STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE APPLICATION OF GREAT RIVER ENERGY, NORTHERN STATES POWER COMPANY (D/B/A XCEL ENERGY) AND OTHERS FOR CERTIFICATES OF NEED FOR THREE 345 KV TRANSMISSION LINES WITH ASSOCIATED SYSTEM CONNECTIONS	PUC DOCKET NO. E002/CN-06-1115 OAH DOCKET NO. 15-2500-19350-2

TESTIMONY OF

JARED ALHOLINNA

On Behalf of

APPLICANTS

NORTHERN STATES POWER COMPANY, A MINNESOTA CORPORATION,
AND
GREAT RIVER ENERGY

May 15, 2008

Exhibit _____

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND YOUR BUSINESS ADDRESS.

A. My name is Jared Alholinna and my business address is 12300 Elm Creek Boulevard Maple Grove, Minnesota 55369.

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

A. I am employed by Great River Energy as Senior Transmission Planning Engineer. I am the lead transmission planning engineer responsible for the Twin Cities – Brookings County 345 kV Project. As the lead planning engineer, I have primary responsibility for the engineering analysis supporting the identified needs for this project. I am also primarily responsible for the engineering analysis to support the facilities proposed here to meet those needs.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A. I earned a Bachelor of Science degree in Electrical Engineering (controls emphasis) from Michigan Technological University in 1993. From 1995 to 2003, I completed additional coursework at the University of Minnesota in electrical engineering. In 2007, I earned a Master of Business Administration degree from the University of St. Thomas. My resume is attached as Schedule 1.

Q. FOR WHOM ARE YOU TESTIFYING?

A. I am testifying on behalf of Northern States Power Company, a Minnesota corporation ("Xcel Energy"), and Great River Energy, the joint Applicants for Certificates of Need in this proceeding.

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

A. The purpose of my testimony is to provide an overview of the need for and engineering analysis supporting the Twin Cities – Brookings County 345 kV Project. I am sponsoring and provided information supporting the sections in Chapter 4 (Community Reliability and Generation Outlet Needs); 5 (System Configuration Analysis); and 7 (System Configuration Alternatives, Double Circuiting and Generation) relating to the Twin Cities – Brookings County 345 kV Project. I am also sponsoring and available to answer questions regarding the Southwest Minnesota – Twin Cities EHV Development Electric Transmission Study ("Southwestern Minnesota Study"), Appendix A-4 to the Application.

II. NEED – GENERATION OUTLET CAPABILITY

Q. WAS THERE A PRIMARY IMPETUS FOR THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT?

A. Yes. The Twin Cities – Brookings County 345 kV Project was prompted by a need for additional generation outlet in southwestern Minnesota to support the increasing amounts of proposed wind generation in the Buffalo Ridge area, Minnesota's premier wind resource. The growth of wind generation development in the Buffalo Ridge area has placed increasing demands on the current transmission system to deliver this wind generated power to customers.

Q. PLEASE DESCRIBE PRESENT EFFORTS TO PROVIDE ADDITIONAL TRANSMISSION SUPPORT TO THE BUFFALO RIDGE AREA.

A. In 2003, the Commission granted Certificates of Need that approved the first set of major transmission infrastructure improvements in the Buffalo Ridge region. These improvements included a new 161 kV line, a new 345 kV line, and two new 115 kV lines ("SW Minnesota 825 MW Facilities"). These facilities were completed in early 2008.

Q. ARE THESE TRANSMISSION IMPROVEMENTS SUFFICIENT TO SUPPORT FUTURE WIND GENERATION AT BUFFALO RIDGE?

A. No. By the end of 2008, it is expected that this increased capacity will already be fully subscribed. As a result, shortly after obtaining the Certificates of Need for the SW Minnesota 825 MW Facilities, Xcel Energy initiated the Buffalo Ridge Incremental Generation Outlet Study ("BRIGO Study") to determine what improvements would be necessary to meet the growing demand for transmission support in the Buffalo Ridge area.

