

- Non Public Document – Contains Trade Secret Data
 Public Document – Trade Secret Data Excised
 Public Document

Xcel Energy

Docket No.: E002, ET2/CN-06-1115

Response To: Elizabeth Goodpaster Information Request No. 2
Wind on the Wires, et al

Date Received: January 9, 2008

Question:

The CapX2020 Group I projects Certificate of Need Application (“Application”) does not appear to include all the underlying transmission upgrades associated with the Brookings – Twin Cities 345 kV line that were identified as needed to achieve the full 1900 megawatt capacity on the proposed Brookings – Twin Cities transmission line, in the “Southwestern Minnesota – Twin Cities EHV Development Electric Transmission Study” (November 9, 2005), Section 8, p. 39-40.

- (a) Please identify all of the underlying transmission upgrades needed to achieve the full 1900 MW capacity of the Brookings – Twin Cities 345 kV line are included in the Application and those that have been excluded.
- (b) If the Application does not include all of the necessary underlying upgrades, please explain why.
- (c) To the extent that the underlying transmission upgrades needed to achieve the full 1900 MW capacity on the Brookings – Twin Cities 345 kV line have been excluded from the Application, please identify and describe the plan to complete the underlying transmission upgrades and anticipated timing for such. *(Identify and describe the plan and timing on both underlying upgrades that require a Certificate of Need as well as upgrades that do not require a Certificate of Need.)*

Response:

The Application describes an outlet level of approximately 1,800 to 1,900 MW that could be achieved by construction of the Twin Cities – Brookings County 345 kV Project. The Project is based on analyses completed in the Southwestern Minnesota – Twin Cities EHV Development Electric Transmission Study (“Southwestern Minnesota Study”). (Appendix A-4.) In the Southwestern Minnesota Study, certain generation patterns comprising the 1,800 to 1,900 MW were assumed for the Buffalo Ridge Area and facilities needed to achieve these levels were identified. Those facilities are listed in Section 8 of the Southwestern Minnesota Study and included a

reconductoring of the Minnesota Valley – Panther – McLeod 230 kV transmission line.

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. Additional studies are currently underway to identify additional transmission improvements to provide additional generation outlet capability.

The limiter preventing further development of outlet capability is the Minnesota Valley – Panther – McLeod – Blue Lake 230 kV line. In the Southwestern Minnesota Study, the plan was to reductor the line to increase its capacity. Planning engineers have concluded that given the dramatic increase in demand for renewable generation created by the RES, the entire Minnesota Valley – Panther – McLeod – 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.¹ It is anticipated that study work will be completed in 2008 with a Certificate of Need application being filed shortly thereafter. When this rebuild project is complete, generation outlet capability could exceed 3,000 MW.

As a result of these events, the list of facilities for the Twin Cities – Brookings County 345 kV Project has been adjusted. A list of the facilities that are part of the Twin Cities – Brookings County 345 kV Project are shown on Exhibit 1, attached. When the Exhibit 1 facilities have been constructed, outlet capability in the Buffalo Ridge Area is expected to reach 1,800 to 1,900 MW.

There are three significant modifications to the list, as follows:

- The 115 kV transmission lines, Brookings County – Yankee #2 and Brookings County – Toronto are not included. The two 115 kV lines were designed to provide access to the high voltage bulk transmission system of 230 kV and 345 kV lines. In transportation terminology, the higher voltage lines are the freeway and the lower voltage lines are the on-ramps to the freeway. (See response to DOC00022). The Brookings County – Yankee 115 kV #2 transmission line is not included because it is being constructed as part of the Buffalo Ridge Incremental Generation Outlet project that was approved in Docket No. E-002/CN-06-154, Order Granting

¹ The Southwestern Minnesota Study identified the Minnesota Valley – Panther – McLeod 230 kV line segment as being in need of reductor. To provide additional generation outlet capability, the entire circuit, which stretches from Minnesota Valley to Blue Lake Substation must be rebuilt.

