414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

May 2, 2008

Burl W. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101

- VIA ELECTRONIC FILING -

RE: PETITION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION FOR A CERTIFICATE OF NEED FOR THE MONTICELLO NUCLEAR GENERATING PLANT FOR EXTENDED POWER UPRATE
DOCKET NO. E002/GS-07-1567

Dear Dr. Haar:

Northern States Power Company, a Minnesota corporation ("Xcel Energy" or "Company") submits to the Minnesota Public Utilities Commission ("PUC" or "Commission") for consideration this Application for a Site Permit for the Monticello Nuclear Generating Plant for Extended Power Uprate project. We filed the companion Certificate of Need with the PUC on February 14, 2008. We are asking the Commission to approve an increase in the electrical generating capabilities of the north-central Minnesota plant by 71 MW (from a nominal capacity of 585 MW to a nominal capacity of 656 MW) to meet our customers' growing energy needs. This Site Permit application is submitted pursuant to Minn. Stat. § 216E and Minn. R. 7849.

The uprate process will occur over two separate refueling outages. The electrical capacity will increase by 15 MW after the first outage, scheduled for 2009. The second outage in 2011 is expected to increase the capacity by 56 MW. Few modifications are required for the reactor and its support systems, and we do not anticipate the uprate project presenting any major environmental issues or impacts.

A license amendment to the Monticello operating license addressing the safe operation at the higher thermal power level was submitted to the Nuclear Regulatory Commission on March 31, 2008. The NRC is reviewing the application for completeness and is expected to approve an amendment to the existing operating license to increase the thermal power level of the reactor.

Please note that we will send an initial fee payment of $10,000 to your attention under separate cover pursuant to Minn. Stat. 216E.18, subd. 2 and Minn. R. 7849.5210.

We are providing hard copies of this filing to the Office of the Attorney General and other parties on the attached service list. Copies of our Site Permit Application can be obtained from the Xcel Energy web site at www.xcelenergy.com.

Please contact Brian Zelenak, Manager, Regulatory Administration, at brian.r.zelenak@xcelenergy.com or (612) 330-5641 if you have any questions regarding this filing.

SINCERELY,

CHARLES R. BOMBERGER
VICE PRESIDENT, NUCLEAR PROJECTS

Enclosure

c: Service List

APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION

FOR A GENERATING PLANT SITE PERMIT

MONTICELLO NUCLEAR GENERATING PLANT EXTENDED POWER UPRATE PROJECT

DOCKET NO. E002/GS-07-1567

MAY 2, 2008

PREPARED BY XCEL ENERGY AND NUCLEAR MANAGEMENT COMPANY LLC.

Xcel Energy®

Application for a Generating Plant Site Permit
Monticello Extended Uprate Project

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Attachment A Approved Uprate Projects in U.S.

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Application Content Requirement

Rule Citation	Regulatory Requirement	Application Section
Minn. R. 7849.5040, Subp. 3(C)	Except as provided in part 7849.5060 or 7849.5980, no person shall increase the generating capacity or output of an existing large electric power generating plant without a permit from the commission.	All Sections
Minn. R. 7849.5500, Subp. 1(C)	Subpart 1. **Eligible Projects**. An applicant for a site permit or a route permit for one of the following projects may elect to follow the procedures of parts 7849.5500 to 7849.5720 instead of the full permitting procedures in parts 7849.5200 to 7849.5340: large electric power generating plants with a capacity of less than 80 megawatts;	Section 1.4 Section 2.4 Attachment B
Minn. R. 7849.5500, Subp. 2.	Subpart 2. **Notice to Commission**. An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 7849.5500 to 7849.5700, shall notify the PUC of such intent, in writing, at least ten days before submitting an application for the project.	Section 2.4 Attachment B
7849.5220, subp. 1 (per Minn. R. 7849.5530)	**Site Permit Application Contents**	
	(a) a statement of proposed ownership of the facility at the time of filing the application and after commercial operation	Section 2.1
	(b) the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated	Section 2.1

Rule Citation	Regulatory Requirement	Application Section
	(c) at least two proposed sites for the proposed large electric power generating plant and identification of the applicant's preferred site and the reasons for preferring the site;	N/A
	(d) a description of the proposed large electric power generating plant and all associated facilities, including the size and type of the facility;	Section 1.4 Section 3.3
	(e) environmental information required under Subp. 3 (Listed Below)	
	(f) the names of the owners of the property for each proposed site;	Section 2.1
	(g) the engineering and operational design for the large electric power generating plant at each of the proposed sites;	Section 3
	(h) a cost analysis of the large electric power generating plant at each proposed site, including the costs of constructing and operating the facility that are dependent on design and site	Section 3.6
	(i) an engineering analysis of each of the proposed sites, including how each site could accommodate expansion of generating capacity in the future	Section 3
	(j) identification of transportation, pipeline, and electrical transmission systems that will be required to construct, maintain, and operate the facility;	Section 3 Section 4.1
	(k) a listing and brief description of federal, state, and local permits that may be required for the project at each proposed site; and	Section 2.3
	(l) a copy of the Certificate of Need for the project from the Public Utilities Commission or documentation that an application for a Certificate of Need has been submitted or is not required.	CON application submitted on February 14, 2008 See Docket E002/CN-08-185

Rule Citation	Regulatory Requirement	Application Section
Minn. R. 7849.5220, subp. 3	**Environmental Information Requirements**	
	(a) a description of the environmental setting for each site or route	Section 4
	(b) a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services	Section 2.3.3 Section 4.2, 4.3, 4.7.8
	(c) a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;	Section 4.7.4
	(d) a description of the effects of the facility on archaeological and historic resources	Section 4.6
	(e) a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna	Section 4.3, 4.7
	(f) a description of the effects of the facility on rare and unique natural resources	Section 4.5, 4.6
	(g) identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	Section 4.3
	(h) a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures	Section 1.5 Section 4.4

1 Introduction

1.1 Overview

Northern States Power Company, a Minnesota corporation ("Xcel Energy" or the "Company") hereby applies to the Minnesota Public Utilities Commission ("PUC" or "Commission") for a Site Permit to increase the electrical generation capacity at its Monticello Nuclear Generating Plant ("Monticello") by 71 megawatts electrical ("MWe" or "MW"). A Site Permit is required for the project under the Minnesota Power Plant Siting Act, Minn. Stat. § 216E, and Minn. R. 7849, parts 7849.5010 through 7849.7010. Specifically, under Minn. R. 7849.5040, subpart 3(C), "…no person shall increase the generating capacity or output of an existing large electric power generation plant [LEPGP] without a site permit from the PUC."

The scheduling and manner of achieving the increased capacity will occur over two separate refueling outages: the first in 2009 and the second in 2011. The increased electrical capacity expected after the 2009 refueling is 15 MW. The 2011 modifications will result in an increase in generating capacity of 56 MW.

Since the proposed uprate is less than 80 MW, the project is eligible for the "Alternative Review Process" available under Minn. Stat. § 216E.04. On December 5, 2007, we filed a letter requesting the PUC review our Site Permit application under the Alternative Permitting Process.

1.2 Monticello Nuclear Generating Plant

Monticello is a 610-megawatt (585-MWe net), nuclear-powered, single-unit boiling water reactor located in Monticello, Minnesota. The plant is located on the western bank of the Mississippi River in Wright County, approximately 50 miles northwest of Minneapolis (Figure 1-1).

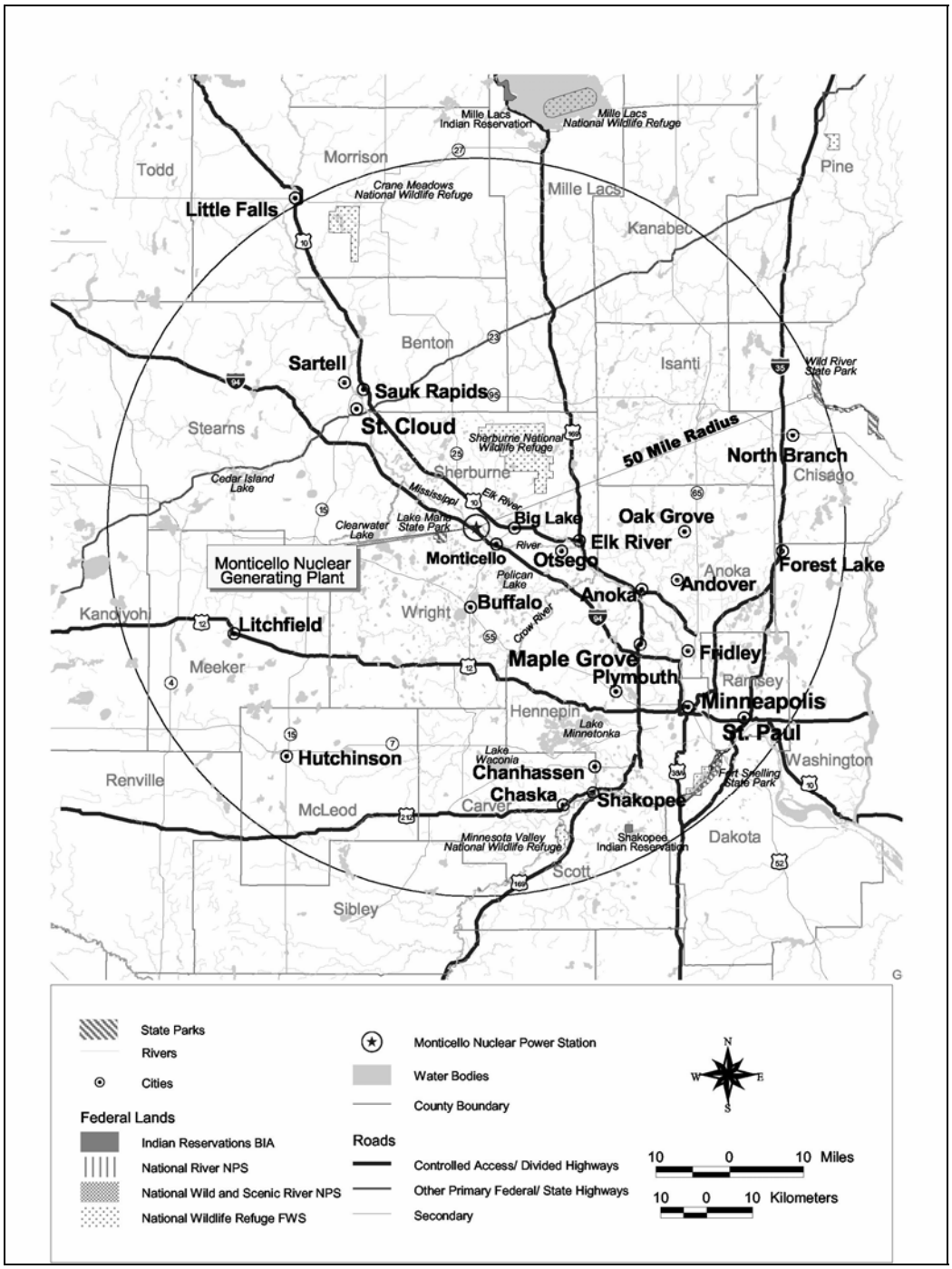

Figure 1.1
Monticello Site Location

1.3 Project Purpose and Need

Monticello is a critical part of our effort to meet the ongoing base load demand for electrical power; it currently produces about 10 percent of our customers' electric energy needs in the Upper Midwest. The purpose of the proposed project is to provide an additional 71 MW of reliable base load generation capacity and energy to our customers. This project is necessary to ensure that we have adequate, low-cost generating capacity in 2009 and beyond to reliably meet customer demand for electricity. The purpose and need of the proposed project is described in detail in our application for a Certificate of Need ("CON") filed with the PUC on February 14, 2008, in accordance with Minn. R.'s 7829 and 7849.

1.4 Power Uprate Project Description

In 1998, the Nuclear Regulatory Commission ("NRC") approved increasing the operating license thermal power rating for Monticello from the original design rating of 1670 MW thermal ("MWt") to 1775 MWt, or 106.3 percent of Original Licensed Thermal Power[1] ("OLTP"). The 1998 uprate increased net generation at Monticello by 36.2 MW, to 585 megawatts, with very few changes to installed plant equipment. The goal of the current power uprate project is to increase the thermal power at Monticello from the current licensed 1775 MWt to 2004 MWt. This will increase maximum Monticello output by an additional 71 MW. Total plant capacity will therefore increase from the current 585 MW to 656 MW, or 120 percent of OLTP. This will result in an additional 15 MW of generation capacity after the 2009 outage and an additional 56 MW of capacity after completion of the 2011 refueling outage.

The power uprate at the Monticello plant will be achieved by: 1) increasing the amount of steam produced in the reactor; and 2) improving the balance-of-plant equipment that converts the steam into electricity. To obtain the higher steam flow the reactor will be operated at a higher thermal power level. The additional heat is achieved primarily by increasing the number of new fuel assemblies replaced in the reactor core at each refueling. This is done without

[1] Under NRC terminology, a power uprate of more than 7 percent (up to a maximum of 20 percent) over the Original Licensed Thermal Power ("OLTP"), and which requires significant balance of plant upgrades, is called an "Extended Power Uprate" (herinafter "power uprate").

increasing the operating reactor pressure and without changes to the fuel design or fuel design limits.[2]

Although few modifications are required for the reactor and its support systems, the power uprate will require steam turbine replacements and a variety of other balance-of-plant improvements to take advantage of the increased steam production.

