SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

CASE NO. EL05-022

IN THE MATTER OF THE APPLICATION BY OTTER TAIL POWER COMPANY

ON BEHALF OF THE BIG STONE II CO-OWNERS

FOR AN ENERGY CONVERSION FACILITY SITING PERMIT FOR THE

CONSTRUCTION OF THE BIG STONE II PROJECT

DIRECT TESTIMONY

OF

JOHN T. LEE

VICE PRESIDENT

BARR ENGINEERING COMPANY

MARCH 15, 2006

TESTIMONY OF JOHN T. LEE

TABLE OF CONTENTS

I. INTRODUCTION 1

II. PURPOSE AND SUMMARY 2

III. ROLE OF BARR ENGINEERING 3

IV. WATER USE AND SOURCES (ASRD 20:10:22:15) 7

V. HYDROLOGY (ASRD 20:10:22:15) 9

VI. COMMUNITY IMPACTS (ARSD 20:10:22:23) 14

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF JOHN T. LEE

I. INTRODUCTION

Q: Please state your name and business address.

A: John T. Lee, 4700 West 77th St., Suite 200, Minneapolis, MN 55435-4803.

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

A: I am employed as Vice President at Barr Engineering Co. ("Barr").

Q: What is your educational background?

A: I graduated from Iowa State University in 1979 with a Bachelor of Science degree in Civil Engineering.

Q: What is your employment history?

A: I have held various engineering and management positions at Barr Engineering Co. since I started working there in 1979.

Q: What work experience have you had at Barr that is relevant to your testimony?

A: During my 26 years at Barr, I have worked as an engineering and project management professional on a wide variety of environmental engineering projects for dozens of power industry and other public and private clients throughout the Midwest. I have completed projects for several utility and independent power producer clients including Xcel Energy, Great River Energy, Minnesota Power, Otter Tail Power Company, Excelsior Energy, Montana Dakota Utilities, WE Energies, MidAmerican Energy, Alliant Energy, Wisconsin Public Service, Consumers Energy, Upper Peninsula Power Company, Tenaska Inc., and NRG Energy. My

assignments have taken me to several states including South Dakota, North Dakota, Minnesota, Missouri, Iowa, Michigan and Wisconsin.

Q: What are some of the specific power plant projects you have worked on?

A: In 1999, I took on the responsibilities for preparing the Site Permit Application for Xcel Energy's $156 million Black Dog Generating Plant Repowering Project in Minnesota, which was completed in 2002. Prior to that, in 1998, I had a similar role on NRG Energy and Tenaska Inc.'s Lakefield Junction Peaking Plant Project located in southern Minnesota. In 2003 and 2004, I again worked for Xcel Energy to obtain Site Permits for the Angus Anson (South Dakota) and the Blue Lake (Minnesota) combustion turbine projects. I worked with Xcel Energy to obtain a Power Plant Site Permit for the High Bridge Repowering Project in St. Paul, Minnesota, in 2005 and am currently working with Xcel Energy to obtain Minnesota water permits and local approvals for the Riverside Repowering Project. Both of those projects are part of Xcel's Metro Emissions Reduction Project. I am also currently working with Great River Energy on a peaking plant project where I prepared a Minnesota Site Permit Application that was submitted in March 2005 and with Excelsior Energy on an proposed IGCC power plant where I will be assisting with obtaining Minnesota water permits and power plant, transmission line, gas pipeline site and route permits, as well as support for a federal EIS process.

Q: Are you a licensed professional engineer?

A: Yes, I am a registered Professional Engineer.

II. PURPOSE AND SUMMARY

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to explain the results of Barr Engineering's analysis of the potential effects of the proposed Big Stone II Project on the environment, the hydrology, and the community.

Q: Please summarize your testimony.

A: As a result of our work on this project, we have concluded that existing and potential environmental, hydrology, and community impact issues have been adequately addressed and that no material adverse effects on the environment, the hydrology, or the community will be presented by constructing and operating Big Stone II.

III. ROLE OF BARR ENGINEERING

Q: Did Barr assist in the preparation of the Application for the Energy Conversion Facility Siting Permit that was submitted in July 2005?

