BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF NORTH DAKOTA

In the Matter of the Application of	)	
OTTER TAIL CORPORATION, d/b/a	)	**Case No. PU-06-481**
Otter Tail Power Company, for an	)	
Advance Determination of Prudence	)	
for the Big Stone II Generating Plant	)	

* * * * * * * * * * * * * *

DIRECT TESTIMONY

OF

TIMOTHY J. ROGELSTAD, PE

MANAGER OF DELIVERY PLANNING

OTTER TAIL POWER COMPANY

DECEMBER 1, 2006

BEFORE THE NORTH DAKOTA PUBLIC SERVICE COMMISSION

DIRECT TESTIMONY OF TIMOTHY J. ROGELSTAD, PE

I. INTRODUCTION

Q: Please state your name and business address.

A: My name is Timothy J. Rogelstad. My business address is 215 South Cascade Street, Fergus Falls, Minnesota 56537.

Q: By whom are you employed, and in what capacity?

A: I am employed by Otter Tail Power Company ("Otter Tail" or "OTP"), a division of Otter Tail Corporation, as the Manager of Delivery Planning.

Q: What is your educational background?

A: I graduated from North Dakota State University in 1989 with a Bachelor's Degree in Electrical and Electronics Engineering.

Q: What is your employment history?

A: I have been an employee of Otter Tail Power Company for the past seventeen years. I started with the company in 1989 as a substation design engineer in the System Engineering Department. In 1992, I transferred to the Transmission Planning department as a Planning Engineer. In 1998, I was promoted to supervisor of Transmission Planning, and in 2002 I was promoted to Manager of Delivery Planning.

Q: What are your responsibilities in your current position?

A: My current job responsibilities include managing four primary areas – transmission planning, transmission contracts, capital allocation, and reliability performance. In this proceeding, I have two direct accountabilities which include overseeing the transmission studies completed for this project, as well as overseeing the project management for the Big Stone Unit II transmission project.

Q: What work experience have you had relating to transmission planning?

A: In most of my professional career I have been involved with transmission planning. My experience ranges from being involved in the details of building models for transmission studies and completing transmission studies, to acting as project manager for a 100 mile 230 kV transmission project, to managing a department that is responsible for transmission planning at Otter Tail.

Q: Have you been involved in any regional planning activities?

A: Yes, I have. Over my career, I have been involved in a number of planning activities at the regional level with the Mid-Continent Area Power Pool (MAPP) and the Midwest Independent Transmission System Operator (MISO) and with other organizations as well. These activities include the following:

- MAPP Model Building Working Group
- MAPP Transmission Reliability Working Group
- MAPP Line Loading Relief Working Group
- MAPP Design Review Sub-Committee

- MAPP Planning Committee
- Past chair of the MAPP RRV SPG (Red River Valley Sub-Regional Planning Group)
- MISO Planning Sub-Committee
- CAPX Technical Team
- CAPX Tariff Team
- Upper Great Plains Transmission Coalition

Q: Are you a registered professional engineer?

A: Yes, I am a registered professional engineer in the states of Minnesota, North Dakota and South Dakota.

Q: What professional organizations do you belong to?

A: I am currently a member of Institute of Electrical and Electronics Engineers (IEEE). My involvement in this organization has included being Past chair of the Red River Valley Section. I am also a member of the Minnesota Society of Professional Engineers.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to describe the transmission planning work that has gone into the selection of the Big Stone Transmission Project. I explain certain requirements that must be met in order to interconnect a new generation source to the

transmission grid and to deliver electricity to customers. I also describe the regional benefits associated with the new transmission facilities.

Q: Please summarize your testimony.

A: The Co-owners are continually engaged in planning efforts to ensure that the transmission system will function as required. When new generation is planned, utilities must complete a number of planning studies to investigate the impact of the new facility on the transmission system and to determine what new transmission infrastructure is required to accommodate the new facility to ensure that all regional reliability standards are adhered to. In this case, the Co-owners have undertaken several planning steps to determine how best to interconnect Big Stone Unit II to the transmission system. As is typical, the planning began with screening studies to identify certain transmission facilities with the greatest potential to provide a reliable interconnection. This work was followed with a specific Interconnection Study required by the Midwest Independent Transmission System Operator (MISO) and then with a Delivery Service Study to determine the impacts of the proposed interconnection on a broader geographic basis. Planning continues until the new facilities are actually placed into operation and even then, additional transmission studies continue.