The major modifications to be completed during the two outages are:

- Replacement of the high pressure turbine;
- Modification of the low pressure turbine;
- Replacement of condensate demineralizer, condensate pump and motor;
- Upgrade of offsite power supplies to power larger plant loads;
- Potential replacement, or modification, of the steam dryer;[3]
- Rewind of the main generator stator;
- Replacement of feedwater pumps and motors;
- Feedwater heater drain cooler capacity;
- Upgrades to isophase bus duct cooling system.

1.5 Environmental Impacts

The power uprate is not anticipated to present any major environmental issues or impacts. Post power uprate operation of the plant will be within all existing environmental (air, water, etc.) permits. The power uprate project will not require new structures or buildings, and so will not change the "footprint" of the existing site; nor will the

---

[2] The NRC has approved extended power uprate projects at 14 General Electric boiling water reactors and 19 extended power uprate projects overall. (See Attachment A.)

[3] The potential need to replace the steam dryer results in an additional $29 million of costs used to represent the upper cost threshold in Section 3.6.

power uprate substantively change the types of effluent from the plant. The primary environmental impacts associated with the power uprate are limited to:

- The significant carbon reduction that will occur over the next twenty years due to the power uprate project as compared to supplying the equivalent base load energy and capacity from a fossil fuel plant.

- The temperature of cooling water discharges to the Mississippi River will increase slightly, (1.7°F to 4.5° F depending on season) but will remain within existing thermal discharge limits established in the Minnesota Pollution Control Agency ("MPCA") National Pollution Discharge Elimination System ("NPDES") permit. The temperature of the cooling water discharge will be maintained through increased use of cooling towers and adjustment of plant output as necessary to remain within permit limits.

- Water consumption at Monticello will increase approximately 13 percent due to the increased use of cooling towers; however, the resulting consumption level will remain well below the level assumed by the NRC in its 2006 environmental impact statement for the Monticello re-licensing (a level that the NRC determined to be not significant).

- The amount of low-level radioactive process waste (e.g. filter sludge, spent resins) will increase by about 3 cubic meters per year (one truck shipment per year).

- The project will slightly increase the maximum projected annual off-site dose and cumulative radiation dose. However, on-site and off-site radiological doses will remain well below federal regulatory limits.

1.6 Summary

Monticello plays an important role in our energy supply and the energy reliability of the region. Our system continues to grow and the additional generation from the project is necessary to meet that growth. Power uprates, such as the one proposed, are common in the nuclear industry. Many nuclear plants –

including Monticello - have already implemented power uprates to gain more output from their existing plants. Our proposed project provides multiple and significant benefits to our customers and the region. As discussed in greater detail in our Certificate of Need filing for this project (Docket No. E002/CN-08-185), the project will provide low-cost, carbon free energy for many years. The project will expand generation capacity at an exiting site instead of developing a new greenfield site. The project will result in some impacts to the environment, but the impacts are minimal and will be well within the existing permits – no operating permits will require any changes as a result of the project.

We believe the information in this Application will demonstrate that our proposed project meets the "… state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure." (Standards and criteria by which the Commission must make its LEPGP site and route permit determinations as established in Minn. Stat. § 216E.03, subd. 7.) We therefore respectfully request that the Commission find that the proposed power uprate will insure continuing system reliability and integrity, while environmentally and cost-effectively meeting and fulfilling our customers' energy needs in an orderly and timely fashion by granting a site permit for the project.

2 Applicant Information and Regulatory Requirements

2.1 Overview

The Monticello Nuclear Generating Plant is owned by Northern States Power Company, a Minnesota corporation, ("NSP-Minnesota"), and is currently operated by Nuclear Management Company, LLC ("NMC"). Due to the recent departure of the other NMC owners, we are currently in the process of reintegrating NMC into Xcel Energy. On April 14, 2008, we filed a Status Report with the PUC on our reintegration efforts. On April 16, 2008, an application was filed with the NRC to transfer the operating license from NMC back to NSP-Minnesota. NSP-Minnesota holds the current Site Permit for Monticello and is the applicant or permittee responsible for this Site Permit request.

Xcel Energy is Minnesota's largest electric utility based on generating capacity. We own and operate a number of generation facilities including coal, oil, natural gas, hydro, refuse derived fuel and the Monticello and Prairie Island nuclear power plants. The Company serves 1.5 million electric customers in our upper Midwest service territory (shown in Figure 2-1), which includes parts of Minnesota, Wisconsin, North Dakota, South Dakota, and Michigan.

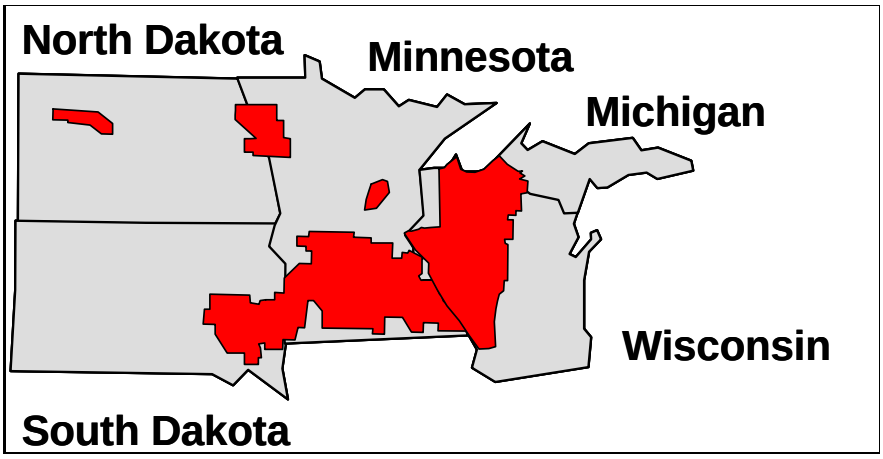

Figure 2-1
Xcel Energy Service Territory Map

The contact person at Xcel Energy regarding this Project is:

Brian R. Zelenak
Manager, Regulatory Administration
414 Nicollet Mall, 7th Floor
Minneapolis, MN 55401
Phone 612-330-5641

2.2 Project Schedule

In order to make the plant modifications with minimal disruption to regional energy supply, the power uprate is scheduled to occur during routine refueling outages in 2009 and 2011. Although few modifications are required for the reactor and its support systems, the power uprate will require a variety of balance-of-plant improvements to take advantage of the increased steam production. Modifications during the 2009 refueling outage will enable an increase in output by 15 MW, and modifications during the 2011 refueling outage will increase output by an additional 56 MW. The power increase in 2009 will occur after completion of required reviews currently in progress (see Section 2.3.3).

2.3 Required Project Permits and Approvals

The proposed Monticello power uprate project requires the Minnesota Site Permit, as well as the following:

- A state Certificate of Need ("CON") from the Minnesota Public Utilities Commission, and;
- An amendment to the facility-operating license from the federal Nuclear Regulatory Commission ("NRC")[4].

None of the existing Monticello operating permits will require amendments due to the power uprate project.

2.3.1 Minnesota Site Permit

Minn. Stat. § 216E.03 establishes the standards and criteria used by the Commission in issuing a site permit. As detailed in Section 1-6 of this application, the Commission is required to consider whether the

[4] This application was filed with the NRC on March 31, 2008.

project will support the state's environmental goals and secure its energy security in making determinations about issuing site permits for large electric generating plant projects. See also Minn. R. 7849.5900.

2.3.2 Minnesota Certificate of Need

Under Minn. Stat. §216B.243, no large energy facility can be sited or constructed in Minnesota without the issuance of a Certificate of Need by the PUC. Under Minn. Stat. §216B.2421, subdivision 2, a "Large energy facility" means: "(1) any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts or more and transmission lines directly associated with the plant that are necessary to interconnect the plant to the transmission system." The CON regulations are found in Minn. R. 7829 and 7849, parts 7849.0010 to 7849.0400. Therefore, in addition to the State Site Permit, we must apply for and receive a CON from the PUC. We applied for a CON on February 14, 2008. The PUC assigned docket number E002/CN-08-185 to the Monticello power uprate CON and held an April 29, 2008 prehearing conference date.

2.3.3 NRC - Operating License Amendment

The United States Nuclear Regulatory Commission ("NRC") is responsible for overseeing the safe operation of nuclear generation facilities. The NRC regulates the radiological, engineering, health and safety standards applicable to operating Monticello. Therefore, we must apply for and receive an amendment to Monticello's operating license prior to operating the facility up to the proposed higher power level. The regulatory approval process to amend a nuclear facility's operating license and technical specifications is governed by Title 10 of the Code of Federal Regulations, Part 50. The application for the operating license amendment was filed with the NRC on March 31, 2008.

2.3.4 Other Approvals Required

In addition to the State and Federal permits mentioned above, the project will require interconnection approval and an updated transmission service agreement with the Midwest Independent System Operator ("MISO"). On January 10, 2007, we filed the required

Generation Interconnection Agreement with MISO to cover the 2009 expected capacity increase of 15 MW.

In September 2007, we also filed a transmission service request ("TSR") with MISO to increase our network resources for up to 621 MW to accommodate the 15 MW increase in 2009.

On December 7, 2007, we filed a second generation interconnection request to interconnect the additional 56 MW expected in 2011, and we filed the necessary TSR for the additional 56 MW of network resources beginning in 2011.

2.4 Alternative Permitting Process

On December 5, 2007, we provided the Commission with written notice that we intended on using the alternative review process contained in Minn. R.'s 7849.5500 to 7849.5720, (Attachment B) for review of the Minnesota Site Permit. Under the Alternative Permitting Process, the applicant is not required to propose alternative sites to the project.

We considered the expansion of multiple existing generation facilities in the 2004 Resource Plan while assessing how to meet the identified need. From that review, uprates/upgrades at Monticello, Prairie Island, and Sherco were all identified as potential sites for additional generation. This power uprate project is an expansion of a large electric power generating plant of less than 80 MW. *See* Minn. R. 7849.5500, subp. Since this project will expand the generating capacity of an existing plant, the only viable project site for *this* project is the existing site and plant.

3 Engineering and Operational Design

Monticello uses nuclear fuel in a single-unit boiling water reactor to produce on average a nominal value of 585 megawatts of electrical power.[5] This chapter provides a description of the Monticello Nuclear Generating Plant and the changes to the plant necessary to increase the electrical generating capacity by approximately 71 MW from a nominal net capacity of 585 MW to 656 MW.

Monticello received its initial operating license from the NRC in September 1970. The initial license was for a period of 40 years and was scheduled to expire in 2010. The initial license has subsequently been renewed with the NRC for an additional 20 years. The renewed license expires in September 2030.

3.1 Plant Operation

Monticello is a boiling water reactor. In a boiling water reactor, a nuclear reaction in the reactor core generates heat, which boils water to produce steam inside the reactor vessel, which in turn is directed to turbine generators to produce electrical power (Figure 3-1). The steam is cooled in a condenser and returned to the reactor vessel to be boiled again. The cooling water is force-circulated by electrically powered feedwater pumps. Emergency cooling water is supplied by other pumps, which can be powered by onsite diesel generators.

[5] In-house loads at Monticello range between 15 and 25 MW, resulting a net ouput to the grid of approximately 585 MW.

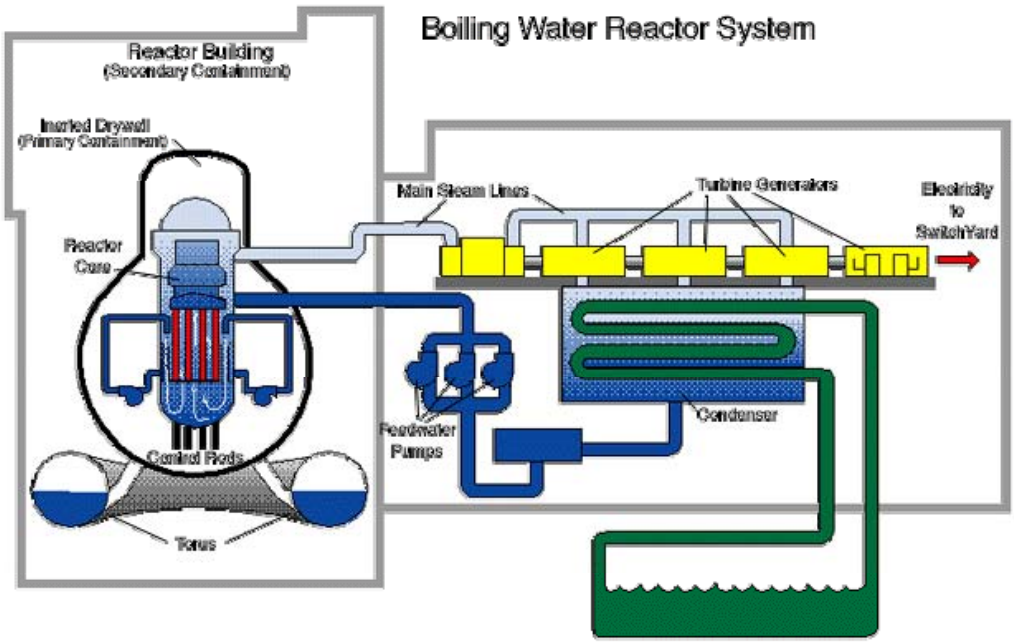

Figure 3-1
Boiling Water Reactor System

3.2 Plant Performance

Monticello has performed exceptionally well during its 36 years of operation. Over the past five years it has had an average capacity factor of 94 percent. In 2006, Monticello generated a record 5,070,000 megawatt-hours of electricity, eclipsing its prior record set in 2004. The proposed power uprate is not expected to impact the Monticello plant's high capacity factors. The plant has received the General Electric (GE) Outstanding Plant Performance Award for boiling water reactors 17 times. It has received the Minnesota Safety Council Award for the past five years for outstanding efforts in reducing workplace injuries or illnesses. Currently, Monticello has all green indicators in the NRC's Reactor Oversight Process. A "green" code is the highest or best available rating and indicates performance in compliance with NRC requirements.