A: Yes, several Barr Engineering employees assisted in preparation of the Application. Besides myself, key staff involved were Daniel Jones, environmental scientist, Tina Pint, geologist, and Andrew Skoglund, acoustical engineer. They are also providing pre-filed testimony in this matter.

Q: What was your role in preparation of the Application?

A: I began assisting the Big Stone II Applicants with preparation of the South Dakota Siting Permit application in 2004 as Barr's project manager and Principal-in-Charge. I managed the data collection effort and was the primary author for certain sections of the application. I worked with the Applicants, other Barr Engineering staff, and other consultant staff members to collect and evaluate data and present the required information for the application.

Q: What specific sections of the Siting Permit Application did you author?

A: I was the primary author of the Executive Summary, Section 1 (Introduction), Section 4.2.2 (Water Use and Sources), Section 5.2 (Infrastructure Impacts), 5.3 (Community Services), Section 5.4.1 (Population and Demographics), Section 5.5 (Amelioration of Potential Adverse Community Impact), and Section 6 (Other Information).

Q: What is the major business of Barr Engineering Co?

A: Barr provides engineering, environmental, and information technology services to clients across the nation and around the world. We were incorporated as an employee-owned firm in 1966 and trace our origins to the early 1900s. Today, our nearly 300 engineers, scientists, and technical support staff in Minnesota, Michigan, and Missouri work with clients in numerous industries, as well as at all levels of government..

Q: What services has Barr provided for clients on other power plant projects?

A: Barr has worked on projects for more than 25 power companies across the country, ranging in size from small municipal utilities to large regional power producers Current clients include Otter Tail Power, Xcel Energy, Consumers Energy, Minnesota Power, Great River Energy (GRE), and Minnkota Power. We have assisted utilities and other companies with environmental permitting and approvals necessary for major industrial projects. This assistance has included gathering, understanding, and developing engineering, environmental, historical, economic, and other data from diverse sources and disciplines. Barr's broad range of staff, including civil, chemical, mechanical, electrical, structural and geotechnical engineers; hydrologists, biologists, geologists, ecologists, wetland specialists and other environmental scientists, provide Barr with capabilities and experience well-suited to address the environmental aspects of utility projects.

Q: What kind of services has Barr performed with some of the projects you have worked on?

A: I described a number of current projects that Barr is providing environmental permitting services for in any earlier answer. Our services on those projects have included preparation of applications for Certificates of Need, for generating facility site permits, for transmission line route permits, and for gas pipeline route permits. We have also assisted various companies with air emission modeling and permitting and natural resource preservation, wetland, and noise issues for those projects. Barr has helped utility clients obtain water appropriations permits and NPDES and other environmental permits and designed air emissions controls, as well as fuel-storage and ash handling facilities for dozens of coal-fired and gas- and oil-fired power plants. Furthermore, Barr has also designed and permitted several hydroelectric power stations in Minnesota and Wisconsin and worked on wind power projects across the United States.

Q: How did Barr initially begin collecting data about this project?

A: Beginning in 2004, Barr initially reviewed previously prepared documents provided by Otter Tail Power Company that contained pertinent environmental information. That provided a baseline of information that was used by Barr to identify potential gaps in the planned information-gathering efforts.

Q: What kind of information did you obtain?

A: Barr obtained information related to the proposed plant site and the possible transmission corridors from Otter Tail Power Company and publicly available sources (in electronic format where available). That included information regarding

- Terrain (topography)

- Soils
- Geology
- Hydrogeology
- Surface Waters
- Wetlands
- Vegetation
- Wildlife
- Land Use
- Transportation Infrastructure
- Traffic
- National, State, Regional and Local parks, scenic areas, management areas and similar designated significant resources
- Population and demographic information
- Archaeological, historical and architectural resources

Q: Did you visit the plant site?

A: Yes, we visited the plant site in mid-2004 to:

- identify wetlands (but not complete a rigorous delineation),
- verify surface water drainage patterns,
- review and photo-document resources identified in the vicinity of the plant through our inquiry to the South Dakota Historical Society,
- perform a general field survey of natural resources present at the plant site. The field survey was not at a level of detail to identify or list every species present at

the site. Any species that are rare or endangered were identified through inquiries to the State agencies and USFWS. The field survey identified, in general, natural communities potentially impacted by the project.