The planning studies that were undertaken in this case with respect to Big Stone Unit II show that additional transmission in South Dakota and Minnesota is required to accommodate the proposed generation unit.

The planning for the project has also taken into account other potential transmission and generation needs in the region that have been identified in other planning efforts. Because of this coordination, the Big Stone Transmission Project is highly compatible with other possible projects and transmission plans in the region.

The Design Review Subcommittee of the Mid-Continent Area Power Pool ("MAPP") recently conditionally approved the Interconnection Study and the Delivery Service Study which forms the basis for the facilities proposed in this matter. We expect final approval of these same studies by the Midwest Independent Transmission Systems Operator ("MISO") by the end of January 2007.

III. TRANSMISSION PLANNING

Q: Can you describe generally the transmission planning process?

A: Generally, transmission planning is an ongoing, continuous process of ensuring that the large transmission grid in this country is operated in a reliable and economic fashion. The transmission grid is a huge machine. In fact, the National Academy of Engineering recently selected electrification as the single greatest engineering achievement of the 20th Century, above the automobile, computers, space exploration, and many other achievements. The connected electrical transmission grid has likewise been referred to as the most complicated machine operating today.

Transmission planning in the Dakota's and throughout the country is done primarily on a regional basis. In this region, transmission engineers and other stakeholders work with MAPP and MISO, and the various regulatory agencies, to

develop plans to ensure the continued reliable and economical operation of the transmission system. MAPP and MISO maintain various committees, such as its Subregional Planning Groups (SPGs) and other transmission planning groups, to focus on the additional transmission infrastructure in the region.

MISO participates with MAPP and the regional utilities in planning and works in close coordination with the SPGs. As a federally designated Regional Transmission Organization, MISO has the responsibility of developing plans for maintaining the transmission system throughout the MISO footprint.

Q: Is it necessary to consider regional impacts when performing transmission planning?

A: Yes, it certainly is. We want to provide a transmission grid that operates as efficiently as possible. Rather than identify a separate plan for each transmission need, we as transmission planners look for synergies of potential transmission projects that will address multiple needs within a region. What geographic area encompasses a region varies from study to study but it is generally broader than a single utility's service area. Also, because of the regional nature of the transmission system, transmission additions can have a far-reaching impact on the system. We have to ensure that new additions do not have unanticipated adverse impacts on other parts of the grid.

Q: Are there regional needs for additional transmission in the region that includes North Dakota, South Dakota and Minnesota?

A: Yes, there certainly are. Transmission investment nationally declined in real dollar terms from 1975 to 1998, despite increasing electrical demand. The electrical transmission system in the Dakota's and Minnesota mirrors this trend, consisting primarily of a network of transmission lines, most of which were built several decades ago. Stagnant investment combined with ongoing load growth is causing constraints in the regional transmission system. North Dakota has tremendous energy resources (coal and wind) available to export, but transmission is severely limiting the ability to develop substantial new generation in North Dakota. In reviewing the MISO interconnection queue, ND had over 3,500 MWs of generation interconnection requests. The existing generation exceeds the amount of load in North Dakota and as a result relies on the transmission system to move the power out of North Dakota.

IV. TRANSMISSION PLANNING FOR BIG STONE

Q: Can you describe generally the transmission planning process that has been undertaken to accommodate the proposed second unit at Big Stone?

A: Transmission planning to determine the preferred way to accommodate a plant like a Big Stone Unit II has been under way for several years and will continue into the future, even beyond the time the proposed lines are constructed and placed into operation. Planning in this case is similar to planning in other situations as well.