3.3 Description of Fuel and Operating Cycle

Nuclear fuel is fabricated by GE and transported to Monticello by truck. GE was the original plant designer and has supplied the plant with almost all of its fuel.

A fuel assembly consists of a fuel bundle and a channel that surrounds it. Fuel rods are spaced in a square array secured by means of stainless steel upper and lower tie plates. Each fuel assembly is 5.28 by 5.28 inches wide and up to 172 inches long.

Each fuel rod within the assembly consists of high-density ceramic uranium dioxide fuel pellets, each about the size of a thimble, stacked in a tube made of a special alloy of steel called Zircaloy. The air in the filled tube is evacuated, helium (an inert gas) is backfilled, and the fuel rod is sealed by welding Zircaloy plugs in each end.

The plant's reactor core is comprised of 484 fuel assemblies, arranged in 121 cells. Each cell contains 4 fuel bundles or assemblies and a control blade.

Approximately every two years, the plant is shut down to refuel the reactor. Between refueling outages, the plant typically operates at full output around the clock. At current power level of 1775 MWt (585 MWe) approximately 150 of the 484 fuel bundles are replaced during refueling. Each individual nuclear fuel assembly provides heat for three fuel cycles or about a six-year period before its output declines to the point it is replaced to maintain the desired plant output level. These spent nuclear fuel assemblies are then removed from the reactor and stored in the spent fuel pool to cool and are ultimately placed in dry storage casks and will be moved to the Independent Spent Fuel Storage Installation ("ISFSI").

3.4 Uprate Plant Modifications

The power uprate at the Monticello plant will be achieved by: 1) increasing the amount of steam produced in the reactor; and 2) improving the balance-of-plant equipment that converts the steam into electricity. To obtain the higher steam flow the reactor will be operated at a higher thermal power level. The additional heat is achieved primarily by increasing the number of new fuel assemblies replaced in the reactor core at each refueling. This is done without increasing the operating reactor pressure and without changes to the fuel design or fuel design limits. [6]

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[6]Each reactor has an NRC imposed limit for the highest power level allowed for each fuel assembly. The highest fuel assembly power occurs in the middle of the core, but drops off

The goal of the current power uprate project is to increase the thermal power to 120 percent of the OLTP. This power uprate would increase reactor power from the current licensed thermal power level of 1775 MWt to 2004 MWt. The corresponding increase in net generator output is estimated at 71 MW for a nominal net electrical output delivered to the grid of 656 MW. The project will take place over two refueling outages and will require very few modifications to the reactor and the reactor support systems that produce steam.

The implementation of the power uprate is scheduled to take place during each of the next two routine refueling outages (2009 and 2011). The modifications completed during the 2009 refueling outage will increase output by approximately 15 MW, and the modifications completed during the 2011 refueling outage will increase output by approximately 56 MW.

In summary, no changes in the fuel mechanical designs or fuel design limits are required to implement the power uprate. The reactor output at Monticello will increase as a result of increasing the number of fresh fuel assemblies replaced at each refueling and changes in the fuel-loading pattern. No changes in operating pressure or core flow are necessary to support the power uprate. However, to take advantage of the increased steam output, a number of "balance-of-plant" improvements are necessary to generate additional MWs.

3.5 Balance of Plant Improvements

We propose to implement the project during two routine refueling outages scheduled in 2009 and 2011. The modifications completed during the 2009 refueling outage will increase output by 15 MW, and the modifications completed during the 2011 refueling outage will increase output by 56 MW. While no changes in the fuel assemblies mechanical or design limits are necessary, significant changes will be

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toward the sides of the core. By increasing the heat output of the nuclear fuel around the sides of the reactor core, the maximum output of a single fuel assembly and the highest fuel assembly power in the reactor center remains the same; but the overall average fuel assembly power increases and thus the steam output of the reactor increases. GE's calculations for previous power uprate projects have demonstrated to the NRC that GE's boiling water reactors can operate within safety margins using this approach.

required to the balance-of-plant systems that convert the steam produced in the reactor to electricity.

The major modifications and a short description of the work to be completed during the 2009 and 2011 refueling outages are listed below. Additional smaller scope modifications will be identified during the detailed engineering phase of the project.

A. Replacement of the high pressure turbine section (2009)

   The entire rotating element and diaphragm assemblies of the high-pressure turbine will be replaced with higher capacity components to accommodate the increased steam flow rate.

B. Modification of the low pressure turbine sections (2009)

   Several of the low-pressure turbine stages will be modified to accommodate the increased steam flow rate. This includes replacing various stage diaphragms and casing bolting.

C. Condensate demineralizer replacement (2009)

   Additional condensate flow is required to support power uprate. The existing demineralizer vessels will be replaced with larger ones.

D. Replacement of condensate pump and motor (2011)

   Condensate pumps move water from the hot well of the condenser to the reactor feed water pumps. The reactor feed water pumps supply water to the reactor where it is heated to produce steam. In order to meet the increased demand for water to the reactor feed water pumps the condensate pumps will be replaced with different models to satisfy the increased flow and head requirements of the suction side of the reactor feed water pumps as a result of the extended power uprate.

E. Upgrade of offsite power supplies to power larger plant loads (2011)

   In order to provide power for the new reactor feedwater pumps/motors and new condensate pumps/motors and improve the reliability of the onsite auxiliary electrical

distribution system, a new 13.8 KV bus and new 1R and 2R transformers and distribution systems will be installed.

F. Replacement, or modification, of the steam dryer (2011)

The steam dryer is a component inside the reactor that ensures that the steam does not contain any water in a liquid form before it goes to the turbine (water in liquid form damages the turbine). Vibrations and the resulting stresses incurred by the steam dryer increase as a result of power uprate. Therefore, instrumentation was installed during the 2007 outage to monitor the current levels of vibration in the steam dryer. The ability of the existing steam dryer to withstand the additional stresses that will result from the uprate will be analyzed and a decision to modify or replace the steam dryer will be made at a later date.[7]

G. Rewind of the main generator stator (2011)

The existing main generator stator would be above mechanical and electrical design limits at the proposed power uprate levels. The stator will be rewound to satisfy the new design requirements at the uprated power conditions.

H. Replacement of feed water pumps and motors (2011)

Reactor feed water pumps supply water to the reactor where it is heated to produce steam. In order to meet the increased demand for water to the reactor, more reactor feed water pump capacity is needed. In order to meet the increased demand for both steady state and transient conditions, the feed water pumps and motors are being replaced with different models.

I. Feedwater heater drain cooler capacity (2011)

Feedwater heaters increase the temperature of the water that is being returned from the condenser to the reactor. With the increased flow of steam and water through the primary side of the feedwater heat exchangers, the capacity of the heat

[7] The potential need to replace the steam dryer results in an additional $29 million of costs used to represent the upper cost threshold in Section 3.7, below .

exchangers needs to be increased. This will be accomplished by increasing the outlet drain capacity on two of the feedwater heaters, rerating some components and replacing three feedwater heaters.

J. Upgrades to isophase bus duct cooling system (2011)

The isophase bus conducts the electrical output of the main generator to the main transformer. Heat loads in the isolated phase bus duct will increase with the higher power levels that result from uprate resulting in a need to increase the cooling capability of the isophase bus ducts.

3.6 Impact on Spent Fuel Production

Approximately every two years, Monticello is shut down to refuel the reactor. Between refueling outages, Monticello typically operates at full output around the clock. At the current power level of 1775 MWt, approximately 150 of the 484 fuel bundles are replaced during refueling. The increased power level to 2004 MWt proposed under the power uprate project will increase the fuel bundles being replaced during each refueling to approximately 173 of the 484. This will result in a total of approximately 230 additional fuel assemblies being produced over the remaining operating license period as a result of the power uprate. Considering the space available in the spent fuel pool, three new dry storage casks may be necessary to support operations until 2030 due to the power uprate project. Since the three additional dry-storage casks do not become necessary until approximately the 2025 time frame, we are not requesting additional storage casks at this time. It is anticipated that the federal government could begin removing spent fuel from Monticello in time to preclude the need for more than the 30 canisters already approved.

3.7 Impact on Plant Operations

Operation of Monticello will generally not change as a result of the power uprate. As described in more detail in Section 4.3, one of the only operational impacts due to the uprate will be increased operation of the cooling towers to supplement the Mississippi River cooling capacity more frequently over the course of a year. Currently, the cooling towers are typically used during low river flow and times of the year when there are high ambient temperatures, normally during

the summer months. The cooling needs of the circulating water system will increase due to the uprate, and thus, require the use of the supplemental cooling system more frequently. If extreme conditions warrant, the facility will reduce power to remain within the constraints of existing permits.

3.8 Ancillary Infrastructure Upgrades

The power uprate will not require us to construct or modify any building footprint, access roads, parking areas, or lay down areas. To assure the reliability of the onsite auxiliary electrical distribution system, the uprate will require a new 13.8 KV bus and two new transformers at the plant.

Also, we do not anticipate that power uprate will result in the need to construct additional or new low-level radioactive waste storage buildings. The uprate does not affect the storage requirements for above ground or below ground tanks. Property located outside the inner security fence will not be modified or changed.

3.9 Transmission Upgrades

The Midwest Independent System Operator ("MISO") has not yet definitively determined whether the transmission system will need to be upgraded to support the uprate. However, the most recent feasibility study of the transmission system indicates that transmission system improvements *may* be required to support the uprate. A feasibility study for the Monticello power uprate was performed in a manner consistent with the Mid-Continent Area Power Pool ("MAPP") Design Review Standards ("DRS") and MISO practices for interconnection and transmission studies. This feasibility study does not take the place of the System Impact Study (SIS) effort to be performed by MISO under the Large Generation Interconnection Process ("LGIP"), which will ultimately determine the required changes to the transmission system, if any, to support the increased generation from the project. For example, final results may change depending on which generation projects (and corresponding transmission improvements) listed in the MISO interconnection queue ahead of the Monticello uprate project actually progress to construction.

3.10 Cost Analysis

The total projected cost for the proposed power uprate will range between $104 million and $133 million – depending upon whether a new steam dryer is required. With the 71 MW increase in output resulting from the proposed uprate project, this is an installed cost of between $1,465/kW to $1,875 kW.

3.11 Future Expansion

Minn. R. 7849.5220, subpart 1(I) requires an applicant to describe the extent to which a proposed generating plant site can accommodate future expansion. The power uprate project does not "expand" the footprint of the existing site. The Monticello site cannot accommodate additional future nuclear expansion without extensive reconstruction of the reactor core itself as well as relicensing, re-permitting, and potential acquisition of additional property. We currently do not have any plans, other than the proposed uprate project, for expanding generation capacity at the Monticello site.

4 Potential Environmental Impacts

The primary impact of the proposed 71 MW uprate is a small temperature increase (4.5 F° maximum) in the circulating water leaving the main condenser due to the increase in thermal power output. Cooling water discharge temperature will be maintained through increased use of the cooling towers or other methods; therefore, the thermal discharge will remain within the limits of the recently reissued NPDES permit. No changes are planned for the Monticello plant intake system or intake flow velocity; therefore no change in permitted water appropriation is needed. The amount of water consumption will increase slightly, but remain well below the level the NRC determined to be insignificant in their Environmental Impact Statement for the Monticello re-licensing (NRC, 2006). Impacts on aquatic communities would be minimal, and there would be no affect on threatened or endangered species.

In addition, the proposed uprate will slightly increase gaseous radionuclide emissions, but it will not measurably change the maximum projected annual off-site radiation dose or cumulative radiation dose. On-site and off-site radiological doses will remain well below federal regulatory limits.

Section 4 is divided into the following eight subsections:

Section 4.1	Land Use, Physical, and Ecological Setting
Section 4.2	Radiology and Health
Section 4.3	Water Quality and Temperature
Section 4.4	Water Supply (Surface and Groundwater)
Section 4.5	Rare and Unique Natural Resources
Section 4.6	Historic and Archaeological Resources
Section 4.7	Human Settlement (Demography and Socioeconomics Noise, Aesthetics, Other Impacts)

4.1 Land Use

The Monticello plant is located in the City of Monticello, Wright County, Minnesota, northwest of downtown Monticello on the southern bank of the Mississippi River. The general location of Monticello and major features within the region (within 6 miles) are

shown on Figure 4-1. Figure 4-2 shows an oblique aerial view of the site and the nearby area.

In addition to the City of Monticello, the nearest metropolitan areas to the Monticello plant are St. Cloud and the Twin Cities. St. Cloud is located 22 miles to the northwest and upstream of Monticello. The Twin Cities metropolitan area is approximately 30 miles to the southeast and downstream of the site.

The surrounding region remains primarily agricultural, but is becoming increasingly residential. As shown on Figure 4-1, the natural resources in the region include rivers, streams, and lakes. The nearest wildlife refuge is the Sherburne National Wildlife Refuge, which is located approximately 9 miles to the northeast. There are three nearby state parks, of which Lake Maria State Park is the nearest, located approximately 6 miles to the west-southwest (MDNR, 2004a). Additional state properties include three state forests; eighteen state Scientific and Natural Areas; and numerous state wildlife management areas (MDNR, 2004 b, c, d, e). As described below, the only potential environmental impact on the surrounding area is a slight increase in water discharge temperature, so the uprate will not affect any of these regional features.

The Monticello site itself consists of approximately 2,150 acres with roughly two miles of frontage on the north and south banks of the Mississippi River in Wright and Sherburne Counties. Figure 4-3 shows the site boundary in relation to the power block as well as the exclusion zone for the plant, which is set as the owner controlled fenced area. A road connecting to Wright County Road 75, which parallels Interstate 94, provides access to the plant.