Q: Were there other sources of information you reviewed?

A: Yes, we reviewed aerial photography and topographic maps that are readily available from public sources. We also reviewed information and work product prepared by the seven project Applicants, Burns and McDonnell, Inc., The 106 Group, Ltd, Stuefen Research and Business Research Bureau, and the First District Association of Regional Governments.

Q: Did the Application consider the environmental factors established in ARSD 20:10:22:13?

A: Yes. Sections 4 and 5 of the Application address and provide evidence as to environmental information and effects on human, plant, and animal communities.

IV. WATER USE AND SOURCES

Q: Were you involved in evaluating the potential impacts of the proposed Big Stone Unit II on water use?

A: Yes.

Q: Please describe your involvement.

A: I worked with other Barr engineers to assess the impacts of the additional water requirements on Big Stone Lake and the Minnesota River through the refinement of a water balance model Barr had previously prepared. I also prepared the water appropriation permit application for the combined needs of Big Stone Unit I and the proposed Big Stone Unit II.

Q: Please explain water use and source issues as they relate to the proposed Big Stone Unit II.

A: The anticipated fresh water makeup requirement for operation of the combined Big Stone Unit I and Big Stone Unit II, assuming typical precipitation and evaporation rates and expected plant operation, is approximately 11,700 acre-ft per year, up from the current typical usage of 4,200 acre-feet per year for Unit I alone.

The current maximum permitted appropriation is 8,000 acre-ft authorized under Water Right No. 1983-3 and Water Permit No. 6253-3. The project will require the permitting of an additional annual appropriation form Big Stone Lake of 10,000 acre-feet. This additional appropriation is needed to adequately supply the Big Stone unit I and Big Stone II with water during periods of extended drought.

The increase in production that will result from the combined Big Stone Unit I and Big Stone Unit II electric generating facilities will also require a significant increase in the volume of on-site water storage ponds for cooling and process makeup water. The existing ponds and the proposed Big Stone II storage pond will have a combined capacity of approximately 18,800 acre-feet (including dead storage).

Q: Did you prepare any written studies/work product that are reflected in the Application?

A: The water use and sources issues are discussed in Section 4.2.2 of the Application. The water balance modeling is further described in Exhibit B to the Application, Supplement to the June 2002 Evaluation of Water Supply for Increased Power Generation prepared by Barr Engineering Co. in March 2005.

Q: Describe the results of your analysis.

A: Additional water storage and appropriation is needed to adequately supply the Big Stone Unit I and Big Stone Unit II with water during periods of extended drought. Big Stone Lake and the Minnesota River will not be adversely affected by this increased appropriation, as indicated by the modeling we completed. The water appropriations will continue to be subject to the same operating restrictions tied to lake water levels in place under the current appropriations permit and no increase in diversion rate is required.

Q: Will the proposed Big Stone Unit II comply with all federal, state and local standards and regulations relating to water use once it is constructed and operating?

A: Yes.

V. HYDROLOGY (ASRD 20:10:22:15)

Q: Have you considered ARSD 20:10:22:15 in your analysis of hydrology as it relates to the proposed Big Stone Unit II?

A: Yes. Also, the Application in Section 4.2 and Exhibit 4-6 discuss hydrology and address related issues.

Q: Was there additional analysis done on hydrology?

A: Yes. Additional analysis of potential impacts to Big Stone Lake levels and Minnesota River flows has been completed by Barr. This analysis was completed because of changes in the plant water balance from those assumed when the original analysis was completed. Those plant operational changes and associated water balance assumptions are discussed in Terry Graumann's pre-filed testimony. The analysis supports our conclusions presented in the siting

permit application that no significant adverse effect is expected on those water bodies as a result of the additional water appropriations required for the Big Stone II project.

Q: Please summarize the results of this new analysis.

