FINAL ENVIRONMENTAL IMPACT STATEMENT

XCEL ENERGY PRAIRIE ISLAND NUCLEAR GENERATING PLANT

EXTENDED POWER UPRATE PROJECT
PUC DOCKET NO. E002/CN-08-509
PUC DOCKET NO. E002/GS-08-690

REQUEST FOR ADDITIONAL DRY CASK STORAGE
PUC DOCKET NO. E002/CN-08-510

RED WING, MINNESOTA

office of energy security

Prepared by:
STATE OF MINNESOTA
Minnesota Department of Commerce

THE GREAT SEAL OF THE STATE OF MINNESOTA
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July 31, 2009

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ABSTRACT

The Public Utilities Commission (Commission) is considering two projects proposed by Xcel Energy for the Prairie Island Nuclear Generating Plant (PINGP).

The first project is a proposed extended power uprate (EPU) of 164 megawatts (MW); the 164 MW total capacity uprate at the PINGP would be achieved by increasing the heat produced in the reactor and the steam produced in the steam generators.

The second project is a request for additional dry cask storage at the PINGP's independent spent fuel storage installation (ISFSI). The PINGP currently has state authorization for enough dry casks to store the spent fuel generated until the end of the current operating licenses in 2013 and 2014 (29 casks). There are currently 24 dry casks at the PINGP ISFSI. In order for the reactors to continue operation through a license renewal period to 2033 and 2034, up to an additional 35 dry casks would need to be added to the existing ISFSI.

This Environmental Impact Statement (EIS) was produced to satisfy the environmental review requirements for both projects.

Additional Information on this project is available in the project applications listed in the References section of this EIS. Other material related to this docket is also available online at http://energyfacilities.puc.state.mn.us/Docket.html?Id=19602.

The Draft EIS was released on March 17, 2009. A public meeting was held on April 21, 2009, at the Red Wing Public Library. The public was encouraged to provide oral comments at the public meeting and to submit written comments to the Office of Energy Security (OES) by May 8, 2009. A court reporter was present at the public meeting to ensure that all oral comments were recorded accurately.

This Final EIS incorporates the OES, Energy Facility Permitting's responses to the substantive comments (consistent with the scoping decision) received on the Draft EIS.

Final EIS Comments Due by Friday, August 21, 2009.

Comments on the adequacy of the Final EIS will be accepted until Friday, August, 21, 2009. Comments should be sent by e-mail or U.S. mail to:

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Following the comment period, the Commission will determine the adequacy of Chapter 1 (extended power uprate) and the Commissioner of the Department of Commerce will determine the adequacy of Chapter 2 (additional dry cask storage).

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SUMMARY

The Minnesota Department of Commerce, Office of Energy Security (OES) has prepared this environmental impact statement to evaluate two proposed projects at Xcel Energy's Prairie Island Nuclear Generating Plant (PINGP): (1) an increase in the thermal and electrical power of the reactor units at the PINGP – known as an extended power uprate (EPU), and (2) an expansion of dry cask storage at the Prairie Island independent spent fuel storage installation (ISFSI).

The environmental impact statement (EIS) is presented in chapters reflecting each of the proposed projects. An additional chapter contains public comments on the draft EIS and associated responses:

- **Chapter 1 – Extended Power Uprate**
- **Chapter 2 – Additional Dry Cask Storage**
- **Chapter 3 – Comments and Responses**

Environmental Review Framework

The proposed projects of this EIS fall into three dockets, each of which will come before the Minnesota Public Utilities Commission (Commission) for a decision. The extended power uprate (EPU) requires a certificate of need (CON) and a site permit from the Commission. The additional dry cask storage requires a CON. The three documents and their required environmental review documents can be summarized as follows:

Docket	Docket Number	Environmental Review Document
Certificate of need for the EPU	E002/CN-08-509	Environmental Report
Site permit for the EPU	E002/GS-08-690	Environmental Impact Statement
Certificate of need for additional dry cask storage	E002/CN-08-510	Environmental Impact Statement

The environmental report for the extended power uprate (EPU) certificate of need (CON) and the environmental impact statement (EIS) for the EPU site permit have been combined into a single environmental review document pursuant to Minn. Rule 7849.7100. In addition, OES staff, in consultation with Commission staff, determined that further process efficiencies could be achieved by incorporating the EIS for the additional dry cask storage CON with the EIS for the extended power uprate.