Most of the site is located on the southern side of the Mississippi River with approximately 450 acres on the northern side. Approximately 50 acres are occupied by the plant and its supporting facilities (NMC, 2003). The remaining acres are undeveloped with approximately 174 acres leased by local farmers for growing row crops and 144 acres are under lease for recreational use.

Except for transportation of equipment during construction and the routine disposal of waste, the uprate maintenance activities are confined to the inner-plant security fenced area. The uprate does not affect the storage requirements for above ground or below ground tanks. Other lands located outside the inner security fence will not be modified or changed to support uprate activities. Since the uprate does not involve any construction outside the existing plant boundary, the uprate will not physically impact the surrounding area, nor will it affect the existing view of the Monticello Plant for those living nearby.

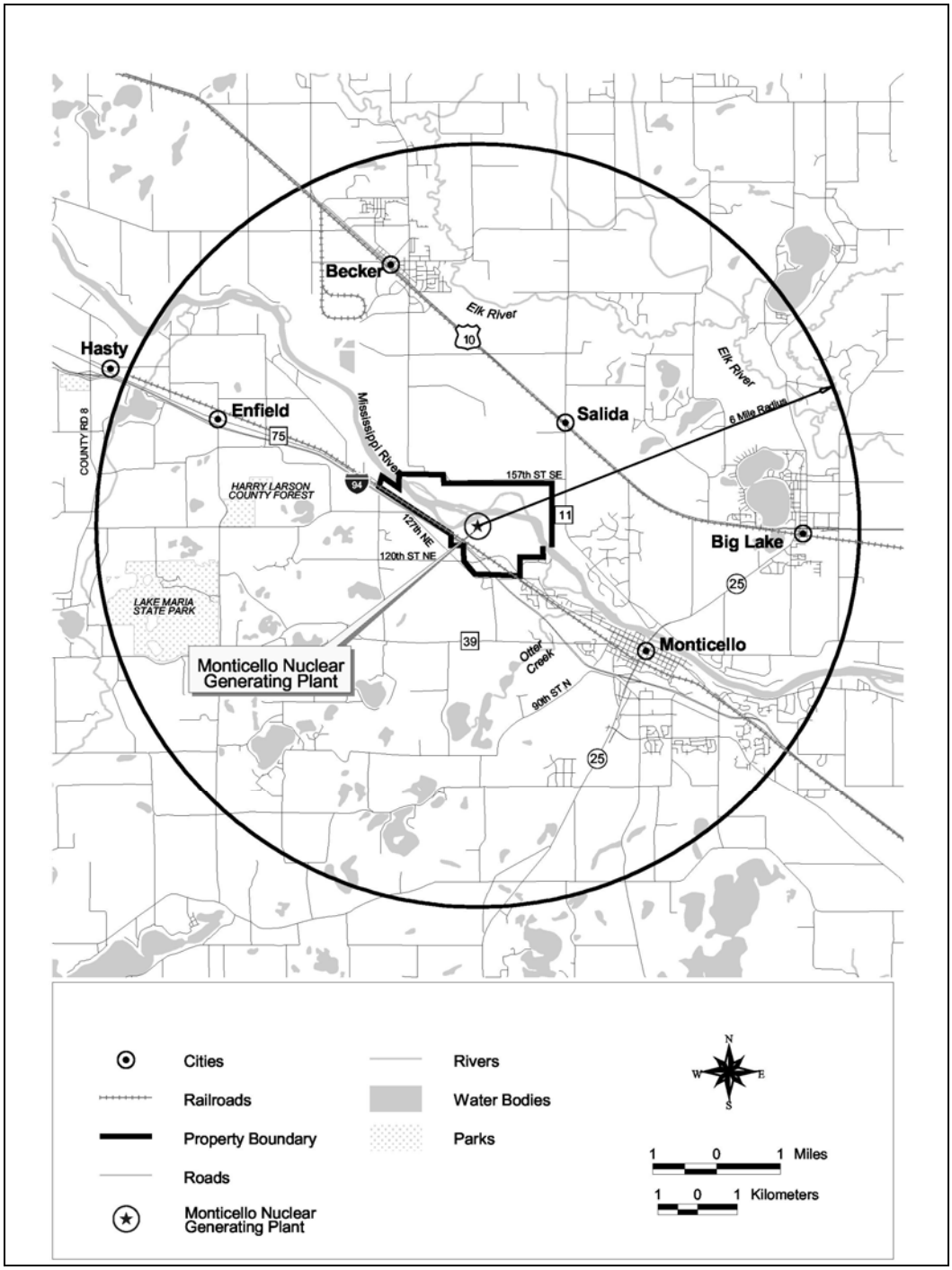

Figure 4-1
Monticello Nuclear Generating Plant Location and Regional Features within 6-Mile Radius

Figure 4-2
Oblique aerial photograph of
Monticello Nuclear Generating Plant, view looking toward the west.
Cooling towers in the foreground right; reactor building to the right.

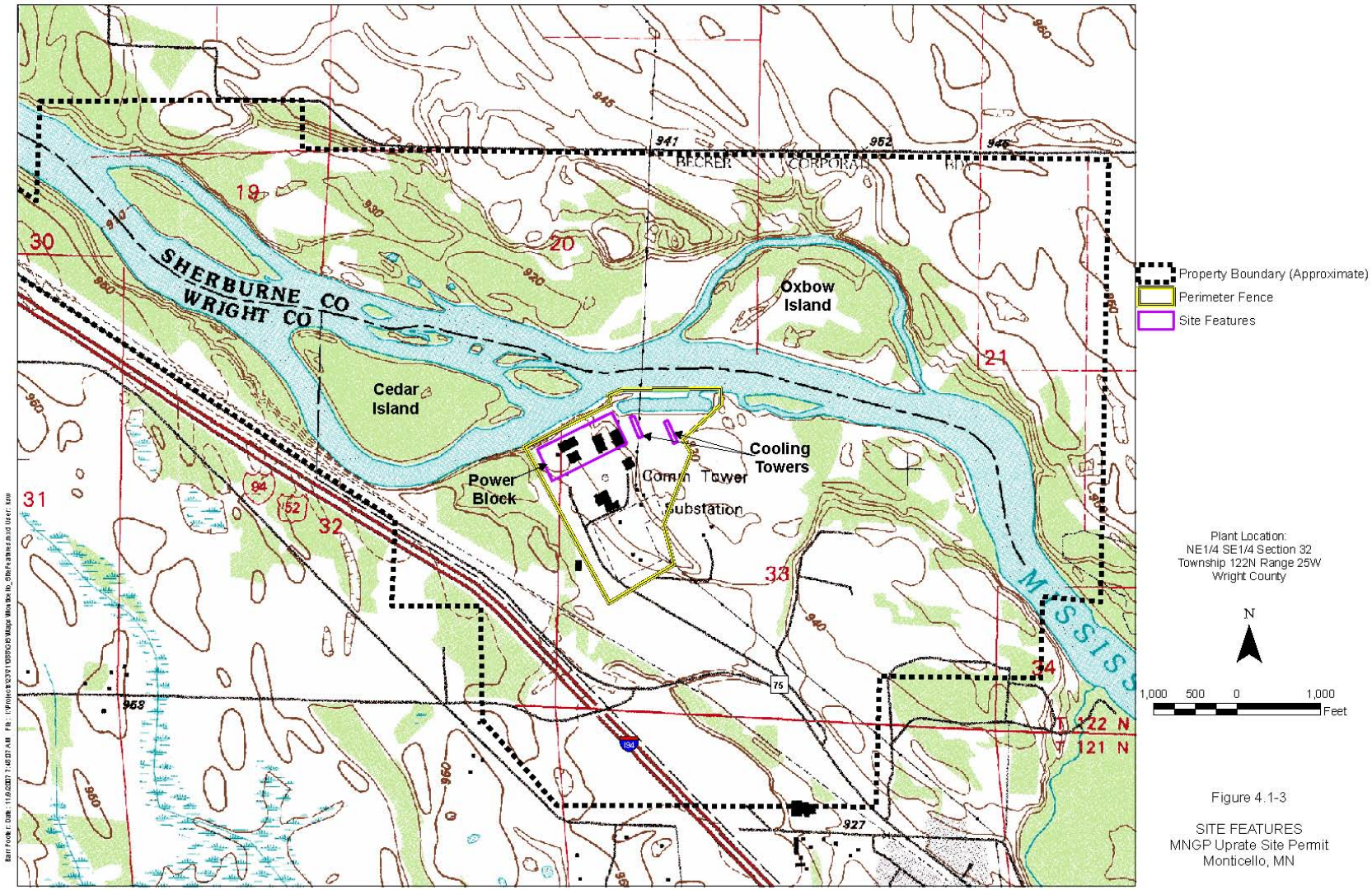

Figure 4-3
Monticello Site Features

4.1.1 Soils, Geology and Hydrogeology

Soils at the site consist of loams and loamy sands of the Hubbard-Mosford complex with 0 to 3 percent slopes. These soils are classified as sandy mixed, frigid Entic Hapludolls. These soils are permeable, have limited available water capacity, have the potential for groundwater contamination and are susceptible to wind erosion. (Xcel Energy, 2003)

Site geology consists of unconsolidated sedimentary deposits consisting of (from the surface downward) modern alluvium, glacial outwash sand with subordinate layers of gravel, silt, and clay. The unconsolidated sediments overlie upper Cambrian quartz sandstone of the Jordan and Mt. Simon Formations. The sandstone overlies older, Precambrian granitic and basic intrusive that form the crystalline basement rock below the site (Xcel Energy, 2003).

4.1.2 Aquatic Communities

The Upper Mississippi River near the Monticello site supports a variety of plant and animal species that are typical of free-flowing rivers in the upper Midwest. The major primary producers, or plant groups, present are periphyton (attached algae), phytoplankton (floating algae), and macrophytes, which are larger flowering plants, either rooted or floating. Near the site, periphytons are the most important primary producer. Their ability to attach to underwater substrates allows these organisms to function in the higher velocity waters near Monticello.

Although present in the area, neither phytoplankton nor macrophytes are prominent, because they are not well adapted to the relatively turbulent currents in the area (Amish et al., 1978). The Benthic invertebrate community — comprising a great variety of insects, crustaceans, mollusks, and others — constitute a prominent faunal feature of the Mississippi River near Monticello, as is typical in any flowing water system. The Mississippi River also supports a diverse array of fish species, which are integral to ecosystem functioning. These fish communities also support significant recreational fishing activities in the vicinity of the Monticello site.

4.1.3 Riparian Habitats

There are no wetlands on the Monticello site that are designated as protected under Minn. Stat. § 103G.005, subd. 15. There are limited riparian wetlands along the Mississippi River in the site vicinity, but they occur on river islands and, generally in small isolated tracts, along or near the river channel in the floodplain near the plant (Delaney and EPP, 1993; Hoffmann, 2004). The power uprate will not affect the hydrology or populations in this habitat.

4.1.4 Terrestrial Habitats and Populations

Flora and fauna of the site are typical of the upland and wetland communities found along this stretch of the Mississippi River. For the most part, Monticello itself is located on previously cultivated areas. Existing vegetation in these areas consists of early successional forbs and grasses. Upland forests on site are predominantly northern pin oak (*Quercus ellipsoidalis*), green ash (*Fraxinus pennsylvanica*), basswood, and prickly ash (*Zanthosxylum americanum*). Species composition of the forested wetlands on the northeast bank of the River and the river islands include American elm (*Ulmus americana*), box elder (*Acer negundo*), silver maple, cottonwood (*Populus deltoides*), and black willow (*Salix nigra*) (NMC, 2005)

A recent search of the MDNR's Natural Heritage and Non-Game Research Program database indicated two native plant communities within 1 mile of the Monticello site (MDNR, 2007). These included the Dry Sand Gravel Oak Savanna (Southern) Type #9 and the Dry Sand – Gravel Prairie (Southern) Type #114. See Attachment C.

4.2 Radiology and Health

Long-term monitoring of the radiation levels near the Monticello plant have been ongoing since before the plant was operation. The monitoring of air, surface water, groundwater and biota has been done by both us (as part of the federally required Radiation Environmental Monitoring Program or REMP) and the Minnesota Department of Health. As described below, the Monticello Plant does release small amounts of radionuclides during normal operation. However, the results of long-term monitoring indicate no increases in radioactivity in nearby areas due to plant operations. Details regarding the

monitoring program and results are provided in the Environmental Impact Statement for the Monticello ISFSI (Provided as Appendix F, Attachment 1 to our Certificate of Need Application to the PUC for the uprate (Xcel Energy, 2008, Appendix F, Attachment 1, Section 5.5).

4.2.1 Releases to Air

During normal operation, radioactive gaseous effluents are released through the Reactor Building Ventilation System and the Offgas System pathways. These effluents include small quantities of noble gases, halogens, particulates, and tritium. The dose to individuals from normal gaseous effluent releases at Monticello at the current licensed thermal power level are well within the guidelines of 10 CFR 50 Appendix I and the limits of 10 CFR 20 for all airborne radioactive nuclides. The effluent radioactivity, in curies, of noble gases, iodine, and particulates discharged from Monticello has been reduced steadily and is significantly below discharges during initial operating conditions. Power uprate is expected to increase the production and activity of gaseous effluents approximately 13 percent. However, this increase is well within regulatory limits.

The gaseous radioactivity of the reactor coolant system is, in part, a function of the extent of fuel defects; the causes of which are independent of power uprate.