The first step in any planning for additional generation is to conduct a screening study to identify possible ways to provide an interconnection for the proposed generating facility, and that is what was done here. The Big Stone Screening Study (May 2004) is

attached as Exhibit No. _____ (TR-1). Once the possible transmission options are narrowed to a manageable number of potential solutions, MISO requires an interconnection study to determine the impact of the new generating source on the existing grid. That was done here too, and the Interconnection Study (November 2004) is attached as Exhibit No. _____ (TR-2).

The next step is to conduct a Delivery Service Study. This is a study completed in response to requests for delivery of the electric power to be generated, and is designed to identify the impacts of the proposed project over a broader geographic basis. A Delivery Service Study identifies whether any transmission infrastructure is required to deliver the power to the intended consumers. We have recently finalized the study for the Big Stone project.

Q: Are additional studies performed after completion of the Delivery Service Study?

A: Yes, additional studies will continue to identify any transmission or equipment upgrades or other projects that might be required to optimize the system once the new transmission lines are in operation.

Of course, while all this planning is going on, planners must be constantly alert to other possible changes in the system, such as new generating facilities and additional transmission lines. With respect to the Big Stone Transmission Interconnection Project, the Co-owners have taken into account the proposed CapX 2020 projects and other possible developments in the region.

Q: In the transmission studies completed for the Big Stone II transmission project, did you look at the possibility of serving multiple needs?

A: Yes, we did. We not only considered what was necessary to provide an interconnection to the Big Stone Plant, but we also took into account what other functions these new transmission lines might serve and how these new lines would best fit into regional transmission planning.

V. INTERCONNECTION STUDY

Q: What is an interconnection study?

A: An interconnection study is a technical study to determine what impact a new source of electric generation would have on the existing transmission grid. An interconnection study is performed to determine what facilities are required to interconnect a proposed generator to the transmission grid, whether the existing grid can handle the additional power, and what new transmission infrastructure might be required to address the expected impacts of the new generation source. The generation interconnection process, which is governed by the Federal Energy Regulatory Commission (FERC) and administered by MISO, requires all new generation projects to undergo an interconnection study to determine the potential impacts.

Q: Why does MISO administer the interconnection process?

A: The Big Stone Plant is located in an area within MISO's jurisdiction and MISO administers its FERC-approved tariff on behalf of transmission owners.

Q: If the Interconnection Study is under the responsibility of MISO, why did Otter Tail take the lead in conducting the study?

A: It is common practice for MISO to contract with a transmission owner to perform the interconnection study. This is done for a couple of reasons. The first reason is related to the number of generation interconnection requests the MISO receives. The studies are complicated, time consuming, and MISO simply does not have enough internal resources to complete the studies. As a result, MISO looks to hire a contractor to perform the studies. The second reason MISO often asks the transmission-owning utility to conduct interconnection studies is the recognition that the utility staff are normally the most knowledgeable about the transmission system in their area.

Q: What was the main conclusion of the Big Stone Interconnection Study?

A: The main conclusion of the study is that one of two options would adequately handle the addition of Big Stone Unit II: 1) a new line from Big Stone to Morris, Minnesota, and a new line from Big Stone to Granite Falls, Minnesota, or 2) a new line from Big Stone to Willmar, Minnesota, and a new line from Big Stone to Granite Falls, Minnesota. In either case, a new line from Big Stone to Granite Falls is a part of the overall solution.

Q: And what is the status of the study?

A: The Interconnection Study was submitted to both the MISO and the MAPP DRS in mid-August. On September 18, 2006 the MAPP DRS conditionally approved the Big Stone Interconnection Study. MAPP DRS identified three conditions that needed

following up on: the first is addressing local stability, the second involves running additional transient stability simulation on the Minnesota-Wisconsin Stability Interface, and the third is simply to inform the MAPP DRS which alternative the Minnesota Public Utilities Commission prefers in its siting proceedings. We are taking steps to address these routine contingencies and expect to have final approval no later than the end of January 2007.

MISO is currently reviewing the Interconnection Study, and it is our understanding that the only outstanding issue necessary for MISO to approve the study is to address the local stability issue that was also identified by the MAPP DRS. We anticipate that the MISO will approve the interconnection study within the next two months.