Thus, the OES has prepared one EIS to fulfill:

- The EPU's CON and site permit environmental review requirements of Minn. Rule 7849.7030 and 7849.5300, respectively, combined pursuant to 7849.7100.
- The dry cask storage expansion's CON environmental review requirements of Minn. Statute 116C.83, developed in accordance with Minn. Statue 116D and Minn. Rules Chapter 4410.

The EIS scoping decision, covering all three dockets, was signed by the Director of the OES on November 14, 2008. The following issues were excluded from the EIS by the scoping decision:

Prairie Island Plant Radiation and Safety. The EIS will summarize the environmental impacts of continued operation of the PINGP, but will not include a detailed study of these issues because the U. S. Nuclear Regulatory Commission (NRC) will complete a detailed evaluation of environmental impacts, and mitigation options, of continued plant operations during its license renewal review. Likewise, the EIS will summarize but not evaluate potential mitigation methods regarding radiation and safety issues of continued operation of the plant because the NRC has regulatory jurisdiction over operational issues of the PINGP and ISFSI.

Storage Technology, Accidents, Terrorism. The EIS will summarize but not evaluate options for dry cask storage because the NRC has sole jurisdiction over whether and how spent fuel is stored on site at nuclear power plants, including ISFSI design and safety from threats such as accident and terrorism. Likewise, the EIS will not evaluate life-cycle safety of the Independent Spent Fuel Storage Installation (ISFSI), ISFSI management, or the adequacy of security at the generating plant or the proposed ISFSI.

Nuclear Fuel Cycle. The EIS will not address in detail, the impacts of the nuclear fuel cycle because that issue will be addressed in the federal generic and supplemental EIS to be completed during the federal re-licensing review.

Off-Site Alternatives. The EIS will not evaluate ISFSI sites outside the PINGP boundaries because the NRC has jurisdiction over whether such a site can be considered. Additionally, the Commission's authority is "limited to the storage of spent nuclear fuel generated by a Minnesota nuclear generation facility and stored on the site of that facility" (Minn. Statute 116C.83, subdivision 4, item b).

Economic Feasibility of Alternatives. The analysis of the economic feasibility will cover the same alternatives for which environmental impacts are evaluated, but will incorporate by reference the analysis of the Department of Commerce in the CON proceeding.

Transportation of Spent Fuel from PINGP. While certain matters regarding Yucca Mountain will be described in the EIS, the EIS will not include a detailed discussion of issues related to the transportation of spent nuclear fuel from Minnesota to Yucca Mountain.

Nuclear Regulatory Commission Standards. While the EIS will reference certain standards and rules promulgated by the NRC, the EIS will not address the adequacy of any federal standards that are applicable to the ISFSI or the generating plant. Nor will the EIS evaluate potential mitigation measures to reduce radiation exposure, accident risks or security requirements.

The EIS contains three separate chapters:

- Chapter 1 covers the extended power uprate (CON and site permit)
- Chapter 2 covers the additional dry cask storage (CON)
- Chapter 3 contains comments and responses for both projects and all three dockets. Changes made to Chapter 1 and Chapter 2 as a result of comments received are printed in **bold** in the final EIS.

Each chapter will be evaluated for adequacy by its respective reviewing body – Chapter 1 by the Commission and Chapter 2 by the Commissioner of the Department of Commerce.

Summary Chapter 1 – Extended Power Uprate

The 164 megawatt (MW) extended power uprate at the PINGP would be achieved by (1) increasing the heat produced in the reactor and steam produced in the steam generators and (2) improving the balance-of-plant equipment that converts the steam into electricity.

Higher steam flow from the reactors is obtained by operating the reactors at a higher thermal power level. Increasing the thermal output of the reactors requires more uranium in the reactor core to maintain the same fuel cycle length (e.g., 18 - 20 months). This would be accomplished by using a fuel assembly that has slightly larger diameter fuel pellets. These larger fuel rods would also have more surface area for heat transfer offsetting some of the higher operating temperatures.

The EPU will require approval from the State of Minnesota and the federal government (NRC) to increase the PINGP's maximum power level, and from the NRC to increase the diameter of the fuel pellets.

Section 3 contains an analysis of the feasibility of alternatives to the EPU; options covered include (1) the no build alternative, (2) demand side management, (3) purchase power, (4) alternative fuels (fossil fuel technologies, renewable resources, and developing technologies), (5) up-grading existing facilities, (6) new transmission, (7) distributed generation, and (8) wind/gas combination.