Monticello has a good history with respect to nuclear fuel performance. During the past 30 years of plant operation only two fuel rod defects have occurred. One defect was identified in 1989 and was attributed to a manufacturing problem. The other defect was recently detected in late 2007 and is being managed through applicable core management and power suppression techniques. It is anticipated that this defect will be removed no later than the 2009 refueling outage.

Table 4.1 presents the gaseous releases from Monticello for the years 2001 through 2006. Table 4.2 presents the potential increase in gaseous releases due to the power uprate project.

Given the increases presented in Table 4-2, it is reasonable to conclude that the effect of power uprate on gaseous radioactive effluents is negligible, and that continued compliance with the release limits of 10 CFR 20 and the design objectives of Appendix I to 10 CFR 50 is maintained with significant margin.

Table 4-1
Radioactive Releases

Source: Annual Radioactive Effluent Release Reports for MNGP	10 CFR 50 Appendix I Limits								10 CFR 20		
	10	20	15	5	15	15	3	10	100		
	Gaseous Releases						Liquid Releases		Gaseous Releases		
	Max Site Boundary Gamma		Organ	Maximum Dose to Most Likely Exposed Member of General Public			Max Offsite Dose		Max Dose to Individuals due to Activities Inside Site Boundary		
	Gamma	Beta		Whole Body	Skin	Thyroid	Whole Body	Organ	Whole Body	Thyroid	Max Organ (Skin)
	mrad/yr	mrad/yr	mrem/yr	mrem/yr	mrem/yr	mrem/yr	mrem	mrem	mrem	mrem	mrem
2001	3.00E-03	4.00E-03	1.10E-02	6.00E-03	7.00E-03	1.10E-02	1.61E-05	1.72E-04	1.20E-02	1.40E-02	1.50E-02
2002	1.00E-03	2.00E-03	1.40E-02	6.00E-03	8.00E-03	1.40E-02	0.00E+00	0.00E+00	1.40E-02	1.80E-02	1.60E-02
2003	2.20E-02	1.70E-02	4.70E-02	3.90E-02	7.30E-02	4.70E-02	2.45E-07	5.55E-07	2.00E-02	3.00E-02	3.00E-02
2004	1.30E-02	1.00E-02	3.70E-02	2.20E-02	3.70E-02	3.70E-02	1.94E-10	1.94E-10	9.00E-03	1.10E-02	9.00E-03
2005	3.00E-03	3.00E-03	2.50E-02	1.60E-02	2.50E-02	2.50E-02	0.00E+00	0.00E+00	1.50E-02	1.60E-02	1.90E-02
2006	1.00E-03	1.00E-03	1.40E-02	8.00E-03	6.00E-03	9.00E-03	0.00E+00	0.00E+00	8.00E-03	8.00E-03	1.00E-02
Averages	7.17E-03	6.17E-03	2.47E-02	1.62E-02	2.60E-02	2.38E-02	2.72E-06	2.88E-05	1.30E-02	1.62E-02	1.65E-02

Table 4-2
Increase in Releases
(Ci/year)

Element	Activity Release
H-3*	2.80E+01
Kr-85m	1.33E-01
Kr-87	8.21E-01
Kr-88	4.31E-01
Kr-89	1.88E+00
Xe-131m	0.00E+00
Xe-133	5.74E+01
Xe-133m	5.40E-01
Xe-135	7.61E+00
Xe-135m	1.07E+01
Xe-137	2.46E+01
Xe-138	2.71E+01
Ar-41	3.38E-02
I-131	1.32E-03
I-133	1.23E-02
I-135	1.57E-02
Cr-51	0.00E+00
Mn-54	0.00E+00
Co-57	0.00E+00
Co-58	0.00E+00
Co-60	1.73E-04
Zn-65	0.00E+00
Se-75	0.00E+00
Cs-137	1.97E-04
Ba-140	5.81E-05
Ce-141	3.96E-07
Sr-89	1.72E-05
Sr-90	3.93E-08

4.2.2 Operating and Shutdown In-Plant Radiation

The proposed power uprate will involve slight increases in in-plant radiation levels. The impact of the increase in radiation dose to workers is minimized by monitoring radiation levels, controlling access to radiation areas, and by implementation of the As-Low-As-Reasonably-Achievable ("ALARA") principles. These practices are already in-place at Monticello and will continue after the power uprate. The refueling cycle average dose at Monticello has decreased at an average annual rate of 10 percent from refueling cycle 18 to cycle 23.

4.2.3 Impact on Offsite Doses

Radiation exposures (dose rates) are generally reported in units called Roentgen Equivalent Man, or rem. One-thousandth of a rem is a millirem, or mrem. Long term dose monitoring near the plant has never indicated an increase in radiation dose due to the plant. See Environmental Impact Statement ("EIS") for the Monticello ISFSI, Section 5.2, provided as Appendix F, Attachment 1 to our Certificate of Need Application to the PUC for the power uprate. (Xcel Energy, 2008, Attachment F, Attachment 1, Section 5.2).

As described above, the power uprate will likely increase normal operational gaseous activity levels slightly. The increase in activity levels is generally proportional to the percentage increase in core thermal power (13 percent for this project). However, as shown in Table 4.3, this slight increase is insignificant relative to the offsite dose limits established by 10 CFR 20.

The Monticello Technical Specifications implement the guidelines of 10 CFR 50 Appendix I, which are well within the 10 CFR 20 limits. Adjusting present values for maximum projected power uprate increases, the estimated offsite dose is presented in Table 4-3 below. As shown in Table 4-3, the offsite dose does not change significantly and continues to be well within the conservative Technical Specification dose limits.

Additionally, Monticello Technical Specifications requires a program that conforms to 10 CFR 50.36a for the control of radioactive

effluents and for maintaining the doses to members of the public from radioactive effluents as low as reasonably achievable.

Table 4-3
Radiological Effluent Doses

	Noble Gases
Technical Specification Limits	10 mrad/year and 5 mrad/quarter gamma; 20 mrad/year and 10 mrad/quarter beta
Nominal Operating Values (a)	0.01% of 5 mrad/quarter gamma; 0.004% of 10 mrad/quarter beta
Adjusted Power Uprate Values (b)	0.011% of 5 mrad/quarter gamma; 0.0045% of 10 mrad/quarter beta

(a) From the percentages given in the 2006 Monticello Radioactive Effluent Release Report.

(b) Estimated by multiplying the nominal operating value percentage times the power uprate ratio (2004 MWth/1775 MWth).

Power uprate does not create any new or different sources of offsite dose from Monticello operation, and it does not involve significant increases in present radiation levels. Therefore, it is reasonable to conclude that the offsite dose will remain well within regulatory criteria with no significant environmental impact.

4.2.4 Reactor System Waste

Reactor system wastes will increase slightly due to the uprate. These wastes are currently stored in the spent fuel pool and are not shipped offsite. An Independent Spent Fuel Storage Installation ("ISFSI") is

currently being constructed at Monticello and spent fuel will begin being stored there in 2008. Under power uprate conditions, the number of irradiated fuel assemblies discharged from the reactor will increase from a nominal 150 assemblies/cycle to approximately 173 assemblies/cycle. These additional assemblies will be stored in the existing spent fuel pool and ISFSI facility.

The uprate will not result in radiological levels above the safe thresholds established by the NRC and in the Technical Specifications for the plant. The uprate will not introduce any new or different radiological release pathways. The uprate will increase the number of fuel assemblies to be handled at each refueling (from 150 to about 170 per refueling), but this change does not increase the probability of an operator error or equipment malfunction that would result in an uncontrolled radioactive release. Given the arguments above, the environmental impact due to generation of solid radioactive from power uprate conditions is insignificant.

4.2.5 Solid Waste

Monticello continually tracks the volume of radioactive solid waste ("radwaste") generated on-site. Significant volume reductions have occurred in past years making Monticello a recognized industry leader in waste reduction. For calendar years 1994 and 1995, the low-level solid radwaste volume at Monticello was 48 and 49 cubic meters respectively. This is well below the U. S. BWR Industry Median Volume of Low-Level Solid Radwaste of 178 cubic meters in 1994 and 107 cubic meters in 1995. For calendar years 2001 through 2006, the average volume of solid radwaste (spent resin, filter sludge, evaporator bottoms, etc.) shipped per year was less than 20 cubic meters. The increased volume of resins due to power uprate (estimated at 3 cubic meters/year) could be accommodated in one additional truck shipment per year.

The bulk volume of total solid radwaste shipped from Monticello (in addition to the spent resin, filter sludge, evaporator bottoms, etc.) consists of dry compacted waste, and contaminated equipment. This portion of the solid radwaste volume is not directly impacted by power uprate on an ongoing basis, but is a factor in the amount and types of housekeeping, maintenance and modification activities performed in the plant. There will likely be a temporary increase in

these volumes due to the modifications and equipment replacements in support of power uprate. However, Monticello procedures and practices remain committed to a goal of minimizing the volume of solid radwaste that is created and ultimately requires shipment.

Equipment wastes from operational and maintenance activities, chemical wastes, and reactor system wastes also contribute to solid waste generation. Power uprate does not significantly affect the production or type of equipment and chemical wastes. The effect of power uprate on process wastes and reactor system wastes is evaluated below.

The power uprate will result in small increases in the process wastes generated from operation of the Reactor Water Cleanup ("RWCU") filter/demineralizers and the condensate demineralizers.

The changeout limits for the RWCU filter/demineralizers are based on differential pressure and effluent chemistry. It is expected that more frequent RWCU backwashes will occur after power uprate due to chemistry limits. Power uprate will not involve changes in RWCU flow rate or filter performance. We have estimated that the number of backwashes for RWCU would likely increase by approximately 5 backwashes per year from 24 to 29.

The changeout limits for condensate demineralizer operation are based on differential pressure and conductivity. The principal power uprate effect on the Condensate Demineralizer System is increased condensate flow. A consequent result of increased condensate flow is that the vessel differential pressure changeout limit will be reached more frequently. We have estimated that the number of backwashes for condensate demineralizer operation would likely increase from 78 to 93 backwashes per year for an increase of 15 backwashes per year.

The increases in solid wastes from the aforementioned processes will result in waste volumes increasing from 17.5 cubic meters/year to approximately 20.6 cubic meters/year, an increase of approximately 3 cubic meters/year.

The volume and activity of waste generated from spent control blades and in-core ion chambers may increase slightly under the higher flux conditions associated with power uprate conditions.

The annual environmental impact of low and high level solid wastes has been generically evaluated by the NRC Staff for a 1000 MWe reference reactor. The estimated activity content of these wastes is given in Table S-3 in 10 CFR 51.52 and is bounding for Monticello at power uprate operating conditions.

4.2.6 Zero Discharge Policy for Liquid Radioactive Waste

Although we are authorized to discharge liquid radioactive at Monticello, we have administratively operated Monticello as a zero radioactive liquid release plant since 1972. No change is expected in the zero release policy as a result of power uprate project.

The annual liquid volume processed due to the uprate is estimated to increase from approximately 11,000 gals/day to 11,250 gals/day due to the increased frequency of reactor water clean-up system filter/demineralizer and condensate demineralizer backwashes necessary as a result of power uprate. This increased frequency is estimated to add approximately 91,000 gallons/year, or about 250 gals/day. This increase is less than 2 percent of overall system capacity and brings the total usage to about 55 percent of system capacity. In addition, because of the zero liquid radioactive discharge at Monticello, this slight increase in input to the liquid radioactive system will be recycled, not discharged, and therefore will not produce any environmental impact.

The uprate will not affect compliance with the limits of 10 CFR 20 or the guidelines of Appendix I to 10 CFR 50 for liquid effluents at Monticello.

4.3 Water Quality and Temperature

Monticello uses cooling water withdrawn from the Mississippi River using two, 140,000 gallons per minute (gpm) circulating water pumps. The water is circulated through the condenser and then routed, along with service water, to the discharge structure. During open cycle operation, i.e., when ambient river water temperature is less than 68 degrees Fahrenheit (°F) (and river flow is adequate), the condenser effluent is routed to an open canal and discharged directly to the river. Open-cycle operation is typical from about mid-September to mid-

May. When river water temperatures exceed 68°F and river flow is adequate, condenser effluent from the discharge structure is pumped into two, induced-draft cooling towers, and then to the river via the discharge canal. Under high temperature and/or low flow conditions, Monticello can also be operated in a partial recycle mode or closed-cycle mode. These alternative operating modes are used to comply with MDNR water appropriation restrictions and MPCA thermal discharge limits established in the NPDES permit.

The NPDES permit for Monticello is periodically reviewed and re-issued by the Minnesota Pollution Control Agency ("MPCA"). The MPCA recently reissued the NPDES permit for Monticello on October 16, 2007. The NPDES permit specifies maximum daily average temperature at the end of the discharge canal depending on the month: 95°F in April through October; 85°F in November and March; and 80°F in December through February.

The NPDES authorizes discharges from five outfalls and requires monitoring at the river water intake. The outfalls and their effluent limits are listed in Table 4-4. None of the limits listed in this table will require modification to implement power uprate. Thus, no changes to the permit requirements, other than administrative and descriptive changes, are necessary to implement the power uprate. The relevant changes identified thus far include the slight increase in circulating water discharge temperature (Outfall SD 001).