Q. WHAT WERE THE RESULTS OF THE BRIGO STUDY?

A. At the outset, BRIGO Study participants determined that critical high voltage transmission improvements, *i.e.*, 345 kV transmission facilities, would be required to meet the growing demand for wind generation in the Buffalo Ridge region. Given that such large improvements would take considerable time to permit, design and construct, the study focused on finding shorter term solutions that could increase capability by a few hundred megawatts of additional generation outlet capability until higher voltage projects could be developed. The BRIGO Study concluded that three new 115 kV transmission lines with associated upgrades of underlying facilities could increase transmission capacity in the area up to approximately 1,200 MW. Based on these findings, Xcel Energy sought

Certificates of Need from the Minnesota Public Utilities Commission ("Commission") to build these three new 115 kV transmission lines ("BRIGO Projects"). On September 14, 2007, the Commission granted the Certificates of Need for the BRIGO Projects.

The BRIGO Projects, shown on Figure 4-22 of the Application, include: (1) a 10- to 15-mile, 115 kV transmission line between the Lake Yankton Substation near Balaton, Minnesota and a new Marshall Municipal Utilities substation near Marshall, Minnesota; (2) a 15- to 20-mile, 115 kV transmission line between the Fenton Substation near Chandler, Minnesota and the Nobles County Substation northwest of Worthington near Reading, Minnesota; and (3) a 10- to 15-mile, 115 kV transmission line between the Yankee Substation south of Hendricks, Minnesota and the Brookings County Substation near White, South Dakota. Routing applications are currently pending for these three projects with the Commission. A facility permit application has also been filed with the South Dakota Public Utilities Commission for the South Dakota portion of the Yankee – Brookings County 115 kV project.

Q. WILL ADDITIONAL TRANSMISSION SUPPORT BE NEEDED IN THE BUFFALO RIDGE AREA AFTER THE COMPLETION OF THE BRIGO PROJECTS?

A. Yes. With the addition of the BRIGO Projects in the near term, the transmission system will be able to deliver approximately 1,200 MW of power from Buffalo Ridge. But even this increased capacity is insufficient to accommodate all of the wind generation projects proposed in the Buffalo Ridge area. For example, the Midwest Independent Transmission System Operator ("MISO") reported in March of 2008 that wind developers have made

applications to connect 14,236 MW of additional generation in the Buffalo Ridge area by 2014. The Twin Cities – Brookings County 345 kV Project will provide additional transmission capability to satisfy a portion of the wind generation interconnection requests arising from the Buffalo Ridge area.

Q. HOW MUCH ADDITIONAL GENERATION CAPACITY WILL THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT PROVIDE?

A. Once constructed, the Twin Cities – Brookings County 345 kV Project is projected to provide approximately 700 MW of additional capacity (above the BRIGO level), raising total generation outlet capacity in the Buffalo Ridge area from 825 MW (today) and 1,200 MW (BRIGO) to approximately 1,900 MW.

Q. **HOW DOES THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT ACHIEVE THIS LEVEL?**

A. The Twin Cities – Brookings County 345 kV Project provides a high capacity line from wind collection points in the Buffalo Ridge area to delivery points in the Twin Cities area. This line also works in concert with the existing transmission system to provide contingency backup for the regional transfer of the wind power. In addition, the underlying system improvements mitigate several existing limiters which inhibit the Buffalo Ridge outlet capacity and the associated system additions allow for the efficient delivery of the wind power to and from the high voltage network. Specifically, the Twin Cities – Brookings County 345 kV Project creates an additional path for power from the Buffalo Ridge area to the east, thereby avoiding two limiters, Lakefield Gen – Wilmarth 345 kV line and the Granite Falls – Willmar 230 kV line.