Alternatives were evaluated based on Xcel Energy's stated resource deficit starting in 2010. The reliability, applicability, cost and environmental impacts of selected alternatives were compared. The proposed PINGP EPU project was found to be the most cost effective and was shown to have the least environmental impacts of those alternatives that could meet the stated need criteria.

Section 4 focuses on the additional impacts to human health and environmental welfare that would result if the 164 MW uprate were to be implemented. The proposed power uprate project will have minimal environmental impacts. Environmental impacts of the power uprate will include (1) an increase in water use by up to 10 percent, remaining within the bounds of current appropriation permit levels, (2) an increase in circulating water outfall temperature of a maximum 3^{o} F, remaining within the limits of current National Pollution Discharge Elimination System (NPDES) discharge permit, and (3) an increase in gaseous radionuclide emissions of not more than 10 percent, remaining well below current limits.

Summary Chapter 2 – Additional Dry Cask Storage.
Xcel Energy proposes to extend the concrete storage pad within the existing Prairie Island ISFSI to accommodate an additional 35 dry storage casks of spent nuclear fuel. The ISFSI currently has state authorization for 29 casks. The ISFSI expansion will allow the PINGP to operate through 2034. Xcel Energy proposes using an enhanced version of the current Transnuclear Inc. dry storage casks used at the PINGP for the expansion, the TN-40HT cask. The ISFSI is designed to accommodate, with expansion of the storage pad, the storage casks necessary for operation of the PINGP though 2034 and decommissioning of the Prairie Island plant. Section 3 of this chapter provides further information on the proposed project.

The request for additional dry cask storage will require approval from the State of Minnesota and federal government (NRC). The NRC regulates nuclear generating plants and spent fuel storage facilities (ISFSIs) to ensure that they are safely operated. Federal regulation preempts state regulation with respect to radiological, engineering, health, and safety standards. The State of Minnesota, however, decides as an economic and policy matter whether it is in the public interest to allow additional storage of spent nuclear fuel at the Prairie Island ISFSI in order to allow the PINGP to continue operating until 2034. Section 2 of this chapter outlines the regulatory framework governing the Prairie Island ISFSI.

Section 4 discusses the non-radiological impacts that expansion of the Prairie Island ISFSI could have on humans and the environment; since this project takes place within the existing footprint of the secured ISFSI no significant non-radiological impacts are anticipated. There will be minor impacts, such as increased noise and traffic, associated with the construction phase of the project.

Section 5 discusses the radiological impacts that expansion of the ISFSI could have on humans and the environment. Radiation doses to the general public from ISFSI operations result from skyshine radiation. Shielding on the storage casks themselves reduces radiation doses, as does the earthen berm surrounding the ISFSI. The casks and berm greatly minimize direct radiation to the public, leaving skyshine radiation as the primary means of exposure.

Estimated annual dose to the nearest residence with 64 casks on the ISFSI pad was calculated; the estimated dose is within NRC regulatory limits for radiation exposure to the general public from ISFSI operations. This section includes a discussion on impacts from potential incidents at the ISFSI. Additionally, this section discusses cumulative impacts from two reasonably foreseeable future projects: (1) continued operation of the PINGP through 2034, and (2) use of the ISFSI to facilitate decommissioning of the PINGP after cessation of operations.

Section 6 discusses alternatives for storing spent nuclear fuel generated by the PINGP through 2034. These alternatives include: (1) off-site storage, (2) on-site storage, (3) alternative storage systems, and (4) eliminating the need for storage by ceasing PINGP operations in 2014.

None of the off-site storage options offers a feasible alternative to expansion of the Prairie Island ISFSI. None of the on-site options appear to be a more reasonable alternative than the proposed ISFSI expansion. The potential human and environmental impacts of ceasing PINGP operations in 2014 and decommissioning the plant are discussed in this section.

Section 7 of this chapter discusses alternative methods of generating the 1,100 MW currently produced by the PINGP and the human and environmental impacts of these alternatives. Alternatives were evaluated based on replacing 1,100 MW of baseload power with an availability date of 2014; the environmental impacts and costs of selected alternatives were compared.

Six alternative scenarios to continued operation of the PINGP were evaluated: (1) purchased power, (2) pulverized coal power plant, (3) pulverized coal power plant with partial carbon sequestration, (4) natural gas combined cycle plant, (5) large wind energy conversion system and natural gas plant combination, and (6) renewable resource technologies.