Table 4-4
NPDES Discharge Limit Summary

Outfall Number	Description	Parameter	Limit
SD 001	Plant Cooling Water Discharge	Bromine	Monitor Only
		Chlorination	2.0 hr/day (daily max)
		Chlorine Rate	Monitor Only
		Flow (mgd) monthly avg.	Monitor Only
		Flow (mgd) calendar month max	
		Flow (MG) calendar month total	

Outfall Number	Description	Parameter	Limit
		Oxidants, Total Residual	0.2 mg/l (instantaneous max.)
		Plant Capacity Factor	Monitor Only
		Discharge Temperature °F	Seasonala
SD 003	Holdup Pond Effluent Discharge	Flow (mgd)	Monitor Only
		PH	pH (6.0 to 9.0)
		Total Suspended Solids	9.9 kg/day monthly avg.
		Total Suspended Solids	30 mg/L monthly avg.
		Total Suspended Solids	33.2 kg/day daily max
		Total Suspended Solids	100 mg/L daily max
SD 004	Turbine Building Sump & Miscellaneous Discharge	Flow (mgd) monthly avg.	Monitor Only
		Flow (mgd) calendar month max	Monitor Only
		Flow (MG) calendar month total	Monitor Only
		Oil and Grease	4.2 kg/day calendar month avg.
		Oil and Grease	10 mg/L calendar month avg.
		Oil and Grease	15 mg/L daily max
		Oil and Grease	6.3 kg/day max calendar week avg.
		PH	pH (6.0 to 9.0)
		Total Suspended Solids	12.7 kg/day calendar month avg.
		Total Suspended Solids	30 mg/L calendar month avg.
		Total Suspended Solids	42.3 kg/day daily max
		Total Suspended Solids	100 mg/L daily max
SD 005	Screen Backwash & Roof/Yard Drain	Flow (mgd) monthly avg.	Monitor Only
		Flow (mgd) calendar month max	
		Flow (MG) calendar month total	
SD 006	Screen Backwash & Roof/Yard Drains	Flow (mgd) monthly avg.	Monitor Only
		Flow (mgd) calendar month max	

Outfall Number	Description	Parameter	Limit
		Flow (MG) calendar month total	
SW 001	Water Intake	°F Calendar Month Avg.	Monitor Only
		°F Calendar Month Max	
		°F Calendar Month Minimum	
WS 001	Mid-downstream discharge canal	Oxidants, Total Residual	0.05 mg/L daily max

(a) In no case shall the maximum daily average temperature at the end of the discharge canal exceed the following limits:

(i) During the months of April through October: 95 °F

(ii) During the months of November and March: 85 °F

(iii) During the months of December through February: 80 °F

4.3.1 Increase in Circulating Water Discharge Temperature

Due to the increased thermal energy produced following the power uprate, the heat rejected by the condenser increases. This results in a corresponding increase in the circulating water outlet temperature for a given system flow rate. The steam cycle heat dissipation is provided by the Circulating Water System and the Cooling Tower System. The heat dissipation system at Monticello is the source of thermal discharges from the plant. No physical modifications or operational changes are required for these systems to implement the uprate.

The power uprate will not involve any changes to the MPCA discharge temperature limits. The slight discharge canal temperature increase will not result in one half of the surface width of the river temperature exceeding the 90°F maximum as delineated in the Final Environmental Statement (AEC, 1972 p. V22).

Extensive field studies have been performed to confirm that the limits imposed by the NPDES permit are conservative and assure no

significant adverse impact on the environment. These temperature studies ended in 1988 when the MPCA determined that 20 years of temperature monitoring had adequately characterized the thermal impacts of Monticello operation. Based on studies that evaluate the Monticello impact on the river ecosystem, cooling tower operation during the summer months has adequately prevented detrimental environmental effects, and water temperatures downstream are not high enough to harm aquatic species or impede fish migration even in summer months. Temperature monitoring of Outfall SD 001 (discharge canal) is continuous, and we operate Monticello in conformance with the permit's thermal discharge requirements.

The temperature increase across the intake and plant discharge is highest in fall and winter, when once-through cooling is employed. The temperature increase is lowest in summer and during periods of low river flow; when NPDES permit limits associated with upstream average river temperature necessitate cooling tower use. During open cycle operation at rated circulating water system flow, it is conservatively estimated that uprate will result in an increase in temperature of water entering the discharge canal by approximately 4.5°F. During other modes of operation, the water temperature increase will be less due to tempering from partial or full cooling tower operation. With cooling towers in service, the discharge canal temperature is expected to increase less. The calculated maximum temperature increase of 4.5°F at the discharge canal inlet would be experienced during months when cooling tower operation is not required to meet NPDES permit temperature requirements. This resultant discharge canal temperature increase is well bounded by seasonal variations.

During combinations of low river flow and high atmospheric temperatures, discharge canal temperatures have approached the NPDES permit limits with cooling tower operation. During such periods we have reduced power at Monticello to maintain compliance with the NPDES permit. This practice will continue after power uprate.

A 1.7°F to 4.5°F inlet temperature increase would not involve any significant increase in harmful thermophilic organisms in the discharge canal. Monticello's daily average discharge canal

temperatures range from 66 to 95 °F when the plant is operating and rarely averages more than 90°F over a month. Thermophilic bacteria generally occur at temperatures of 25 to 80°C (77-176°F), with maximum growth at 50 to 60°C (122-140°F). Pathogenic forms have evolved to survive in the digestive tract of mammals and, accordingly, have optimum temperatures of around 37°C (99°F). Similarly, pathogenic protozoans, such as Naegleria fowleri, have maximum growth and reproduction at temperatures ranging from 35 to 45°C (95-113°F) and are rarely found in water cooler than 35°C (95°F).

Another factor limiting concentrations of pathogenic microorganisms in the Monticello discharge is the absence of a seed source or inoculants. Wastewater, whether municipal sewage, industrial wastewater, or agricultural runoff, is usually the source of pathogens in natural waters. Since October 1983, the Monticello plant has pumped its sanitary wastes to the City of Monticello's wastewater treatment plant. Power uprate does not increase the sanitary waste from Monticello. Consequently, power uprate does not involve significant discharges of pathogenic microorganisms to the discharge canal and the Mississippi River. Pathogenic organisms in the Mississippi River downstream of Monticello would typically come from upstream anthropogenic sources or animal wastes.

Given the information presented above, the slight increases in circulating water outlet temperature due to power uprate will not involve any changes in compliance with the present discharge temperature limits established by the MPCA and will not result in any significant impacts to the environment. The results of the Section 316(a) demonstration (Afzal, 1975) for Monticello determined that Monticello operation has had subtle alterations in the structure of some aquatic communities, but these impacts have been limited to a small area directly downstream of the plant. Biological diversity has not suffered and may have been enhanced by thermal inputs during certain times of the year. Based on available information, the minor increase in thermal output to the river due to power uprate is not expected to result in any impacts on aquatic biota that are different in kind or greater in magnitude than those identified over the past 25 years.

In addition to the 316(a) demonstration, we conducted thermal plume studies following the construction of the discharge canal weir. These studies showed that even in the worst-case year the thermal plume disperses rapidly, is largely restricted to the near side of the river, and is not a barrier to fish movement. In addition, depending on the ambient conditions and the distance downstream from the plant, roughly 30 to 70 percent of the river is unaffected by the heated discharge. The uprate will not alter water volume requirements for the heat dissipation system, the physical construction of the discharge canal terminus, or temperature limits established by the NPDES permit. Therefore, the uprate does not change the findings of the thermal gradient and plume studies.

4.3.2 Cold Shock

Cold shock is caused by an unplanned shutdown; the probability of an unplanned shutdown is independent of power uprate. The projected increase in discharge canal inlet temperature of 1.7°F to 4.5°F does not result in a significant increase in the overall discharge canal temperature, thus the magnitude of the temperature decrease in a cold shock situation is not significantly changed.

The cold shock concerns of river fish species have been reduced by the construction of a weir at the end of the discharge canal, and by backwashing of the traveling screens above 50°F. The weir limits the number of fish in the discharge canal and reduces the effects of cold shock on aquatic species in the river. In addition, administrative procedures for controlled temperature reduction of the discharge canal are in place to minimize thermal shock to the aquatic biota. Power uprate will not affect cold shock.

4.3.3 Water Quality

The water quality of the Mississippi River at the Monticello point of discharge is classified Class 2Bd by the State of Minnesota. Class 2Bd water quality is sufficient to allow for water sports, fishing, and aquatic recreation.

Water quality upstream and downstream of the plant has been addressed in considerable detail in Monticello's Annual Environmental Monitoring Reports (e.g. 1981 - 1987). Based on 20

years of water quality monitoring at Monticello, we submitted a report for review by the MPCA in 1987. In 1988, the MPCA determined that Monticello's operation had not adversely affected the water quality of the Mississippi River downstream of the plant and allowed us to reduce the monitoring program. There is no indication that chemical discharges from Monticello have caused any detrimental effects to the aquatic biota.

Monticello water quality monitoring programs are conducted in accordance with the NPDES permit. Effluent limitations and monitoring requirements for the discharges are an integral part of the NPDES permit. Each Outfall identified in the permit requires continuous flowrate monitoring when discharging. Chemical discharges from Monticello have been nominally less than those predicted in the 1971 Environmental Report. Modifications of the non-radiological drain systems or the retention basin system are not required as part of power uprate, and biocide/chemical discharges will be consistent within existing permit limits. No new contaminants or pollutants will be introduced as a result of power uprate, nor will contaminants presently allowed for release by the MPCA be significantly increased.

The present NPDES permit requires the operation of cooling towers when the inlet river temperature is consistently at or above 68°F. Based on an examination of operating temperatures, we have determined that the 68°F river temperature requirement would preempt the 95°F discharge temperature requirement in all but a few cases. We have determined that an additional 20 days of cooling tower operation may be required to support power uprate operation to meet the 95°F maximum discharge canal limit.

Bromine and sodium hypochlorite are injected into plant water systems at various concentrations to minimize microbiological fouling. The additional 20 days per year of operation may require a very slight increase in normal bromine and sodium hypochlorite injection. The discharge of any additional residual halogens attributable to the increased use of cooling towers is expected to be insignificant, and effluent concentrations would continue to be well below the NPDES daily discharge limits.

4.4 Groundwater and Surface Water Resources

This section of the application summarizes the available surface and groundwater sources for Monticello.

4.4.1 Groundwater Use

Ground water is used at the Monticello site to supply domestic potable water to the plant administration building, raw water to the reverse osmosis/make-up demineralizer system, and seal water to pumps at the plant intake structure. Groundwater supplies in the area are drawn primarily from surface deposits consisting of glacial outwash sand and gravel. The primary regional groundwater use in the vicinity of the Monticello site is for crop irrigation. The nearest potable water supply wells are located at the Monticello site. The groundwater table is about 20 feet below the surface at an approximate elevation of 910 feet MSL. The flow in the water table aquifer is toward the Mississippi River, which is at about elevation 905. Groundwater flow in the deeper bedrock units is toward the southeast, generally parallel to the regional surface water drainage. (NMC, 2005).

Actual usage of groundwater between 1998 and 2006 averaged less than 38 gpm. Groundwater use for the facility is permitted by the MDNR Groundwater Appropriations Permit number 67-0083. The permit pertains to two water wells, each equipped with a 100-gpm capacity pump, which are connected together and are regulated under a single water appropriations permit with a withdrawal limit of 200 gpm. Four additional wells are operated at the facility for potable and non-potable uses similar to above. However, these wells have usage below 10,000 gallons per day and are not required to have a water appropriation permit. The estimated consumption due to the power uprate is not considered to be significant; therefore the uprate will not involve any changes to the Groundwater Appropriations Permit.

Monticello monitors groundwater as part of the Radiological Environmental Monitoring Program. Since 1976, four wells have been sampled quarterly for radioactive and chemical contamination which includes sampling for tritium and gamma-emitting radionuclides. No contamination has been detected in any of the wells (NMC, 2005).

4.4.2 Surface Water Use

Surface elevation varies at the Monticello site from approximately 935 feet MSL to about 910 feet MSL. Natural surface drainage is generally to the southwest at an approximate 2 to 3 percent grade away from the Mississippi River. See Figure 4-3.

The major hydrologic feature of the Monticello site is the Mississippi River, which flows from northwest to the southeast (Figure 4-3). The maximum monthly average flow for the period 1971 to 2001 was 30,561 cfs (April, 2001) and the minimum monthly average flow of 853 cfs occurred in September 1976 (NRC, 2005). The river elevation is approximately 907 feet above mean sea level (MSL) in the vicinity of the site. The Mississippi River tributaries close to the site are Silver Creek, five miles to the northwest, and Otter Creek, three miles to the southeast (See Figure 4-1). The Monticello plant site is located outside the 100-year floodplain (Xcel Energy, 2005).

The surface water at the Monticello site, which is drawn from the Mississippi River, is used for plant condenser cooling and auxiliary water systems, such as service water cooling, intake screen wash, and fire protection. Under typical river conditions, the circulating water system removes heat from the Monticello condenser by the once-through circulating water system.

Currently, surface water use averages about 509 cfs. A small percentage (2 percent) of this cooling water is evaporated due to plant operations. The surface water consumption due to open cycle evaporative losses and cooling tower evaporation and drift is currently estimated at approximately 6,800 acre-ft/year (9.4 cfs) assuming 130 days of cooling tower operation, 235 days of open-cycle operation and nominal values of cooling tower flow (at a water use rate of approximately 509 cubic feet/second).

Following the uprate, assuming an increase in open cycle consumption of 20 percent, an increase in days of cooling tower operation to 150 days/year, and nominal values of cooling tower flow, results in an estimated consumption of 7,700 acre-ft/year (10.6 cfs). Even using the maximum surface water appropriation limit of 645 cubic feet/second as the cooling tower flow value, the resulting estimated total water consumption would be no more than 8,700 acre-ft/year (12 cfs).

This level is still well below the level determined to be insignificant in the NRC EIS completed for the Monticello re-licensing (NRC, 2006).