A: Increased consumptive use of water supplies is expected as a result of the proposed plant expansion. Almost all of the increase would be due to greater volumes of water evaporated in the cooling tower. Some evaporation would occur at the other water storage ponds. The volumes of water evaporated would change over time, depending on not be constant; they would vary with weather conditions and plant operations. Current evaporative consumption for the existing plant has averaged about 3,550 acre-feet-per-year (afy) for the period 1991 through 19982001, and about 4,220 afy for 1999 through 2001. These rates can be reasonably expected to increase substantially as a result of the volume of water required for the proposed plant expansion.

The proposed plant will require an additional 7,500 afy of fresh water from Big Stone Lake, in addition to existing withdrawals of 4,200 afy for the existing plant. These withdrawals would be required to satisfy the evaporation from plant cooling towers, cooling ponds and water storage ponds. The total amount of withdrawal amount would be 11,700 afy for existing and proposed plant needs, which exceeds the current State of South Dakota approved amount of 8,000 afy for the existing plant. As part of the permitting for the proposed Big Stone II plant, an application for a new Permit to Appropriate Water would be made to the State of South Dakota to add an additional 10,000 acre-feet withdrawal amount. This additional volume is necessary to satisfy existing and proposed plant needs through future drought periods.

Q: Did you look at withdrawals of water from Big Stone Lake?

A: Yes. Water withdrawals from Big Stone Lake would not exceed state-permitted volumes. Also, the proposed plant would operate within the withdrawal limits of the permit.

Extensive simulation and calibration of modeled lake levels over time, using historical agency measurements as modeling inputs and references, were used in a lake level and outflow evaluation. Slightly lower lake levels at Big Stone Lake are expected on rare occasions as a result of increased power plant withdrawals. Study results indicate that if plant water withdrawals were increased to 11,700 afy with a pond system storage volume of 18,800 afy at the plant site, the worst effect was that the lake would be 1 foot lower in 2 non-consecutive weeks out of a 70-year model period. On average, over the 70-year model period, the lake elevation would only be decreased by 0.1 feet. There are predicted to be very slight increases in the relative frequency of lake levels less than 964 feet (project datum), and very slight decreases in the relative frequency of lake levels between 964 feet and 967 feet. Essentially no change in the relative frequency of attaining the target recreational season pool elevation (968 feet project datum) is expected.

Q: Did you look at additional withdrawals of water for Unit II?

A: Yes. Although an annual withdrawal higher than 11,700 afy is not anticipated under most conditions, it is important to also look at the effect of withdrawing a volume closer to the pond system storage capacity on Big Stone Lake levels as well. Study results indicate that if plant water withdrawals were increased to 18,000 afy with a pond system storage volume of 18,800 af at the plant site, the worst effect was that the lake would be 1 foot lower during 9 non-consecutive weeks and 1 foot lower during one 2-week period out of the 70-year model period. On average, over the 70-year model period, the lake elevation would only be decreased by 0.3

feet. Essentially no change in the relative frequency of attaining the target recreational season pool elevation (968 feet project datum) is expected.

Q: Will these additional withdrawals affect the flow in the Minnesota River?

A: Most of the predicted flow reductions in the Minnesota River related to the withdrawal of up to 18,000 afy from Big Stone Lake were less than 50 cfs. As a result of these water level or flow changes, there could be a slight reduction in available habitat for aquatic species. The reach that could be affected would be the approximate 10-mile section from the Big Stone Dam downstream to Highway 75 Dam. When considering the base flows in the Minnesota River, water volume reductions would represent a change of less than 5 percent under most situations. According to model results, under critical flow situations, which would occur 44 times (in terms of weeks) over 70 years (a total of 3,360 weeks) (Table 6), flow reductions could represent a relatively high portion of base flow conditions in the 10-mile section below Big Stone Dam. Under most-likely conditions (appropriation volume of 11,700 afy), these critical low flow periods would occur much less frequently (only 32 times, in terms of weeks, over the 70 year model period) (Table 1).

Beneficial flow increases also could occur on an infrequent basis during low flow periods (Table 1), which would provide increased aquatic habitat in the river. Based on these projections, flow changes would occur for short durations that would not significantly impact fisheries in the Minnesota River.

