STATE OF MINNESOTA

OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE ROUTE PERMIT APPLICATION FOR THE CAPX2020 HAMPTON – ROCHESTER – LA CROSSE 345 KV TRANSMISSION LINE	PUC DOCKET NO. E002/TL-09-1448 OAH DOCKET NO. 7-2500-20283-2

DIRECT TESTIMONY OF

AMANDA KING

On Behalf of

APPLICANT

NORTHERN STATES POWER COMPANY, A MINNESOTA CORPORATION

April 18, 2011

Exhibit _____

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I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND YOUR BUSINESS ADDRESS.

A. My name is Amanda King and my business address is 414 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am employed as a Senior Transmission Planning Engineer at Northern States Power Company, a Minnesota corporation ("Xcel Energy"). In that capacity, I serve as the lead planning engineer assigned to the Hampton to Rochester to La Crosse 345 kilovolt ("kV") Transmission Project ("Hampton – Rochester – La Crosse Project" or "Project").

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A. I earned a Bachelor of Science degree in Electrical Engineering from Iowa State University in 1999. From 1999 until 2001, I was employed by Xcel Energy as a Development Manager and was responsible for project management of large distribution, substation and transmission projects from design through construction. Since 2001, I have been employed by Xcel Energy as a Transmission Planning Engineer, with promotion to Senior Transmission Planning Engineer in 2006. My responsibilities include determining required transmission facilities using electric system models for powerflow and voltage/system stability analyses. In addition, I develop and coordinate long term plans to ensure system reliability and efficiency. I am the

lead planning engineer for the Project. As the lead planning engineer, I have primary responsibility for the engineering analysis supporting the identified needs for this Project. I am also responsible for analyzing predicted load flows on the facilities used to calculate anticipated magnetic field levels.

Also since 2004, I have served as Xcel Energy's technical representative for the CapX2020 Technical Team which provides input and guidance on studies to meet the State's transmission needs. This team was originally comprised of CapX2020 engineers but has expanded to include other engineers from transmission-owning utilities in the region and is now under the auspices of the Minnesota Transmission Owners organization. My resume is attached as Schedule 1.

Q. FOR WHOM ARE YOU TESTIFYING?

A. I am testifying on behalf of Xcel Energy, the applicant for a Route Permit in this proceeding.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide additional information regarding the load flow assumptions used for calculating magnetic field levels for the proposed 345 kV line. I am also providing testimony about the estimated load flows on the Fargo—St. Cloud 345 kV Project ("Fargo Project") and how they compare to the Project.

Q. WHAT SCHEDULES ARE ATTACHED TO YOUR TESTIMONY?

A. Schedule 1: Resume of Amanda King

II. MAGNETIC FIELD CALCULATIONS

Q. WHAT WAS YOUR ROLE IN ESTIMATING MAGNETIC FIELD CALCULATIONS FOR THE HAMPTON – ROCHESTER – LA CROSSE PROJECT?

A. Magnetic fields are primarily a function of the voltage and loading on the transmission line. It is also affected by the design of the structures and the conductors. I was responsible for analyzing the bulk electric transmission system with the new facilities installed and running powerflows on a computer model to determine the expected flow on each segment of the line between substations during peak and average system intact conditions. I then supervised an electrical engineer who used the amperage estimates as inputs to a computer model which provides the magnetic field calculations.

Q. WHAT INFORMATION WAS PROVIDED IN THE ROUTE PERMIT APPLICATION ABOUT ESTIMATED MAGNETIC FIELDS?

A. In the Route Permit Application ("Application"), we provided estimated magnetic field levels for the system intact, peak and average loading, year 2015 when the Project would be in service and for 10 years later, in 2025. As part of the Draft Environmental Impact Statement ("DEIS") process, we provided additional calculations for a double circuit configuration and 600 MVA loading levels. The magnetic field tables are available in the DEIS at Table 7.1.1.2-1 and Table 7.1.1.2-2.

Q. WHAT WAS THE HIGHEST FLOWS YOU ESTIMATED FOR 2015 AND 2025?

A. The highest system intact flow reported in the Application was 143 MVA, along the North Rochester to Mississippi River segment. To convert this flow to amperage, you divide the MVA flow by the voltage. In this case, you take the MVA, 143 MVA, and divide by 345 kV (.345 MV) and the amperage is 145 amps.

Q. IN THE FARGO PROJECT, CALCULATIONS FOR 600 MVA AND 1500 MVA WERE PROVIDED. WHAT ANALYSIS HAS THE COMPANY DONE TO DETERMINE IF IT WOULD BE APPROPRIATE TO CONSIDER THE SAME LEVELS HERE?