Summary Chapter 3 – Comment Response Document

Based on the comments received on the draft EIS, OES energy facility permitting (OES EFP) staff prepared responses, made additions, corrections, or modified the EIS (chapters 1 and 2) where appropriate. The EIS was also revised based on OES EFP's internal technical and editorial review of the draft EIS (i.e., changes made to the EIS that were not in response to a comment received).

OES staff received 12 oral comments from individuals at the draft EIS public meeting; OES staff received an additional 15 written comments during the public comment period.

Transcripts of the public meeting, as well as scanned images of the original comment documents are included in Chapter 3. The commenters and their comments are identified and labeled on each document image beginning with the public meeting transcripts. Individual responses for each comment are provided on the right-side of each page in close proximity to the corresponding comment. In cases where subsequent comments address the same issue, references are made to the earlier comment number for appropriate responses. Changes made as a result of comments received are printed in **bold** in the final EIS.

CHAPTER 1

ENVIRONMENTAL IMPACT STATEMENT

Xcel Energy Prairie Island Nuclear Generating Plant Extended Power Uprate Project

PUC Docket No. E002/CN-08-509
PUC Docket No. E002/GS-08-690

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1.0 INTRODUCTION

Xcel Energy filed two applications with the Public Utilities Commission (Commission) relative to the proposed extended power uprate (EPU) for the Prairie Island Nuclear Generating Plant (PINGP).

The Certificate of Need (CON) application was filed on **May 16, 2008**, in accordance with Minnesota Rules Chapter 7829 and 7849. On **July 15, 2008**, the Commission accepted the application as complete (**July 22, 2008 Order**). The docket number for the EPU certificate of need is E002/CN-08-509.

On August 1, 2008, Xcel Energy submitted a large electric power generating plant (LEPGP) Site Permit application to the Commission for the proposed EPU project. On August 14, 2008, the Commission accepted the application as complete (August 15, 2008 Order). The docket number for the LEPGP Site Permit is E002/**GS**-08-690.

Chapter 1, Section 1 provides specific information about the proposed extended power uprate. Section 2 provides information on the regulatory process for both the Certificate of Need and the Site Permit processes. Section 3 describes and analyzes the alternatives to the proposed EPU project that attempt to reduce, mitigate or eliminate the need for the project. Section 4 addresses the human and environmental impacts and mitigative measures that can be implemented; this section also describes the environmental setting of the PINGP. Section 5 summarizes the unavoidable impacts that would result from the development of the proposed project.

1.1 PROJECT DESCRIPTION

The PINGP utilizes a pressurized-water reactor (PWR). The PINGP consists of two 575 MWe gross (550 MWe net), two-loop, pressurized-water nuclear reactors. The reactors are referred to as Unit 1 and Unit 2. The 560-acre plant site and the associated transmission and other facilities are in Red Wing, Minnesota, on the western bank of the Mississippi River in Goodhue County. The site is approximately 30 miles southeast of St. Paul.

Unit 1 began commercial operation in December 1973, and Unit 2 began operations in December 1974. The initial NRC license for each unit was for a period of 40 years. The initial licenses will expire in 2013 and 2014 for Unit 1 and Unit 2, respectively. Xcel Energy submitted an application to the NRC for an additional 20-year license extension for both units on April 15, 2008.

Over the past five years (2003 through 2007), Prairie Island has maintained an average capacity factor of 90.2 percent. In 2007, Prairie Island generated a record almost 9 million megawatt-hours of electricity, eclipsing its prior record set in 2003. For 2007, the capacity factor for the entire year was 93.85 percent.

The proposed EPU of 164 MWe consists of an 82 MWe net capacity uprate at Unit 1 and an 82 MWe net uprate at Unit 2. Xcel Energy proposes to complete the uprate on Unit 1 during the 2012 refueling outage and on Unit 2 during the 2015 refueling outage.

Power uprates in a pressurized water reactor (PWR) do not require significant modifications to the reactor, nuclear steam supply system, or emergency core cooling systems. The 164 MWe total capacity uprate at the PINGP would be achieved by:

1. Increasing the heat produced in the reactor and steam produced in the steam generators and;
2. Improving the balance-of-plant equipment that converts the steam into electricity.