VI. BIG STONE TRANSMISSION INTERCONNECTION PROJECT

Q: What have the Co-owners decided is the preferred transmission alternative?

A: The Big Stone Unit II Co-owners have requested that the Minnesota Public Utilities Commission issue a certificate of need to construct a new transmission line between the Big Stone Plant and Granite Falls, Minnesota, which will be designed capable of operating at 345 kV but which will most likely initially operate at 230kV; and to construct a new 230 kV line between the Big Stone Plant and Morris, Minnesota, which for the most part will actually be an upgrade of the existing Big Stone – Morris 115 kV line. This certificate of need application is pending.

Q: Are any additional studies required before the Co-owners can decide on the best way to proceed?

A: No. All of the necessary studies have been concluded to the point we deem is sufficient to make decisions in accordance with prudent utility practice. Transmission planning, of course, is an ongoing endeavor; while more information is always helpful, at some point a utility must decide on a course of action. The studies that have been done to date to analyze the Big Stone Unit II interconnection request provide enough information to allow us to confidently say that the proposed transmission lines will safely, economically, and reliably serve our customers.

Q: Please summarize the reasons for preferring the Morris Line to the Willmar area Line.

A: The Morris Line is preferred because it is shorter, and therefore less costly. It performs better from the standpoint of line losses, and the ability to utilize an existing line corridor minimizes the impact on the environment. In contrast, a new line from Big Stone to Willmar would require a new transmission line corridor for nearly the entire length.

Q: Have you identified any other regional benefits of the Big Stone Unit II project?

A: Yes we have. The North Dakota Export (NDEX) transmission constraint is a well known transmission limit in the region. Past operating experience with Big Stone Unit I

has demonstrated that generation at the Big Stone location has a positive impact on the NDEX constraint.

Q: Can you please explain how a generator in SD can have a benefit to a constraint in ND?

A: Yes. First, let me provide some background. The NDEX constraint actually includes more than North Dakota, it includes a portion of western Minnesota and eastern South Dakota. I have attached a map as Exhibit No. _____ (TR-3) that shows the transmission facilities that make up the NDEX boundary. One of the primary limiters for the NDEX constraint is a phenenmon known as transient stability. Transient stability is a complicated issue, but it is a result of having large amounts of generation that are remotely connected to large load centers through a long or relatively weak transmission system. North Dakota is a classic example of an area that has large amounts of generation (substantially more than what can be consumed in North Dakota) that is connected through a long transmission system to a major load center of Minneapolis and St Paul. When a transmission line that connects the remote generators with the large load center trips out of service, the remaining transmission lines must be able to absorb the power that was on the transmission line that went out of service and the power must be redirected. In this situation, the voltages on the transmission system experience swings, meaning they go from high voltage conditions to low voltage conditions, and if the voltage swing is severe enough, the transmission system can break apart or separate from the rest of the transmission system which could result in wide-spread blackouts.

A significant benefit of locating generation at Big Stone is that it is located midway between the remote generators (western ND) and the large load center (Minneapolis – ST Paul). As a result, Big Stone generation provides a stabilizing effect on the voltage in the region and as result can actually improve the NDEX stability problems.

In today's operation of the transmission system if Big Stone Unit I is off-line, transmission system operating guides require that NDEX transmission limit be reduced by 350 MWs.

Q: Have you done any analysis with Big Stone Unit II and its associated transmission facilities to determine the impact on NDEX stability?

A: Yes we have. A member of my staff, Jason Weiers completed an analysis which I have attached as Exhibit No. _____ (TR-4) to my testimony. This analysis looked at the impact on NDEX stability with and without Big Stone Unit II and its associated transmission.

Q: What were the results of that analysis?

A: The analysis indicates that there is an improvement in NDEX stability performance. It should also be noted that he performed his study with the assumption that the Granite Falls transmission line is sized at 230 kV. At 345 kV we expect we would see even additional improvement.

Q: Does improved stability mean there will be an increase in NDEX available for others?

A: We believe so. I should point out, however, that much more detailed studies will be necessary to confirm an increase, but the results do indicate there is good potential that transient stability will improve and result in an increase in NDEX capability.