A. The Company considered potential flows on the 345 kV line facilities that could occur under the highest anticipated loading conditions at some point in the future. High line loading conditions could occur during off-peak demand periods if significant generation were to be located in the area and if there were an unplanned outage of a major Twin Cities 345 kV transmission source such as Byron—Prairie Island or King—Eau Claire. These off-peak demand periods generally occur for about six hours per day. Based on this scenario, planning engineers determined that the highest flow that could reasonably be expected to occur on the facilities would be on the North Rochester—Mississippi River segment of the line; flows on the Hampton—North Rochester segment would be lower. The North Rochester—Mississippi River segment could potentially experience approximately 600 MVA for short periods of time. Planning engineers also assessed whether there was a scenario could result in flows higher than 600 MVA. Planning engineers determined

that assuming load levels above 600 MVA would not be a reasonable assumption given the limited local generation that may develop in the area.

Q. BUT, AS YOU NOTED, INFORMATION ABOUT THESE LEVELS WERE INCLUDED IN THE FARGO PROJECT ROUTING PROCEEDING. WHY ARE THE LEVELS DIFFERENT HERE?

A. A key difference between the projects is the impact of generation connections on anticipated load flows. It is likely that smaller generator projects would interconnect with the electrical system in the Project area. In contrast, larger generators are expected to interconnect with the electrical system on the north end of the Fargo Project area. In the Fargo case, planning engineers estimated the highest loading levels that might occur on the line at some point in the future, considering a hypothetical high generation scenario where several thousands of megawatts (> 4,000 MW) of new generation is developed in North Dakota, South Dakota and Manitoba. Under this scenario, in any year, loading values of 600 MVA and 1,500 MVA would only potentially occur on the Fargo 345 kV line for up to six hours per day, for up to several days in a row.

It's also important to note that there is a network of bulk transmission lines in Minnesota that is set up like a hub and spoke where major facilities connect to the 345 kV ring around the Twin Cities. Generally, flows head from the west and the north toward the Twin Cities, the state's largest load center, and then move east and south. In the Twin Cities, power is drawn down from the lines to meet customer demand. Therefore, load flows "out" of the Twin Cities is lower than load flows headed "in" to the Twin Cities. Due to this general load

flow and the lack of large generators in southeast Minnesota, load flows on the Hampton – Rochester – La Crosse line will be lower than those on the Fargo line.

III. CONCLUSION

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

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AMANDA R. KING

EXPERIENCE

Xcel Energy/Northern States Power Company — Minneapolis, MN
June 1999 - current

Senior Transmission Planning Engineer — **June 2000 – Current**
Responsibilities Include:

- Serve as Xcel Energy's lead technical representative for the CapX 2020 Technical Team, responsible for the development and writing of the May 2005 Vision Study, MN Certificate of Need development and public meeting presentations. Testified as technical witness at the contested evidentiary hearing for the CapX Certificate of Need in July 2008. (July 2004 – current)
- Lead Transmission Planning Engineer for the CapX Hampton – Rochester – La Crosse 345 kV line project, representing the five CapX team companies. (2005 – current)
- Develop and maintain transmission planning's FERC and NERC Compliance Standards, including participation in the NERC/MRO audit. Prepare pre-audit documentation and participate in readiness and full audit interviews. (July 2007 – current)
- Lead development of the NSP 20 Year Transmission Plan study and report. Oversee the technical study work and prepare a yearly presentation to be presented to upper management; work with planning managers in other jurisdictions to prepare unified presentation for the entire Xcel Energy footprint. (January 2010 – current)
- Serve as study manager for two Renewable Energy Standard (RES) studies for the region, overseeing technical work performed by engineers. In addition, responsibilities include preparing written and oral study updates to be presented to management levels of Planning, Engineering, Operations, and others outside Xcel Energy, including regulatory officials and other utilities. The study resulted in the "Corridor Project", a 345 kV line from SW Minnesota to the Twin Cities.
  (January 2008 – March 2009)
- Serve as manager for engineering interns, leading hiring process, providing periodic reviews and being responsible for their professional development. Assist manager in interviewing and hiring of full time engineering staff. (2007 – current)
- Determine required transmission facilities using electric system models for powerflow and voltage/system stability analysis. Develop and coordinate long term plans to ensure system reliability and efficiency.
- Cooperate with Midwest ISO (MISO) in the implementation of their Transmission study process, while complying with FERC orders 888/889.
- Work closely with Independent Power Producers, MISO, Energy Markets, Xcel Energy's Transmission organization, and other utilities for successful completion of Generation Interconnection Studies, Facilities Studies, and Interconnection Agreements.
- Represent the organization in internal and external study groups to reliably plan and coordinate work on the transmission system, while meeting customer needs.

Development Manager — **June 1999 – June 2000**
Responsibilities Included:

- Responsible for Project Management of large distribution, substation and transmission projects from design through construction.
- Worked as a member of a team to balance the Northern States Power Co. corporate capital and operating budgets for 1999-2002
- Organized and facilitated project team meetings

EDUCATION

BS EE May 1999 – Iowa State University, Ames Iowa — Fall 1995 – Spring 1999
St Olaf College – Northfield, Minnesota — Fall 1994 – Spring 1995
Engineer in Training (EIT) Certification — Fall 2001