III. REGIONAL RELIABILITY

Q. HOW WILL THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT IMPROVE REGIONAL SYSTEM RELIABILITY?

A. Generally speaking, a higher voltage transmission grid provides the backbone necessary for regional reliability. Regional reliability is related to the efficient transfer of bulk power across regions and between regions. By constructing additional 345 kV transmission lines, the regional system is benefited as a whole because those additional connections provide for a more robust transmission system that is able to better withstand system contingencies. A more robust bulk power system also enhances efficient transfer of power across and between regions, which promotes and supports fair and competitive wholesale electric markets to meet the needs of all regional market participants, rather than just those of the individual utility's customers or a specific generation resource type.

The result of the CapX2020 projects, including the Twin Cities – Brookings County 345 kV Project, is a reliable high voltage regional network that facilitates lower cost or renewable generation to be dispatched by MISO. The Twin Cities – Brookings County 345 kV Project will improve the reliability of the transmission grid in the region while ensuring compliance with national electric reliability standards and relieving significant points of congestion on the grid.

IV. COMMUNITY RELIABILITY

Q. WILL THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT ALSO ADDRESS LOCAL COMMUNITY SERVICE ISSUES?

A. Yes. While the primary purpose of the Twin Cities – Brookings County 345 kV Project is to increase transmission available to support the wind generation in the Buffalo Ridge region, these facilities will also address long-term reliability needs in communities in the project area.

Q. PLEASE PROVIDE AN EXAMPLE OF A LONG-TERM COMMUNITY SERVICE RELIABILITY BENEFIT OF THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT.

A. Many communities lie within the area affected by the installation of the Twin Cities – Brookings County 345 kV Project. Community reliability benefits will be created by the 345 kV facilities, which will provide additional capacity and voltage support for the area electrical system.

The New Ulm and Redwood Falls areas will benefit from the presence of this project because the new Franklin 345/115 kV transformer will provide a much needed new power supply point to the 115 kV system. Also, the Franklin 345/115 kV transformer will benefit the Olivia and Bird Island areas. This includes communities as far west as Renville, north to Lake Lillian, east to Brownton, and south approximately two-thirds of the distance from Bird Island to Franklin.

In addition, the Hazel Creek – Lyon County 345 kV segment will strengthen the system's ability to serve the Granite Falls area and surrounding territory, as far east as Sacred Heart, north and west to Montevideo and Clara City, and south to the Marshall area.

Q. WILL THERE BE ANY COMMUNITY RELIABILITY BENEFITS OF THE PROJECT TO THE GREATER TWIN CITIES AREA?

A. Yes. The presence of this 345 kV Project will electrically tie communities in the southwest metro to the larger metro region. This grouping extends from Hutchinson on the northwest, to Gaylord on the southwest, to Belle Plaine on the southeast, and Waconia on the northeast.

In addition, our proposal includes a new 345 kV connection and a new 345/115 kV transformer at Lake Marion Substation that will provide significant load serving support in the surrounding growing communities. Absent this 345 kV connection, it would be necessary to periodically build new 115 kV lines from the existing 345/115 kV substations on the north, southward through the already developed load area.

Q. CAN THESE SAME COMMUNITY RELIABILITY BENEFITS BE ACHIEVED IF THE 345 KV LINE WERE CONNECTED AT SOME LOCATION OTHER THAN THE LAKE MARION SUBSTATION?

A. No. Because of the configuration of the load serving system surrounding the Lake Marion Substation, a connection at Lake Marion Substation is critical to avoid a significant increase in system losses and overloads to the existing system. The connection also eliminates the need to construct additional transmission

lines from a different location into the existing Lake Marion Substation to provide for adequate load serving capability.