Table 1. Summary of Minnesota River Flow Changes[a]

Flow Parameters	Flow Reductions (≥25 Percent of Base Flows)	Significant Flow Increases (≥25 Percent of Base Flows)
Appropriation of 11,700 afy (Most Likely Scenario)		
Number of occurrences	32	36
Total flow data values[b]	3,360	3,360
Percent occurrence[c]	1.0%	1.1%
Appropriation of 18.900 afy (Worst Case Scenario)		
Number of occurrences	44	83
Total flow data values[b]	3,360	3,360
Percent occurrence[c]	1.3%	2.5%

[a]Flow changes represented ≥25 percent of baseline conditions during the low flow period (≤80 cfs).

[b]Weekly summary of daily flows for the period of record, 1930-2000.

[c]Percent occurrence = number of significant flow changes ÷ total flow data values.

Sources: Barr, 2005d; Barr, 2005e, Barr2005f.

On average, the discharge from Big Stone Lake is approximately 98,000 afy. The proposed increase in lake water usage (on the order of 7,500 afy) represents about eight percent of this average annual outflow.

The occurrence of a noticeable flow reduction would depend on the interactions of a number of variables, including the timing and volume of plant withdrawals, seasonal and shorter-

term runoff conditions, and other influences on lake levels. The overall storage capacity at the proposed and existing plant site (18,800 acre-feet) would allow some flexibility in the timing and volume of withdrawals, such that their effects could be minimized. Modeling indicates that additional lake withdrawals would have little or no effect on an average annual basis or over most flow intervals. Using 2004 as an example, withdrawals for the existing plant were made in May, June, July, and November, with most withdrawals made in May. All of these months, except November, are relatively high flow months on the upper Minnesota River and withdrawals are expected to have minimal effect. However, due to varying river and lake conditions and the possibility of storage withdrawals at other times, occasional reductions in outflows from Big Stone Lake would be expected.

VI. COMMUNITY IMPACTS (ARSD 20:10:22:23)

Q: Were you involved in evaluating the potential community impacts of the proposed Big Stone Unit II?

A: Yes, we considered the community factors set forth in ARSD 20:10:22:23 and discussed them in the Application in Section 5.

Q: Please describe your involvement.

A: I prepared Section 5.2 Infrastructure Impacts, 5.3 Community Services, Section 5.4.1 Population and Demographics, Section 5.5 Amelioration of Potential Adverse Community Impact of the Application

Q: Describe your work and the results as to housing.

A: A survey of available accommodations to evaluate the impacts on housing due to temporary need for additional housing to accommodate construction of Big Stone II was

conducted in March 2005. The study area encompassed an approximate 60-mile radius from the Big Stone II unit. The surveyed motels have a total of 2,242 beds (1,653 beds in South Dakota and 589 beds in Minnesota).

Our analysis consisted of comparing the available housing resources with the anticipated labor force needed for construction of the plant (temporary housing resources) and for plant operation (permanent housing resources).

Typically, long-term arrangements for large blocks of rooms is a method used by large construction employers to accommodate temporary housing for the labor influx associated with the construction of large industrial facilities. Short-term shortages of motel and campsite accommodations may occur during typical peak seasonal periods, but are expected to be infrequent and of short duration due to the amount of motel beds available in the 60-mile radius study area. Permanent housing for the estimated 35 additional permanent workers is not expected to be an issue.

Q: Did you evaluate the Project's effect on energy needs?

A: Yes. Big Stone II will not detract from the energy needs in the area. Big Stone II would only enhance power production and, thus, by the nature of the Project, enhance the regional energy setting.

Q: Did you evaluate the effects of the Project on sewer and water?

A: The influx of additional labor personnel to communities in the study area would not, based on survey results, have an impact on existing sanitary sewer services. Grant-Roberts Rural Water supplies all of the water needs for the plant. and their analysis of the additional demand

for potable water during construction indicated the district had sufficient capacity. Local municipal water systems, wells, aquifers, etc., will not be significantly impacted.

Q: Did you evaluate the effects of the Project on roadways?