VII. DELIVERY SERVICE STUDIES

Q: What is a Delivery Service Study?

A: A Delivery Service Study is a study designed to determine the impacts of delivering power from one point on the transmission system to another point on the transmission system. For example, in the case of the Big Stone Project, the Delivery Study looks at the effects on the transmission system caused by the delivery of the Big Stone generation's output to the loads served by the Co-owners. A Delivery Service Study results from the filing of a request with MISO for transmission service. The Study looks at the effects that delivery may cause over a broad geographic area and identifies possible infrastructure changes that might be required to serve the customers for whom the generation is intended. A Delivery Service Study is an optional study, but for the purposes of ensuring that the generation plant is capable of delivering its output to the generation project Co-owners, a Delivery Service Study is required.

Q: Is a Delivery Service Study required for the Big Stone Transmission Interconnection Project?

A: A delivery service study is not required for every generation project, but the participants in the Big Stone Unit II project have requested that one be completed. Each of the Co-owners has made numerous requests to MISO for delivery of various amounts

of electric power. These requests have been combined to represent the expected delivery from Big Stone Unit II to the participants' load centers, and Otter Tail is conducting one Delivery Service Study for MISO.

Q: What do the results of that study show?

A: The work with respect to identifying facility upgrades necessary to accommodate transmission delivery service has identified that only "change-out" of some existing facilities will be necessary (e.g., some improvements at existing substations and possibly re-conductoring existing lines, but at the same voltage level). Most importantly, the transmission delivery service study results are confirming that *even if* the costs associated with delivery service upgrades were included along with the costs associated with Big Stone Unit II interconnection facilities, the analysis with respect to the preferred interconnection facilities being proposed here (a line to Morris and a line to Granite Falls) would not change.

Q: Have you identified any specific upgrades that will be required?

A: Yes we have. At this point we believe that the following facilities will require upgrades that range from replacing substation equipment, raising transmission structures for obtaining higher line loadings and possibly reconductor existing transmission lines.

- Grant County - Morris 115 kV Line
- Grant County - Elbow Lake 115 kV Line
- Moorhead - Morris 230 kV Line

- Hankinson - Wahpeton 230 kV Line
- Kerkhoven - Kerkhoven Tap 115 kV Line
- Sheyenne - Fargo 230 kV Line

Q: Will these facility upgrades only benefit Big Stone generation?

A: No. Some of these facilities have shown up in load serving transmission studies and some have shown up generation interconnection and delivery studies. For example, the Hankinson – Wahpeton 230 kV line has been identified in generation interconnection studies for generators in North Dakota. Because the Big Stone project will require that these facilities be upgraded, it is essentially eliminating facility upgrades for other projects. This is another example of how regional transmission is.

VIII. PROPOSED FACILITY ADDITIONS

Q: What transmission facilities have been identified as necessary for adding Big Stone Unit II and what are the cost estimates for each:

A: I have attached a list of the facilities, Exhibit No. _____ (TR-5), which identifies their respective cost estimates. It should be noted, however, that since our latest formal estimates have been published, significant progress has been made in eliminating some of the costs associated with delivery service. Therefore, while we have not yet quantified the full amount of cost reductions, we expect the cost projections for transmission facilities to be lower than Exhibit 5 now shows. We will provide updated cost projections as they become available.

IX. SUMMARY

Q: In summary, in your opinion what justifies as prudent Otter Tail's and Montana-Dakota's investment in the identified transmission facilities for Big Stone Unit II?

A: Firstly, all facilities identified by the transmission studies are required for the Big Stone Unit II generation addition. Simply put, if those investments are not made, then the generation will not be allowed to interconnect and/or the output will not be deliverable to Otter Tail's and MDU's (and the other Big Stone II Co-owners') customers. Therefore, the transmission investments are prudent for all the reasons that the generator investments are prudent. Additionally, as explained throughout my testimony, the transmission investments are prudent to address other transmission needs and to enhance the operation of the regional transmission system.

Q: Does this conclude your testimony?

A: Yes, it does.