Q. PLEASE ELABORATE.

A. The southern and southwestern parts of the metro are primarily served by a 115 kV network with power supply coming from four sources, all located to the north: Eden Prairie 345/115 kV, Blue Lake 345/115 kV, Black Dog generation and Inver Hills 345/115 kV. The 115 kV network supplies some load directly, but a majority of the load is supplied from the underlying 69 kV system whose sources are the 115/69 kV transformers at the Carver County, Scott County, Glendale, Burnsville and Lake Marion substations. The Helena and Lake Marion 345/115 kV transformer additions provide new power supply points to the 115 kV system precisely where they are most needed – on the south side of the area. The Lake Marion 345 kV/115 kV transformer is needed, as described earlier in my testimony and in the Southwest Minnesota Study (Appendix A-4 at pages 36-37 of the Application), to avoid construction of additional transmission infrastructure in the area to support the 115 kV electrical network located to the north of the existing Lake Marion Substation.

For example, if the new 345 kV connection were made to the south of the existing Lake Marion Substation but not at the substation, this would result in higher losses on the system and cause an overload to the Black Dog – Riverwood 115 kV line. To address this overload in a long-term practical matter, additional transmission facilities would be required, namely an additional 115 kV line connecting the new "southern" substation with the existing Lake Marion Substation and likely a rebuild of the existing 115 kV line between the two

substations. Even if these new facilities were built to address the overload, they would not alleviate the increase in losses caused by the geographical disconnect between the Lake Marion Substation and the new 345 kV line.

Q. WHAT IS THE APPLICANTS' ULTIMATE RECOMMENDATION WITH RESPECT TO THE LOCATION OF THE PROPOSED 345 KV/115 KV TRANSFORMER?

A. Applicants request that the 345 kV transmission line tie directly into the Lake Marion Substation.

V. SYSTEM CONFIGURATION ANALYSIS

Q. WERE YOU INVOLVED IN THE STUDY WORK THAT WAS UNDERTAKEN IN SUPPORT OF THE APPLICANTS' PROPOSED CONFIGURATION FOR THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT?

A. Yes. I was involved in the technical review of the Southwestern Minnesota Study.

Q. WHAT DID THE SOUTHWESTERN MINNESOTA STUDY EVALUATE?

A. The Southwestern Minnesota Study was undertaken to examine what transmission improvements could be made beyond the 825 MW improvements and the BRIGO Projects to increase generation outlet capability in Southwestern Minnesota. The Southwestern Minnesota Study is attached as Appendix A-4 to the Application. The Southwestern Minnesota Study started with a base plan of a single circuit 345 kV line from the Brookings County Substation to the southwestern Twin Cities. The four primary options studied included: (1) the Base Plan; (2) Base Plan – Double Circuit; (3) System Alternate, Brookings

County to Blue Lake and (4) System Alternative (revised). Planning engineers also considered, but rejected a no build alternative.

Q. PLEASE DESCRIBE THE COMPONENTS OF THE TRANSMISSION SYSTEM ALTERNATIVES.

A. Each alternative studied is described below.

Base Plan: The Base Plan configuration is comprised of a single circuit 345 kV line from the Brookings County Substation through Lyon County, Franklin, Helena, Lake Marion and ending at Hampton Corner. It also includes a 345 kV line from Lyon County to a new Hazel Creek Substation near Hazel Run and a 230 kV line between Hazel Creek and Minnesota Valley Substation near Granite Falls.

Base Plan - Double Circuit: This configuration is the same as the Base Plan but also includes a double 345 kV circuit segment portion between Lyon County, Franklin and Helena.

System Alternative, Brookings County to Blue Lake: This option included a Brookings County to Lyon County 115 kV line and a Lyon County – Hazel Creek – Blue Lake 345 kV line.

System Alternative (revised): This option included the following 345 kV line configuration: Brookings County – Lyon County – Hazel Creek – West Waconia – Blue Lake 345 kV and a West

Waconia – Helena – Lake Marion – Hampton Corner 345 kV line.

Q. WERE ANY OTHER ALTERNATIVES DEVELOPED AFTER THE SOUTHWESTERN MINNESOTA STUDY?

A. Yes. Planning engineers developed a single circuit alternative comprised of a 345 kV line between Brookings County – Lyon County – Hazel Creek – West Waconia – Helena – Lake Marion – Hampton Corner ("West Waconia" alternative). This West Waconia alternative would parallel the Minnesota Valley – Panther – McLeod – Blue Lake 230 kV line between Minnesota Valley and West Waconia Substation and bypass the proposed Franklin Substation connection.