Certificates of Need (Sept. 14, 2007). A route application was filed for this line on January 18, 2008. The Brookings County – Toronto 115 kV line was removed because it is not needed to achieve the 1,800 to 1,900 MW outlet capability. Rather, it would provide support to generation placed at Toronto Substation. If additional generation develops on the north end of the Ridge, then this line may be constructed as part of a specific generation project through its interconnection study.

- The Minnesota Valley – Panther – McLeod 230 kV reconductoring project was removed because rebuilding or replacement of the Minnesota Valley – Blue Lake 230 kV line is the next step in developing further outlet capacity. Additionally, further analyses have determined that identified outlet capacity level can be achieved for the Buffalo Ridge Area without reconductoring the line based on upgrades that have taken place. We note that the potential effect of the construction of the Minnesota Valley – Blue Lake 230 kV project on the outlet capability of the system is currently unclear. If the anticipated double circuited 345 kV structures are placed in the same right-of-way as the existing line, the existing line would have to be taken out of service, thereby reducing the outlet capability of the system. This work could not begin until the Twin Cities – Brookings County 345 kV Project is in service because, as noted in the Southwestern Minnesota Study, “outage of this line causes severe reductions in permissible SW Minnesota generation outlet.” (Application Appendix A-4, p. 37.) If the 345 kV structures were placed parallel to the existing line, the Minnesota Valley – Blue Lake 230 kV line might be able to operate during the construction period and construction could potentially begin prior to the in-service date of the Twin Cities – Brookings County 345 kV Project.

Exhibit 1 contains further discussion of more minor modifications of the list contained in the Southwestern Minnesota Study.

The list of facilities for the Twin Cities – Brookings County 345 kV Project will likely be further refined to coordinate with the generation outlet studies currently underway and the recommended facilities that result from those studies. Significantly, preliminary analyses have concluded that the connection between the Minnesota Valley Substation and a new Hazel Creek Substation should be upgraded from 230 kV to either single circuit or double circuit 345 kV in light of the anticipated Minnesota Valley – Blue Lake 230 kV project. To maximize performance of the system, 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. Applicants will provide all parties with additional information as it becomes available.

Response By: Jared Alholinna
Title: Senior Transmission Planning Engineer
Department: Transmission Planning, Contracts & Strategy
Company: Great River Energy
Telephone: 763-241-5797
Date: March 19, 2008

EXHIBIT 1

LIST OF TWIN CITIES – BROOKINGS COUNTY 345 kV PROJECT FACILITIES

High Voltage Transmission Lines

Brookings County – Lyon County 345 kV transmission line
Lyon County – Hazel 345 kV transmission line
Lyon County – Franklin – Helena 345 kV, double circuit transmission line
Hazel Creek – Minnesota Valley – 230 kV transmission line
Helena – Lake Marion – Hampton Corners 345 kV transmission line

As noted in the main response, the two 115 kV projects suggested in the Southwestern Minnesota Study (Brookings County – Yankee #2 and Brookings County – Toronto) are not included.

Rebuilds/Reconductor

Lake Marion – Kenrick – Dakota Heights – Burnsville 115 kV (reconductor)
Minnesota Valley – Maynard – Kerkhoven Tap 115 kV (rebuild)
Helena – Blue Lake 345 kV (reconductor)
Grant County – Morris 115 kV (reconductor)
St. Cloud Tap – Wakefield 115 kV (reconductor)
Wilmarth – Eastwood 115 kV line (rebuild)

As noted in the main response, the Minnesota Valley – Panther – McLeod 230 kV reconductoring project is not included. In addition, as part of the Southwestern Minnesota Study, planning engineers identified the existing Canby – Burr Junction 115 kV line as needing to be rebuilt to ensure that the existing lower voltage circuits are not overloaded if one of the new high voltage transmission lines fails. The rebuild of the Canby – Burr Junction 115 kV line, however, is no longer appropriate because it was only required if the Toronto line were constructed.