Higher steam flow from the reactors is obtained by operating the reactors at a higher thermal power level. Increasing the thermal output of the reactors would require more uranium in the reactor core to maintain the same fuel cycle length (e.g. 18 to 20 months). This would be accomplished by using a fuel assembly that has slightly larger diameter fuel pellets. These larger fuel rods would also have more surface area for heat transfer offsetting some of the higher operating temperatures. To transfer the additional heat energy out of the fuel, the fuel assemblies themselves would operate at slightly higher temperatures. The NRC must approve the new fuel design prior to its use in the PINGP.

In addition to the increased heat output, the EPU would require steam turbine replacements and a variety of other balance-of-plant improvements to take advantage of the increased steam production.

The major modifications that would be completed during the two outages are:

- Upgrade high-pressure turbines;
- Replace or rewind main generators;
- Replace generator step-up transformers;
- Replace moisture separator reheaters; and
- Upgrade isophase bus duct cooling.

Although few modifications are required for the reactor and its support systems, the reactor and support systems have been reanalyzed by Xcel Energy to demonstrate that their functions are unaffected by operation at power uprate conditions, with adequate margin remaining.

The PINGP is located within the city limits of Red Wing, Minnesota, in Goodhue County, on the western bank of the Mississippi River, in Sections 4 and 5, T–113N, R–15W, at 44° 37.3’ N latitude and 92° 37.9’ W longitude, approximately 30 miles southeast of Minneapolis/St. Paul (**Figure 1-1**).

The plant site consists of approximately 560 acres of land owned by Xcel Energy. A perimeter fence and other barriers restrict access to the PINGP. **Figure 1-2** shows the plant site boundaries.

1.1.1 DESCRIPTION of POWER GENERATING EQUIPMENT and PROCESSES

In a pressurized-water reactor (PWR), a nuclear reaction in the reactor core generates heat, which heats water in the primary loop. This heat is transferred to the secondary loop in the steam generators, and the steam produced inside the steam generators is directed to turbine generators to produce electrical power (**Figure 1-3**). The exhaust steam is cooled by a tertiary loop in a condenser and returned to the steam generators to be boiled again. The water in all three loops is force-circulated by electrically powered pumps. Emergency cooling water is supplied by other pumps, which can be powered by onsite diesel generators.

The nuclear fuel used at the PINGP has, to date, been fabricated by the Westinghouse and Exxon companies. The new fuel is transported to Prairie Island by truck. Westinghouse was the original plant designer and has supplied the PINGP with most of its fuel and is anticipated to be the future fuel supplier.

The reactor core of each unit is comprised of 121 fuel assemblies. A fuel assembly consists of 179 fuel rods spaced in a 14x14 square array secured by means of stainless steel upper and lower tie plates. Control rod guide tubes occupy sixteen locations of the array and an instrument tube occupies one location. Each fuel assembly is 7.76 by 7.76 inches wide and 161.3 inches long. **Figure 1-4** shows a representation of a typical fuel assembly used at the PINGP.

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 welding Zircaloy plugs in each end seals the fuel rod.

Approximately every 18 to 20 months, a unit is shut down to refuel the reactor. Between refueling outages the unit typically operates at full output around the clock. During each refueling operation under current power levels, a little more than a third of the fuel assemblies (typically 48), in the reactor are replaced with new ones. Thus, a typical nuclear fuel assembly provides heat constantly over about a five-year period before its output declines to the point it is no longer useful. These spent nuclear fuel assemblies are then removed from the reactor and stored in the spent fuel pool **to cool for approximately 10 to 12 years**.

The spent fuel pool provides storage for spent fuel assemblies. The pool is located within the fuel pool enclosure in the auxiliary building. It is filled with storage racks that hold the spent fuel assemblies and other irradiated reactor components. The spent fuel pool and spent fuel inventory are discussed in Chapter 1, Section 3.3.

1.1.2 DESCRIPTION of PROPOSED POWER UPRATE and PLANT MODIFICATIONS

The EPU at the PINGP will be achieved by increasing the amount of heat produced in the reactor, which will result in more steam being produced by the steam generators. The increased power levels are achieved by loading more uranium into the reactor at the beginning of each fuel cycle. In order to transfer the additional heat energy out of the fuel, the fuel assemblies themselves will operate at slightly higher temperatures.

The increased reactor coolant temperature results in the need to perform several analyses to demonstrate continued compliance with the design criteria for safe operation. The analyses must demonstrate that adequate margin to regulatory limits are maintained at the increased power level. These analyses will be reviewed and approved by the NRC as part of the operating license amendment process.