A: The Project will result in increased utilization of local roadways by construction workers' private vehicles to get to and from the Big Stone II construction site and will be providing off-road private parking in designated onsite parking areas.

Questionnaire responses from the Chiefs of Police in Milbank, South Dakota and Big Stone City, South Dakota and Ortonville, Minnesota; the Grant County, South Dakota Highway Superintendent; the Sheriff of Big Stone County, Minnesota; and the Traffic Facilitator for the Northern Lights Ethanol plant in South Dakota indicated potential transportation issues or problems do not appear to be a significant concern.

Anticipated truck traffic to the Big Stone II construction site will vary during the various phases of construction. Additional truck traffic during construction would consist of periods of increased traffic over relatively shot time periods (days and weeks) rather than the approximately 50 trucks per 24-hour day, seven days per week experienced at the Northern Lights Ethanol plant (Electronic Communication with Northern Lights Ethanol, May 31, 2005). Construction timetable deliveries and drop-offs by contractors and vendors will ultimately flow with the progress of the construction project.

Our analysis of potential impacts focused on the number of worker trips per day. At the peak of the construction project (approximately May through June 2009), it is estimated that the worker force will reach 1,400 maximum personnel, with worker round trips likely less than 1,000 per day.

Q: Did you evaluate the effects of the Project on parking?

A: Parking availability was analyzed. Parking impacts will be mitigated by designating off-road onsite parking facilities to accommodate worker's private vehicles. Work shift schedules will help diffuse traffic and parking problems. It is also likely that the labor force will practice some form of car-pooling, thus further mitigating any traffic or parking impacts.

Q: Did you evaluate the effects of the Project on railroad traffic?

A: Currently, the Burlington Northern Santa Fe (BNSF) railroad provides three to four coal train deliveries per week to the Big Stone Plant unit I. Each of these coal train deliveries consist of approximately 115 coal cars. The analysis of railroad traffic impacts focused on the comparison of projected railroad traffic to current traffic. The Project Co-Owners estimate that there will be an increase from the current coal train deliveries (115 coal cars each) of three to four per week to six to eight deliveries per week to accommodate the additional fuel demands for Big Stone II. The number of trains that pass through Milbank, South Dakota will increase from the current three to four per week to six to eight per week. The overpass and underpass system in Milbank mitigates any train transportation impacts.

Q: Did you evaluate the effects of the Project on health services and facilities?

A: The nine health facilities within twenty miles of Big Stone II are expected to be able to adequately meet the needs during construction and operation of the plant, based on questionnaire responses from those facilities.

Q: Did you evaluate the effects of the Project on schools?

A: An analysis of projected influx of workers and the likely associated influx of school-age children was the basis for assessing the project's impacts on schools. Only a small fraction of

the temporary construction workers are expected to move school-age family members to the area. The number of permanent new employees is relatively small compared to the regional population. The seven South Dakota and two Minnesota school districts in the Project community study area are anticipating future growth and, based on the questionnaire are able to provide quality education to a possible influx of new students.

Q: Will there be any effects on recreation?

A: There are expected to be few real or perceived recreational impacts, as indicated from a survey of community officials. The projected influx of temporary construction workers is not expected to overtax the many recreational facilities in the area.

Q: Will there be any effects on public safety?

A: A survey of the area fire departments indicated no real or perceived fire services impacts from the Project. The seven surveyed law enforcement agencies in the community survey area include 36 full- and part-time law enforcement officers. The additional labor personnel required by the Big Stone II construction will probably result in a minor short-term increase in workload.

Q: What will be the impact on the population and demographics?

A: The increase in the population due to the influx of construction workers and their families and the full-time employees hired to operate Big Stone II and their respective families can be absorbed into the surrounding communities without adverse impact.

Q: Did you review other studies or work product in making your evaluation and/conclusions?

A: Yes. The First District Association of Regional Governments completed surveys of area government agencies and businesses to obtain detailed community information that was used as

1 the basis for the evaluations and conclusion presented in the portion of Section 5 of the
2 Application that I prepared.

3 **Q: Does this conclude your testimony?**

4 A: Yes.