The other change to the rebuild/reconductor list is that the Wilmarth – Eastwood 115 kV line is now listed as a rebuild. The Wilmarth – Eastwood line is currently limited by approximately 3.7 miles of 795 ACSR conductor. The rest of the line is constructed of 795 ACSS conductor. Eliminating the limitation on this line will require removing the existing 795 ACSR conductor and replacing it with 795 ACSS conductor (matching the rest of the line). Because of the design standards required to

support ACSS conductor, it is assumed this will require a rebuild of the limiting segment.

Transformers, Capacitors and Shunt Reactors

<u>Transformers</u>	<u>MVA</u>	
Brookings Co 345/115 kV transformer #2	1 x 448	
Lyon Co 345/115 kV transformer	1 x 448	
Lake Marion 345/115 kV transformer	1 x 448	
Hazel 345/230 kV transformer	2 x 336	
Eden Prairie #10 transformer replacement	448→672	(alternative: add 345 kV line breaker)
Franklin 115/69 kV transformer replacement	2 x 47→2 x 70	
Morris 230/115 kV #2	100→150	
Willmar 115/69 #2	<u>112</u>	
Total Increase	2,448	

Reactive (voltage control) facilities

<u>Shunt Capacitors</u>	<u>MVAR</u>
Brookings Co 115 kV	2 x 40
Lyon Co 115 kV	2 x 30→3 x 40
Lk Yankton 115 kV	4 x 20→4 x 40
Hazel 230 kV	3 x 60
Franklin 115 kV	4 x 30
McLeod 115 kV	4 x 30
Blue Lk 115 kV	1 x 80
Forbes 500 kV capacitor #3 (or equivalent)	<u>1 x 300</u>
Total Increase	1,020

<u>Shunt Reactors</u>	<u>MVAR</u>
Brookings Co	1 x 50
Lyon Co	1 x 50
Hazel	1 x 50
Franklin	2 x 50
Lk Marion	<u>1 x 50</u>
Total	300

The transformers that are part of the Twin Cities – Brookings County 345 kV Project are the same as those identified in the Southwestern Minnesota Study. (See Application Appendix A-4, p. 39.) These new units are located along major transmission corridors for wind outlet and, thus, are needed regardless of the assumptions made regarding locations of new generation.

The capacitors and shunt reactors that are part of the Twin Cities – Brookings County 345 kV Project are also the same as those identified in the Southwestern Minnesota Study which presumed certain general generation locations. (See Application Appendix A-4, pp. 39-40.) The precise size and locations of these facilities, however, will be finalized based on the ultimate locations of new generators that connect to the electrical system and the results of their respective interconnection studies. The specific types of wind generators that connect to the system will also affect these sizes and locations, particularly the sizes and locations of the shunt reactors. As shunt reactors and capacitors do not require the lead-time required of transformers and transmission lines, it makes sense to postpone determination of their precise locations until it can be more accurately determined which installations will result in the most efficient system support.

Substations New

Helena 345 kV Switching Station near Jordan
Hampton Corner 345 kV Switching Station

The Southwestern Minnesota Study also recommends a new Hazel Creek Substation. This substation is being constructed as part of the Buffalo Ridge Incremental Generation Outlet project and will be permitted separately.

Substations Modified

Substations-modified

Lyon Co	add 345 yard, 345/115 kV transformer, 115 kV capacitors & breakers, shunt reactor
Franklin	add 345 yard, 345/115 kV transformer, 115 kV capacitors & breakers, shunt reactors; Replace 115/69 kV transformers
Lk Marion	add 345 yard, 345/115 kV transformer, 115 kV capacitors & breakers, shunt reactor
Lk Yankton	upgrade 115 kV shunt capacitors to 4 x 40 MVAR
Blue Lake	add 115 kV shunt capacitor
Minn Valley	add 230 kV ring bus

The Southwestern Minnesota Study identified four other substations requiring modifications. (See Application Appendix A-4, p. 40.) The modifications to the Forbes 500 kV Substation are already being done as part of the Forbes Bus Reconfiguration. The modifications to the Yankee Substation and the Brookings County Substation are being completed as part of the Buffalo Ridge Incremental

Generation Outlet project. The modifications to the Toronto Substation are not required because the Brookings County – Toronto line is no longer being constructed.

2129954v5