A PWR consists of two separate loops of water to produce steam; the primary loop, also known as the Reactor Coolant System (RCS), carries high-pressure water, moved by two large reactor coolant pumps, from the reactor to the steam generators where the heat generated by fission in the nuclear fuel is transferred to a second loop of water. The high pressure in the RCS ensures that boiling does not occur in the primary system. The steam generators, which are essentially heat exchangers, transfer the heat through the walls of a series of tubes to heat the water in the secondary system, which operates at a lower pressure. The heat transferred to the secondary loop causes boiling to occur in the secondary side of the steam generators, and the steam produced is sent to the steam turbine, which converts the energy into electricity in the turbine generator. The main steam pressure in the secondary loop will be increased resulting in a corresponding increase in steam temperature.

The balance-of-plant systems that convert the steam produced in the steam generators to electricity will need significant modifications. These modifications are anticipated to be completed on Unit 1 during the 2012 refueling outage and on Unit 2 during the 2015 refueling outage.

The current average annual heat rates for the PINGP units are 10.46 mbtu/MWh on Unit 1 and 10.476 mbtu/MWh on Unit 2. The anticipated average annual heat rate for both units following completion of the power uprate is 9.936 mbtu/MWh (after steam generator replacement and power uprate).

Increasing the thermal output of the reactors will require more uranium in the reactor core to maintain the same fuel cycle length (eighteen to twenty months). This will be accomplished by using a fuel assembly that has slightly larger diameter fuel pellets. These larger fuel rods will also have more surface area for heat transfer offsetting some of the higher operating temperatures. Approval for the new fuel design will be sought from the NRC prior to use in the PINGP reactors.

Very few modifications are required to the reactor and its support systems that produce steam. However, significant changes will be required to the systems that convert the steam produced in the steam generators to electricity. The modifications would be installed primarily during refueling outages. The major modifications are described below. Additional smaller scope modifications will be identified during the detailed engineering phase of the project.

In the secondary loop and electrical generation systems, several major equipment changes will be required, both to accommodate the additional steam and feedwater flows, and to handle the extra megawatt output. In making the required changes, features have been incorporated to optimize thermal cycle efficiency under the new steam conditions and therefore maximize gross megawatt output.

High Pressure Turbines. The high-pressure turbine for each unit will be upgraded. The existing high-pressure turbines are double-flow, partial arc admission, reaction bladed design, that have been in service since plant commissioning. One design under consideration is a full arc admission, single-flow, impulse bladed, balancing gland design. A single-flow turbine has 2 exhausts versus 4 in the existing turbine, so a portion of the exhaust piping below the turbine would be replaced to work with the new configuration. The turbine governor valves would be redesigned and the flow area through the valve throats increased to minimize the pressure drop imposed on the steam

Main Generator Rewinds. Currently, Xcel Energy is evaluating both generator rewinds and retrofits. A retrofit could include replacement of all of the stator conductors with water-cooled windings.

Generator Step-up Transformers. The generator step-up transformers are reaching the end of their useful lives, and are underrated for the EPU conditions. When they are replaced, Xcel Energy will add the necessary capacity if the EPU is approved.

Moisture Separator Reheaters. The moisture separator reheaters ("MSRs") at PINGP function to improve the steam quality of the high pressure turbine exhaust and superheat the steam before it enters the low-pressure turbines. Replacing the MSRs with larger units with more flow area and heat transfer surface could reduce the pressure drop by 1/2. This would result in higher pressures to the inlet of the low pressure turbines, and a corresponding increase in electrical generation.

Upgrade Isophase Bus Duct Cooling. The isophase bus conducts the electrical output of the main generator to the main transformer. Heat loads in the isophase bus duct will increase with the higher power levels that result from the EPU, resulting in a need to increase the cooling capability of the isophase bus ducts.

1.1.3 SPENT FUEL PRODUCTION

Yucca Mountain Repository

The Yucca Mountain Repository is the proposed United States Department of Energy deep geological repository storage facility for spent nuclear reactor fuel and other radioactive waste. Yucca Mountain is located in a remote desert on federally protected land within the secure boundaries of the Nevada Test Site in Nye County, Nevada. It is approximately 90 miles northwest of Las Vegas, Nevada. The NRC is the licensing and regulatory agency that will make the final decision on whether the DOE is allowed to proceed with construction and subsequent licensing to operate the repository.[1] See Chapter 2, Sections 5 and 6 for more discussion on Yucca Mountain.