Q. PLEASE DESCRIBE THE PROPOSED CONFIGURATION FOR THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT.

A. The proposed configuration is the configuration referred to as the Base Plan – Double Circuit option in the Southwestern Minnesota Study. The proposed configuration is depicted in Figure 5-8 of the Application.

Q. WHY WAS THE PROPOSED CONFIGURATION FOR THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT CHOSEN?

A. The proposed configuration was chosen because the Southwestern Minnesota Study confirmed that it was the best performing option. The proposed configuration had the best results with regard to steady state and dynamic power system performance, prevention of inadvertent (loop) power flows, power transfer capability and power and energy losses, practicality (logistics of

construction and operation) and price. In addition, the double circuit in the proposed plan increases the power flow from the Buffalo Ridge area to the Twin Cities creating a more direct path for the power. This is due to decreased impedance of the double circuit line and thus the amount of inadvertent (loop) flows to other areas of the transmission system is minimized and losses are reduced. This double circuit also carries approximately an additional 320 MW of power when compared to other options that do not have a double circuited portion.

The Southwestern Minnesota Study also demonstrated that the proposed configuration will improve the electric system reliability in communities throughout the Project Area as I described previously.

Q. HAVE THERE BEEN ANY OTHER STUDY EFFORTS THAT AFFECT THE CONFIGURATION PROPOSED FOR THIS PROJECT?

A. Yes. Since the completion of the Southwestern Minnesota Study, the Renewable Energy Standard ("RES") legislation was enacted, new facilities have been added to the electrical system and further analysis has been undertaken to identify improvements that could provide significantly more outlet capability in Southwestern Minnesota. Currently, the major limiter preventing further development of outlet capability is the Minnesota Valley – Panther – McLeod – Blue Lake 230 kV line ("Minnesota Valley – Blue Lake 230 kV line"). In the Southwestern Minnesota Study, the plan was to reconductor the Minnesota Valley – McLeod segment of the line to increase its capacity.

The utilities are presently performing the Minnesota Valley – Blue Lake 230 kV line "Corridor Study" that generally analyzes how to further increase generation outlet capability in the western part of the State. The Corridor Study is scheduled to be completed in 2008 with a Certificate of Need application early next year. If the Certificate of Need for that line is granted and when this rebuild project and associated underlying system upgrades are constructed, early analyses suggest generation outlet capability could exceed 3,000 MW.

Early analyses also indicate that given the dramatic increase in demand for renewable generation created by the RES, the entire Minnesota Valley – Blue Lake 230 kV line should be replaced by or upgraded to 345 kV, potentially double circuited, to allow more generation development in the Buffalo Ridge area.

Preliminary analyses further indicate that the voltage of the connection between Minnesota Valley Substation and Hazel Creek Substation should be the same as the voltage of the connection between Minnesota Valley Substation and Blue Lake Substation to maximize the performance of the electrical system.

Q. ARE THE APPLICANTS REQUESTING CONSIDERATION OF ANY CHANGES TO THE CONFIGURATION PROPOSED IN THE APPLICATION?

A. Yes. The Application proposes a new 230 kV line between the Hazel Creek and Minnesota Valley substations. This new 230 kV line would replace a segment of the existing Lyon County – Minnesota Valley 115 kV circuit. The results of the Southwestern Minnesota Study, Appendix A-4 of the Application, confirm that in the near-term, 230 kV is the appropriate voltage for this line segment. Based

on the recent study efforts I have described, however, the Applicants now believe that this line segment should be constructed as a single circuit 345 kV line, to match the voltage of the anticipated Minnesota Valley – Blue Lake 230 kV rebuild project, but be operated at 230 kV until other upgrades in the area are complete.