Surface water use at Monticello is permitted by the MDNR under Surface Water Appropriation Permit number PA 66-1172-S. The Surface Water Appropriations Permit allows NMC to withdraw up to 645 cfs (or 290,000 gpm) of water from the Mississippi River, with special operating conditions if the river flow is less than 860 cfs, and further restrictions if river flow is 240 cfs or less. The power uprate will not introduce any significant changes to the screen wash, service water, or circulating water flow requirements. Thus, the estimated additional consumption due to power uprate is within the values previously evaluated by the NRC and is not considered to be significant. Therefore, the uprate will not involve any changes to the Surface Water Appropriations Permit.

4.4.3 Impingement and Entrainment

Section 316(b) of the Clean Water Act requires any standard established pursuant to 301 or 306 shall require the location, design, construction, and capacity of cooling water intake structures to reflect the best technology available for minimizing adverse environmental impacts [33 USC 1326 (b)]. Entrainment of fish and shellfish in the early life stages through the condenser cooling system is one of the potential adverse environmental impacts that can be minimized by the use of the best available technology.

A 316(b) Demonstration was developed and submitted to the MPCA in 1978 (Amish et al., 1978). The Demonstration was ultimately accepted and approved by the MPCA in September 1979, with the conclusion that neither entrainment nor impingement at Monticello "... offers no substantial detriment to the fisheries population." (Hoffman, 1979).

Electrofishing surveys to assess relative abundance and seasonal distribution of fish in response to Monticello's thermal discharge have been conducted from 1976 to the present. Areas of the river sampled extended about 1.5 kilometers both up and downstream from the discharge structure, with the thermal plume generally covering less than one-half of the downstream flow of the study area. Results show similar, persistent, and stable species assemblages both up and

downstream of the discharge. Based on these studies, we conclude that the impact to fish populations as a result of entrainment or impingement are not altered by the uprate project. EPA has recently issued rules implementing Section 316(b). Conformance with these new regulations will be determined within the NPDES Permit renewal process as implemented by MPCA.

The circulating water and service water system flow rates will not change significantly. The power uprate project will not affect the impingement and entrainment of organisms and will not cause effects that have not been previously evaluated. Thus, no significant increase in entrainment of organisms or impingement of fish is anticipated due to the uprate above that present during current operating conditions.

4.5 Rare and Unique Natural Resources

No changes to land use are anticipated as a result of the power uprate and therefore there are no anticipated impacts to rare and unique natural resources or species. This section describes potentially unique species that have associated with the Monticello site.

The MDNR has identified one recently delisted threatened species, one recently listed threatened species and two special concern species within one mile of the Monticello site. No federally listed threatened or endangered species were reported (Attachment C). The uprate will not affect these nearby endangered species because the construction footprint will be limited to areas inside Monticello existing site perimeter.

The bald eagle *(Haliaeetus leucocephalus)*, previously listed as federally threatened, is known to occur in the vicinity of the Monticello site. Originally listed as endangered by the FWS in 1967, the bald eagle was delisted in August 2007 (FWS, 2007). The bald eagle is listed by MDNR as a special concern species.

The Peregrine falcon (*Falco peregrinus*) is also listed as a special concern species by MDNR. With the installation of a nest box on the Monticello Off Gas Stack in 1992, peregrine falcons have been successfully nesting at the site since 1995. Since 2002, five young have fledged from the nesting box (MDNR, 2007).

The third special concern species reported within 1-mile of the Monticello plant site is the Black Sandshell mussel (*Ligumia recta*). In 2004, forty live individuals were found during the Statewide Mussel Survey conducted at survey sites near the Monticello site (MDNR, 2007).

Finally, the formerly rare trumpeter swan has been observed recently in increasing numbers on the Mississippi River, downstream from Monticello. The trumpeter swan was recently listed as a threatened species by the MDNR. The swans are drawn to the open water in the winter months, which results from Monticello's discharge of warm water to the River, and to food supplied by a local resident at the City of Monticello's Mississippi Drive Park. Having disappeared from Minnesota in 1880's, the trumpeter swan has been successfully restored to the state with recent MDNR and FWS surveys showing more than 75 nesting pairs and nearly 900 year round residents (MDNR, 2004). The power uprate will increase the discharge temperatures slightly at times in the Mississippi River, but the slight increase will not affect the swans' use of the downstream area in winter.

The uprate will have no impacts on the current species composition in the area because construction will be limited to within the existing footprint and mainly the exiting building, and the only off-site impact is a slight increase in water discharge temperature in some seasons. The most visible potentially affected species, the trumpeter swan, could be affected by the cessation of warm water discharges during the winter months, resulting in the loss of the open water habitat downstream from Monticello. However, the timing of outages are unaffected by the power uprate. The outages are typically scheduled to coincide with periods of reduced demand for power and this will not change due to the power uprate. The uprate will not affect the likelihood of reduced warm water discharges in the winter, but could slightly increase the water temperature during those discharges

4.6 Historic and Archaeological Resources

The area has a history of Indian and early French trader activity, however, no evidence of this activity has been found at the site (AEC, 1972, Section II.C). The construction of Monticello and the associated transmission line corridors did not impact any known historic or

archaeological resources. No significant resources were found on or near the site during historic and archaeological investigations performed prior to operations (AEC, 1972, Section II.C and Appendix C, page 51; NSP 1971).

The uprate will not result in any construction activities outside the Monticello facility; therefore, no impacts to these resources are anticipated as a result of the project.

4.7 Human Settlement (Demography and Socioeconomics Air Quality, Traffic, Noise, Aesthetics, Other Impacts)

4.7.1 Demographics

The Monticello site is located within the City of Monticello, which has an estimated population of 7,868 (Census, 2000). Approximately 73 percent of Monticello employees live in Wright and Sherburne Counties. Table 4-5 presents decennial population estimates and annual growth rates for these two counties. The population of Wright County has more than doubled since 1970. Sherburne County has experienced similar growth trends, with the population more tripling between 1970 and 2000 (Census, 2000). The power uprate project will not affect the populations of Monticello or the surrounding communities.

Table 4-5
Estimated Populations and Annual Growth Rates – Wright and Sherburne Counties from 1970 to 2040

	Wright		Sherburne	
Year	**Population[a]**	**Percent[b]**	**Population[a]**	**Percent[b]**
1970	38,933	--	18,344	--
1980	58,681	4.19	29,908	5.01
1990	68,710	1.59	41,945	3.44
2000	89,986	2.73	64,417	4.38
2010	109,700	2.00	86,320	2.97
2020	126,420	1.43	105,620	2.04
2030	139,020	0.95	121,920	1.45
2040	152,876	0.95	140,736	1.45

	Wright		Sherburne	
Year	**Population[a]**	**Percent[b]**	**Population[a]**	**Percent[b]**

(a) Source: Years 1970 through 1990, Census 1995; Year 2000, Census 2000b,c DP-1; Years 2010 through 2030, MDA 2004; Year 2040 is a projection using previous decade's rate of growth.

(b) Annual percent growth rate calculated using the equation N[t] = N[o] (1+r)t where N is population, t is time in years, and r is the annual growth rate expressed as a decimal.

4.7.2 Socioeconomic Impacts and Cultural Values

The power uprate construction activities are expected to occur primarily during refueling outages in the first quarter of 2009 and 2011. The size of the workforce during the two refueling outages when power uprate is implemented is not expected to increase significantly from the size of the workforce during a normal refueling outage.

Typically, a routine outage would require an additional workforce of approximately 500 employees depending on contractor's anticipated staffing needs. There is minimal to no impact from the power uprate on the size of Monticello or the City of Monticello's workforce during periods of normal operation. Because no changes to existing workforce are anticipated, no workers will be displaced by the power uprate.

4.7.3 Recreation and Public Services

No impacts to public activities including recreation are anticipated because the power uprate activities will be confined to within the plant boundaries and primarily the existing plant buildings. Although minor changes in thermal discharge are anticipated, these changes are unlikely to have any noticeable effect on recreation (e.g. sport fishing).

No additional demands will be placed on public services because significant changes to the site, workforce, and infrastructure are not anticipated as part of the project. The power uprate is not anticipated to result in additional traffic generated beyond normal levels currently

experienced at Monticello during periods of power generation and refueling outages. Plant modifications to accomplish the power uprate will be completed primarily during refueling outages and equipment deliveries for power uprate will not involve deliveries that are materially different from those required during past refueling outages. Post uprate traffic patterns will not differ from levels currently experienced during normal operations.

4.7.4 Impact on Land-Based Economies

None of the project-related activities represent any changes in land use or displace other land uses because the site is already developed for power generation. Resources such as groundwater or surface water will be utilized within established appropriation limits. There are no anticipated changes to the distribution or demand for these resources that could affect other economic activities. Tourism, forestry, and mining activities are not dependent on the site or its immediate environs, and therefore are unlikely to be increased or decreased as a result of the power uprate.

Since the footprint of Monticello will not change and the power uprate will not affect nearby infrastructure, there will be no displacement of nearby residents or business.

4.7.5 Non-Radiological Air Quality Impacts

The region surrounding Monticello is an "attainment area" that currently meets all federally allowed air concentration limits for criteria air pollutants (as does all of Minnesota). The power uprate project will not affect air quality in the area. Non-radiological air emissions are not expected to increase or decrease as a result of the uprate. Diesel engines, a boiler, and other sources currently associated with the Monticello site emit various nonradioactive air pollutants to the atmosphere, such as NOx, $S0_2$ and CO. Air emissions from these sources are subject to the terms and conditions of a Title V air pollution control operation permit issued by the MPCA (Air Emission Permit No. 17100019-003). No changes to the MPCA air permit are required due to the uprate.

4.7.6 Traffic

Traffic safety will not be degraded, because the power urate will not result in a long-term change to the routes, number of trips, types of vehicles, speed compared to current conditions. Any changes affecting traffic will be temporary in nature to accommodate delivery of equipment for the project.

4.7.7 Noise

Power uprate will not result in any significant changes to the character, sources, or energy of noise generated at Monticello. The majority of new equipment necessary to implement power uprate will be installed within existing plant buildings – the new transformers being the exception. All equipment will be installed within the existing plant footprint. No new significant noise-generating equipment is planned as part of the uprate project. No significant increases in ambient noise levels are expected within the plant.

4.7.8 Visual Aesthetics

The uprate project will not change the visual appearance of plant features from outside the facility boundaries; therefore there is no anticipated impact to aesthetics. Cooling tower operation involves the discharge of water vapor that is potentially visible from outside the plant boundaries. Although the number of days that the cooling towers are used may increase by about 20 days per year, the appearance of cooling tower operation will not change as a result of the uprate.

4.7.9 Site-Specific Unavoidable Effect of Site Development (7849.5220 Subp. 3 G)

The uprate will result in a slight increase (1.7°F to 4.5°F) in water discharge temperature depending upon the season, and a slight increase of some solid and process wastes, as described above.

4.8 Mitigative Measures and Costs (7849.5220 Subp. 3 H)

Mitigation measures implemented for each potential impact are provided above in the preceding applicable subsections.

5 References

Note: This list of references identifies web pages and associated URLs where reference data was obtained. Some of these web pages may likely no longer be available or their URL addresses may have changed. NMC has maintained hard copies of the information and data obtained from the referenced web pages.

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MDNR (Minnesota Department of Natural Resources), 2007. Response to letter request for Natural Heritage information for the Monticello Nuclear Generating Plant Uprate Project. NHNRP Contact #: ERDB 20080252. Attachment included as Long Record Report (copywrited material) available from MDNR 500 Lafayetter Road, St. Paul, MN 55155.

NMC (Nuclear Management Company, LLC). 2003. Monticello Updated Safety Analysis Report. Revision 21. Monticello, MN. May.

Nuclear Generating Plant Application for Renewed Operating License Appendix E – Environmental Report, March 2005

NRC. 2006. NUREG-1437, Supplement 26, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding Monticello Nuclear Generating Plant" August 2006.

Xcel (Xcel Energy Inc.). 2004. "Xcel Energy Code of Conduct (Uniform Policy)." February 25.

Xcel Energy, 2005. Application for Certificate of Need for Independent Spent Fuel Storage Installation at Monticello Nuclear Generation Plant.

Approved Applications for Power Uprates

The following power uprates have been reviewed and accepted by the NRC. The licenses for the following plants have been amended to reflect the increase in power level shown in the table.
(TYPE -- S = Stretch; E = Extended; MU = Measurement Uncertainty Recapture)
The following links on this page are to documents in our Agencywide Documents Access and Management System (ADAMS). ADAMS documents are provided in either Adobe Portable Document Format (PDF) or Tagged Image File Format (TIFF). To obtain free viewers for displaying these formats, see our Plugins, Viewers, and Other Tools. If you have problems with viewing or printing documents from ADAMS, please contact the Public Document Room staff.