National Transportation Plan

In January, 2009, the Department of Energy (DOE), Office of Civilian Radioactive Waste Management (OCRWM) released the National Transportation Plan.[2] The plan outlines the DOE's current strategy and planning for developing and implementing the transportation system required to transport spent nuclear fuel (SNF) and high-level radioactive waste (HLW) from where the material is generated or stored to the proposed repository at Yucca Mountain, Nevada. The plan describes how DOE's OCRWM intends to develop and implement a safe, secure and efficient transportation system and how stakeholder collaboration will contribute to the development of that transportation system.

1.1.4 FUEL SUPPLY

Availability of uranium to support the continued operation of the PINGP with power uprate is not an issue. The Organization for Economic Cooperation and Development (OECD) and the International Atomic Energy Agency (IAEA) in 2005 jointly produced a report on uranium resources.[3] The report states that uranium resources are adequate to meet the needs of both existing as well as new reactors anticipated in the next decade. The agencies base their conclusion on official projections from 43 uranium-producing countries, as well as independent studies by the agencies.

There are a series of steps involved in supplying fuel for nuclear power reactors. This "nuclear chain" typically includes the following stages:[4]

Uranium recovery. Recovery of the uranium includes the extraction (mining) of the uranium ore and the concentrating (milling) of the ore to produce "yellow cake." Yellowcake is the product of the uranium extraction (milling) process; early production methods resulted in a bright yellow compound, hence the name yellowcake.

[1] http://www.ocrwm.doe.gov/ym_repository/index.shtml
[2] National Transportation Plan, DOE/RW-0603. Office of Civilian Radioactive Waste Management. January 2009.
[3] http://www.nea.fr/html/general/press/2006/2006-02.html
[4] http://www.nrc.gov/materials.html

Conversion. After the yellowcake is produced at the mill, the next step is conversion into pure uranium hexafluoride (UF6) gas suitable for use in enrichment operations. During this conversion, impurities are removed and the uranium is combined with fluorine to create the UF6 gas. The UF6 is then pressurized and cooled to a liquid. In its liquid state it is drained into 14-ton cylinders where it solidifies after cooling for approximately five days. The UF6 cylinder, in the solid form, is then shipped to an enrichment plant. UF6 is the only uranium compound that exists as a gas at a suitable temperature.

One conversion plant is operating in the United States: Honeywell International Inc. (NRC Docket No. 40-3392) in Metropolis, Illinois. Canada, France, United Kingdom, China, and Russia also have conversion plants.

As with mining and milling, the primary risks associated with conversion are chemical and radiological. Strong acids and alkalis are used in the conversion process, which involves converting the yellowcake (uranium oxide) powder to very soluble forms, leading to possible inhalation of uranium. In addition, conversion produces extremely corrosive chemicals that could cause fire and explosion hazards.

Enrichment. Enriching uranium increases the amount of "middle-weight" and “light-weight” uranium atoms. Not all uranium atoms are the same. When uranium is mined, it consists of heavy-weight atoms (about 99.3% of the mass), middle-weight atoms (0.7%), and light-weight atoms (< 0.01%). These are the different isotopes of uranium, which means that while they all contain 92 protons in the atom’s center (which is what makes it uranium). The heavy-weight atoms contain 146 neutrons, the middle-weight contains 143 neutrons, and the light-weight has just 142 neutrons. To refer to these isotopes, scientists add the number of protons and neutrons and put the total after the name: uranium-234 or U-234, uranium-235 or U-235, and uranium-238 or U-238.

The fuel for nuclear reactors has to have a higher concentration of U-235 than exists in natural uranium ore. This is because U-235 is the key ingredient that starts a nuclear reaction and keeps it going. Normally, the amount of the U-235 isotope is enriched from 0.7% of the uranium mass to about 5%. Gaseous diffusion is the only process being used in the United States to commercially enrich uranium. Gas centrifuges can also be used to enrich uranium.

The primary hazards in gaseous diffusion plants include the chemical and radiological hazard of a UF6 release and the potential for mishandling the enriched uranium, which could create a critical accident (inadvertent nuclear chain reaction).

The only gaseous diffusion plant in operation in the United States is in Paducah, Kentucky. A similar plant is near in Piketon, Ohio, but it was shut down in March 2001. Both plants are leased by the United States Enrichment Corporation (USEC) from the Department of Energy and have been regulated by the NRC since March 4, 1997.