Q. DOES THE MINNESOTA VALLEY – BLUE LAKE 230 KV CORRIDOR STUDY ALSO IMPACT THE APPROPRIATENESS OF THE WEST WACONIA ALTERNATIVE?

A. Yes. The West Waconia Alternative includes a 345 kV transmission line which has the potential to be built alongside the vicinity of the existing Minnesota Valley – Blue Lake 230 kV corridor. Given the anticipated rebuild or replacement of the Minnesota Valley – Blue Lake 230 kV line with a 345 kV voltage facility, the West Waconia Alternative is no longer a reasonable system configuration alternative because two 345 kV transmission facilities would be constructed near each other, which would place both at equal risk of an outage during a single significant event, *e.g.*, storm. As a result, the reliability of the transmission system would be reduced. Also, geographically separating the lines would allow for additional generation interconnects.

VI. ALTERNATIVES

Q. PLEASE DESCRIBE THE ALTERNATIVES TO CONSTRUCTING THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT THAT WERE CONSIDERED BY THE APPLICANTS.

A. As part of the study process that resulted in the proposal to construct the CapX2020 Group 1 Projects, the Applicants considered a number of alternatives including: (1) system configuration alternatives, such as different substations and voltages, (2) non-system configuration alternatives, such as upgrading or double circuiting, (3) "no build" alternative and (4) using generation as an alternative to transmission.

Q. THERE IS DEMAND FOR WIND GENERATION OUTLET IN SOUTHWESTERN MINNESOTA. WHY ARE APPLICANTS PROPOSING A 345 KV LINE INSTEAD OF SOMETHING BIGGER, LIKE A 500 KV OR 765 KV LINE?

A. Planning engineers designed the 345 kV solution to provide significant additional generation outlet capability in a manner compatible with the existing transmission system and for a reasonable cost. Our Response to Department of Commerce Office of Energy Security Information Request No. 40 provides additional discussion. This Response is attached to the direct testimony of Mr. Daniel Kline as Schedule 2.

Q. HOW WOULD THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT COMPLEMENT THE TRANSMISSION SYSTEM IF MISO'S 765 KV STUDIES RECOMMEND 765 KV FACILITIES IN MINNESOTA?

A. The Twin Cities – Brookings County 345 kV Project would fit in very well with a 765 kV overlay. If MISO recommends in the future to pursue 765 kV lines for this area, the proposed Twin Cities – Brookings County 345 kV Project will provide a foundation for these higher voltage lines to be more easily integrated into the transmission system.

Q. WERE LOWER VOLTAGE LINES CONSIDERED FOR THE TWIN CITIES – BROOKINGS COUNTY 345 KV PROJECT?

A. Yes. A lower voltage line was considered on the west end. Planning engineers initially considered, as part of the System Alternative, a 115 kV connection between Brookings County Substation and Lyon County Substation. This resulted in poor steady state performance which led to this segment being upsized to 345 kV in the proposed plan. Planning engineers determined that this segment did not need to be double circuit 345 kV because a second circuit would not improve system performance or increase generation outlet. As I described in response to Minnesota Center for Environmental Advocacy Information Request No. 9, which is attached as Schedule 2, the transfer capability of the transmission system is limited not by the capacity of this segment or line impedance, but rather is limited by the adjacent and underlying transmission systems.

Q. DID THE APPLICANTS CONSIDER A "NO BUILD" ALTERNATIVE?

A. Yes. The no-build alternative was considered and found to be unreasonable. The primary need for the Twin Cities – Brookings County 345 kV Project is to increase the generation outlet from Buffalo Ridge. If this project is not permitted and constructed, the generation capability for areas in and around Buffalo Ridge would be limited to approximately 1,200 MW after the BRIGO facilities are constructed. In addition, communities along the proposed 345 kV line will not realize any benefits from having a more robust electric system that will result from the construction of this 345 kV Project.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

2177059v1