NO.	PLANT	% UPRATE	MWt	DATE APPROVED	TYPE	ACCESSION #
1	Calvert Cliffs 1	5.5	140	09/26/77	S	
2	Calvert Cliffs 2	5.5	140	11/08/77	S	
3	Millstone 2	5	140	06/25/79	S	7907240100*
4	H. B. Robinson	4.5	100	06/29/79	S	7907180064*
5	Fort Calhoun	5.6	80	08/15/80	S	8008280223*
6	St. Lucie 1	5.5	140	11/23/81	S	ML013530273
7	St. Lucie 2	5.5	140	03/01/85	S	ML013600080
8	Duane Arnold	4.1	65	03/27/85	S	ML021890435
9	Salem 1	2	73	02/06/86	S	ML011660249
10	North Anna 1	4.2	118	08/25/86	S	ML013460131
11	North Anna 2	4.2	118	08/25/86	S	ML013460131
12	Callaway	4.5	154	03/30/88	S	ML021650524
13	TMI-1	1.3	33	07/26/88	S	ML003779786
14	Fermi 2	4	137	09/09/92	S	ML020720520
15	Vogtle 1	4.5	154	03/22/93	S	ML012330056
16	Vogtle 2	4.5	154	03/22/93	S	ML012330056
17	Wolf Creek	4.5	154	11/10/93	S	ML022030519
18	Susquehanna 2	4.5	148	04/11/94	S	ML010170334
19	Peach Bottom 2	5	165	10/18/94	S	ML011490143
20	Limerick 2	5	165	02/16/95	S	ML011560773
21	Susquehanna 1	4.5	148	02/22/95	S	9503070354*
22	Nine Mile Point 2	4.3	144	04/28/95	S	9505090259*
23	WNP-2	4.9	163	05/02/95	S	ML022120154
24	Peach Bottom 3	5	165	07/18/95	S	ML021580312
25	Surry 1	4.3	105	08/03/95	S	ML012710328
26	Surry 2	4.3	105	08/03/95	S	ML012710328
27	Hatch 1	5	122	08/31/95	S	ML013020073
28	Hatch 2	5	122	08/31/95	S	ML013020073

NO.	PLANT	% UPRATE	MWt	DATE APPROVED	TYPE	ACCESSION #
29	Limerick 1	5	165	01/24/96	S	ML011560244
30	V. C. Summer	4.5	125	04/12/96	S	ML012320013
31	Palo Verde 1	2	76	05/23/96	S	ML021710572
32	Palo Verde 2	2	76	05/23/96	S	ML021710572
33	Palo Verde 3	2	76	05/23/96	S	ML021710572
34	Turkey Point 3	4.5	100	09/26/96	S	ML013390234
35	Turkey Point 4	4.5	100	09/26/96	S	ML013390234
36	Brunswick 1	5	122	11/01/96	S	9611070136*
37	Brunswick 2	5	122	11/01/96	S	9611070136*
38	Fitzpatrick	4	100	12/06/96	S	9612180303*
39	Farley 1	5	138	04/29/98	S	ML012140259
40	Farley 2	5	138	04/29/98	S	ML012140259
41	Browns Ferry 2	5	164	09/08/98	S	ML042670045
42	Browns Ferry 3	5	164	09/08/98	S	ML042670045
43	Monticello	6.3	105	09/16/98	E	ML020920138
44	Hatch 1	8	205	10/22/98	E	ML013030084
45	Hatch 2	8	205	10/22/98	E	ML013030084
46	Comanche Peak 2	1	34	09/30/99	MU	ML021820306
47	LaSalle 1	5	166	05/09/00	S	ML003716743
48	LaSalle 2	5	166	05/09/00	S	ML003716743
49	Perry	5	178	06/01/00	S	ML003724441
50	River Bend	5	145	10/06/00	S	ML003762072
51	Diablo Canyon 1	2	73	10/26/00	S	ML003764792
52	Watts Bar	1.4	48	01/19/01	MU	ML010260074
53	Byron 1	5	170	05/04/01	S	ML011420274
54	Byron 2	5	170	05/04/01	S	ML011420274
55	Braidwood 1	5	170	05/04/01	S	ML011420274
56	Braidwood 2	5	170	05/04/01	S	ML011420274
57	Salem 1	1.4	48	05/25/01	MU	ML011350051
58	Salem 2	1.4	48	05/25/01	MU	ML011350051
59	San Onofre 2	1.4	48	070/6/01	MU	ML012180231
60	San Onofre 3	1.4	48	07/06/01	MU	ML012180231
61	Susquehanna 1	1.4	48	07/06/01	MU	ML011760551
62	Susquehanna 2	1.4	48	070/6/01	MU	ML011760551
63	Hope Creek	1.4	46	07/30/01	MU	ML011910345
64	Beaver Valley 1	1.4	37	09/24/01	MU	ML012490569
65	Beaver Valley 2	1.4	37	09/24/01	MU	ML012490569

NO.	PLANT	% UPRATE	MWt	DATE APPROVED	TYPE	ACCESSION #
66	Shearon Harris	4.5	138	10/12/01	S	ML012830516
67	Comanche Peak 1	1.4	47	10/12/01	MU	ML012550246
68	Comanche Peak 2	0.4	13	10/12/01	MU	ML012550246
69	Duane Arnold	15.3	248	11/06/01	E	ML013050342
70	Dresden 2	17	430	12/21/01	E	ML013540187
71	Dresden 3	17	430	12/21/01	E	ML013540187
72	Quad Cities 1	17.8	446	12/21/01	E	ML013540222
73	Quad Cities 2	17.8	446	12/21/01	E	ML013540222
74	Waterford 3	1.5	51	03/29/02	MU	ML020910734
75	Clinton	20	579	04/05/02	E	ML021650543
76	South Texas 1	1.4	53	04/12/02	MU	ML020800263
77	South Texas 2	1.4	53	04/12/02	MU	ML020800263
78	ANO-2	7.5	211	04/24/02	E	ML021130826
79	Sequoyah 1	1.3	44	04/30/02	MU	ML021220060
80	Sequoyah 2	1.3	44	04/30/02	MU	ML021220060
81	Brunswick 1	15	365	05/31/02	E	ML021440346
82	Brunswick 2	15	365	05/31/02	E	ML021440346
83	Grand Gulf	1.7	65	10/10/02	MU	ML022630304
84	H. B. Robinson	1.7	39	11/05/02	MU	ML023100365
85	Peach Bottom 2	1.62	56	11/22/02	MU	ML031000317
86	Peach Bottom 3	1.62	56	11/22/02	MU	ML031000317
87	Indian Point 3	1.4	42.4	11/26/02	MU	ML023290636
88	Point Beach 1	1.4	21.5	11/29/02	MU	ML023370133
89	Point Beach 2	1.4	21.5	11/29/02	MU	ML023370133
90	Crystal River 3	0.9	24	12/04/02	S	ML023380800
91	D.C. Cook 1	1.66	54	12/20/02	MU	ML023470126
92	River Bend	1.7	52	01/31/03	MU	ML030340294
93	D.C. Cook 2	1.66	57	05/02/03	MU	ML030990129
94	Pilgrim	1.5	30	05/09/03	MU	ML031220007
95	Indian Point 2	1.4	43	05/22/03	MU	ML031420375
96	Kewaunee	1.4	23	07/08/03	MU	ML031530734
97	Hatch 1	1.5	41	09/23/03	MU	ML032590944
98	Hatch 2	1.5	41	09/23/03	MU	ML032590944
99	Palo Verde 2	2.9	114	09/29/03	S	ML032720538
100	Kewaunee	6	99	02/27/04	S	ML040430633
101	Palisades	1.4	35.4	06/23/04	MU	ML040970622
102	Indian Point 2	3.26	101.6	10/28/04	S	ML042960007

NO.	PLANT	% UPRATE	MWt	DATE APPROVED	TYPE	ACCESSION #
103	Seabrook	5.2	176	02/28/05	S	ML050140453
104	Indian Point 3	4.85	148.6	03/24/05	S	ML050600380
105	Waterford	8.0	275	04/15/05	E	ML051030068
106	Palo Verde 1	2.9	114	11/16/05	S	ML053130286
107	Palo Verde 3	2.9	114	11/16/05	S	ML053130286
108	Vermont Yankee	20	319	03/02/06	E	ML060050024
109	Seabrook	1.7	61	05/22/06	MU	ML061430044
110	Ginna	16.8	255	07/11/06	E	ML061380133
111	Beaver Valley 1	8	211	07/19/06	E	ML061720274
112	Beaver Valley 2	8	211	07/19/06	E	ML061720274
113	Browns Ferry 1	5	165	03/06/07	S	ML070680307
114	Crystal River 3	1.6	41	12/26/07	MU	ML073610197
115	Susquehanna 1	13	463	01/30/08	E	ML080020201
116	Susquehanna 2	13	463	01/30/08	E	ML080020201
117	Vogtle 1	1.7	60.6	02/27/08	MU	ML080350345
118	Vogtle 2	1.7	60.6	02/27/08	MU	ML080350345
	Total MWt		15788.2			
	Total MWe		5263			

*Documents can be requested from the Public Document Room
Capacity Recapture Power Uprates for Provisional Operating License Plants are not included in this table. These are Haddam Neck uprate of 24% in 1969, Oyster Creek uprate of 14% in 1971, Palisades uprate of 15% in 1977, Ginna uprate of 17% in 1984, Maine Yankee uprate of 10% in 1989, and Indian Point 2 Uprate of 11% in 1990.
NOTE:The NRC staff approved an MUR power uprate for Fort Calhoun on January 16, 2004, which authorized an increase in the licensed thermal power limit to 1,524 megawatts-thermal. The Omaha Public Power District was subsequently informed by Westinghouse that the potential instrument inaccuracies in the Advanced Measurement and Analysis Group (AMAG) ultrasonic flow meter would not allow implementation of the MUR power uprate at Fort Calhoun. As a result, on May 7, 2004, prior to implementation of the MUR power uprate, the Omaha Public Power District submitted an exigent license amendment request to return Fort Calhoun's licensed thermal power limit to 1,500 megawatts-thermal, the pre-MUR level. On May 14, 2004, the NRC staff approved this license amendment.

TOP

http://www.nrc.gov/reactors/operating/licensing/power-uprates/approved-applications.html

Xcel Energy℠

December 5, 2007

Burl W. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

RE: APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION FOR A SITE PERMIT – MONTICELLO EXTENDED POWER UPRATE PROJECT

Dear Dr. Haar:

This is to inform you that Northern States Power Company, a Minnesota corporation ("Xcel Energy"), intends to submit Certificate of Need and Site Permit Applications to the Minnesota Public Utilities Commission ("Commission" or "PUC") to increase the electric generating capacity of the Monticello plant from 585 MWe to 656 MWe. Since the power uprate project will result in an increase in electric generating capacity of less than 80 MW, we intend to file the Site Permit using the alternative permitting process in accordance with Minnesota Rules Chapter 7849.5500 to 7849.5720. We are providing this notice per Minn. Rule Chapter 7849.5500 Subp. 2.

Please call me at (612) 330-5641 if you have any questions regarding this filing.

Sincerely,

BRIAN R. ZELENAK
MANAGER, REGULATORY ADMINISTRATION

Minnesota Department of Natural Resources
Natural Heritage and Nongame Research Program, Box 25
500 Lafayette Road
St. Paul, Minnesota 55155-40__
Phone: (651) 259-5109 Fax: (651) 296-1811 E-mail: lisa.joyal@dnr.state.mn.us

RECEIVED
OCT 19 2007
BARR ENGINEERING CO.

October 15, 2007

Mr. Jim Aiken
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: Request for Natural Heritage information for vicinity of proposed Monticello Nuclear Generating Plant Uprate Project, T122N R25W Sections 32 & 33, Wright County
NHNRP Contact #: ERDB 20080252

Dear Mr. Aiken,

Please note that the Township information that was listed on the Information Request Form did not match the project area as outlined on the map that was submitted with the form. The enclosed search results are for the area indicated on the map. Please contact me if the location description of your project area, as listed in the subject line of this letter, is in error.

The Minnesota Natural Heritage database has been reviewed to determine if any rare plant or animal species or other significant natural features are known to occur within an approximate one-mile radius of the area indicated on the map enclosed with your information request. Based on this review, there are 5 known occurrences of rare species or native plant communities in the area searched (for details, please see the enclosed database printouts and the explanation of selected fields). However, provided that the proposed uprate will not result in changes that negatively affect the water quality of the Mississippi River, I do not believe the project will affect any known occurrences of rare features.

The Natural Heritage database is maintained by the Natural Heritage and Nongame Research Program, a unit within the Division of Ecological Resources, Department of Natural Resources. It is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and protection of these features.

Because our information is not based on a comprehensive inventory, there may be rare or otherwise significant natural features in the state that are not represented in the database. A county-by-county survey of rare natural features is now underway, and has been completed for Wright County. Our information about native plant communities is, therefore, quite thorough for that county. However, because survey work for rare plants and animals is less exhaustive, and because there has not been an on-site survey of all areas of the county, ecologically significant features for which we have no records may exist on the project area.

The enclosed results of the database search are provided in two formats: short record report and long record report. To control the release of locational information, which might result in the damage or destruction of a rare element, both printout formats are copyrighted.

The short record report provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an Environmental Assessment Worksheet, municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the short record report for any other purpose, please contact me to request written permission. **The long record report includes more detailed locational information, and is for your personal use only. If you wish to reprint the long record report for any purpose, please contact me to request written permission.**

Please be aware that review by the Natural Heritage and Nongame Research Program focuses only on *rare natural features*. It does not constitute review or approval by the Department of Natural Resources as a whole. If you require further information on the environmental review process for other natural resource-related issues, you may contact your Regional Environmental Assessment Ecologist, Mike North, at (320) 255-4279.

An invoice in the amount of $67.34 will be mailed to you under separate cover within two weeks of the date of this letter. You are being billed for the database search and printouts, and staff scientist review. Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

Lisa Joyal

Lisa A. Joyal
Endangered Species Environmental Review Coordinator

encl: Database search results
Rare Feature Database Print-Outs: An Explanation of Fields

CERTIFICATE OF SERVICE

I, Carole Wallace, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States Mail at Minneapolis, Minnesota

xx electronic filing

SERVICE LIST: DOCKET NO. E002/CN-08-185

Dated this 2nd day of May 2008

/s/

_____

In the Matter of Xcel Energy's Certificate of Need Petition - Monticello Nuclear Generating Plant for Extended Power Uprate

E002/CN-08-185
04-18-2008

Burl W. Haar
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