lake. The data presented in the thermal study demonstrates that air temperatures during the winter months are a significant factor that affects river temperature and ice thickness within all regions (upper, mid, and lower) of Lake Pepin (i.e., increased air temperatures are correlated to decreased ice thickness, earlier ice out dates, and higher river temperatures).

The MDNR letter also summarizes temperature data to show that the water temperature changes after the thermal discharge is added to the system and there is evidence of the thermal discharge affecting public recreation and safety. As presented in the Thermal Study, both the Sargent and Lundy (2010) report and Stefan (1987) report concluded that residual heat from the plant reaches the upper portion of Lake Pepin but that climate variables are the significant factor in ice formation characteristics on the lake which is directly related to the public use of the lake for winter recreation.

Section 7. Conclusions

Historical and current studies have generally concluded that some residual heat from the plant reaches the upper end of Lake Pepin. However, these studies also determined that weather variables are the dominant factor in determining ice formation characteristics on Lake Pepin. Field biological monitoring of aquatic biota in the Mississippi River around and downstream of the plant continues to demonstrate that the plant operations have not significantly impacted the propagation and diversity of the river ecosystem (NSP 1973 through 2009; Ickes, 1999).

The study model estimated that if the plant operated at two-unit, full load EPU conditions, the additional temperature increase at the headwaters of Lake Pepin would be between 0.1°C to 0.4°C depending on river flow rate (with a mean of 0.2°C). However, based on model results, when air temperatures are -18°C or colder, all the residual heat from PINGP operations (even at EPU levels) can be dissipated before reaching the lake. Although, some residual thermal energy from the plant could be transferred to Lake Pepin, the study demonstrated that other factors (air temperature, river flow) have a greater influence on the river temperature and ice formation to the head of Lake Pepin than the plant discharge.

These analyses indicate that historical plant operations have not had a significant impact, if any, on ice formation in the lake and future plant operations at EPU power levels are not likely to significantly impact ice formation characteristics.

The MPCA determined that the information in the Thermal Study adequately demonstrated that the conditions of PINGP's NPDES Permit are met by the discharge of heated effluent from the plant and that the water quality standards will continue to be met downstream from the compliance monitoring point following the proposed EPU.

Section 8. Action Plan

Based on the conclusions of the study and agency input, Xcel Energy plans to conduct the following actions:

1. Continue to monitor as required per their NPDES permit the temperatures at the compliance monitoring point (Lock and Dam No. 3) after EPU for each Unit and verify that temperatures remain within permit limits.

2. Consult with the appropriate state agency regarding the need and scope for additional study of the impacts to ice formation characteristics on Lake Pepin if Post-EPU Lock and Dam 3 temperatures are significantly greater than the expected temperature increase as a result of the EPU.

3. Initiate discussions with the MDNR regarding the feasibility of utilizing a Public Recreational Use Survey of Lake Pepin to assess the winter use on Lake Pepin based on the comments received by the MDNR regarding winter recreation and public safety due to the ice thickness on Lake Pepin.

4. Reassess the ice characteristic predictions to validate the EPU has not impacted the ice formation on Lake Pepin approximately five years after the second EPU is implemented (Unit 2 is scheduled for 2015).

Dated: December 17, 2010

Northern States Power Company,
a Minnesota corporation

RESPECTFULLY SUBMITTED,

/s/

BRIAN R. ZELENAK
MANAGER, REGULATORY ADMINISTRATION

Attachments
cc: Official Service List

CERTIFICATE OF SERVICE

I, Lindsey L. Didion, hereby certify that I have this day served copies of the foregoing document or a summary thereof on the attached lists of persons:

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

xx via electronic filing

DOCKET NO. E002/M-08-690

Dated this 17th day of December, 2010

/s/

Lindsey L. Didion

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