Fuel Fabrication. Fuel fabrication facilities convert enriched UF6 into fuel for nuclear reactors. Fabrication also can involve mixed oxide (MOX) fuel, which is a combination of uranium and plutonium components. NRC regulates several different types of nuclear fuel fabrication operations.

Fuel fabrication for light (regular) water power reactors (LWR) typically begins with receipt of low-enriched uranium (LEU) hexafluoride (UF6) from an enrichment plant. The UF6, in solid form in containers, is heated to gaseous form, and the UF6 gas is chemically processed to form LEU uranium dioxide (UO_2) powder. This powder is then pressed into pellets, sintered into ceramic form, loaded into Zircaloy tubes, and constructed into fuel assemblies. Depending on the type of light water reactor, a fuel assembly may contain up to 264 fuel rods and have dimensions of 5 to 9 inches square by about 12 feet long.

Chemical, radiological, and criticality hazards at fuel fabrication facilities are similar to hazards at enrichment plants. Most at risk from these hazards are the plant workers.

Spent Fuel. There are two acceptable storage methods for spent fuel after it is removed from the reactor core:

> *Spent Fuel Pools* - Currently, most spent nuclear fuel is stored in specially designed pools at individual reactor sites around the country. The water-pool option involves storing spent fuel rods under at least 20 feet of water, which provides adequate shielding from the radiation for anyone near the pool. The rods are moved into the water pools from the reactor along the bottom of water canals, so that the spent fuel is always shielded to protect workers.
>
> About one-fourth to one-third of the total fuel load from the pools is spent and removed from the reactor every 12 to 18 months and replaced with fresh fuel.
>
> Current regulations permit re-racking of the spent fuel pool grid and fuel rod consolidation, subject to NRC review and approval, to increase the amount of spent fuel that can be stored in the pool. Both of these methods are constrained by the size of the pool.
>
> *Dry Cask Storage* - If pool capacity is reached, licensees may move toward use of above-ground dry storage casks. In the late 1970s and early 1980s, the need for alternative storage began to grow when pools at many nuclear reactors began to fill up with stored spent fuel. Utilities began looking at options such as dry cask storage for increasing spent fuel storage capacity.
>
> Dry cask storage allows spent fuel that has already been cooled in the spent fuel pool for at least one year to be surrounded by inert gas inside a container called a cask. The casks are typically steel cylinders that are either welded or bolted closed. The steel cylinder

provides a leak-tight containment of the spent fuel. Each cylinder is surrounded by additional steel, concrete, or other material to provide radiation shielding to workers and members of the public. Some of the cask designs can be used for both storage and transportation.

There are various dry storage cask system designs. With some designs, the steel cylinders containing the fuel are placed vertically in a concrete vault; other designs orient the cylinders horizontally. The concrete vaults provide the radiation shielding. Other cask designs orient the steel cylinder vertically on a concrete pad at a dry cask storage site and use both metal and concrete outer cylinders for radiation shielding.

The first dry storage installation was licensed by the NRC in 1986 at the Surry Nuclear Power Plant in Virginia. Spent fuel is currently stored in dry cask systems at a growing number of power plant sites, and at an interim facility located at the Idaho National Environmental and Engineering Laboratory near Idaho Falls, Idaho.

Neither a reprocessing facility nor a Federal waste repository is currently approved (licensed) in the United States, and spent fuel is in interim storage.

1.1.5 WATER USE

Groundwater use is governed by water appropriation limits set by the Minnesota Department of Natural Resources (MDNR). The PINGP uses ground water for potable and industrial use from six wells installed within the alluvial aquifer located on the plant property. Five of these wells are permitted by the MDNR. The sixth well does not require a water appropriation permit because it is below the minimum flow requirements of 10,000 gallons per day or 1,000,000 gallons per year set by the MDNR.

Although the maximum combined pumping rate equals approximately 850 gallons per minute (gpm), ground water appropriation permit numbers 69-171-G, 78-5153, 86-5114, and 96402, limit the usage to a total of 354.7 million gallons per year for the five wells. Over a recent period of five years (2003 through 2007), the maximum usage was 61.6 million gallons in 2005 (**Table 1-1**)

Surface water use at the PINGP is in accordance with the water appropriation limits of the MDNR. Under surface water appropriation permit number 69-0172, amended in June 1995, PINGP draws water from the Mississippi River for plant condenser cooling and auxiliary water systems, such as service water cooling, intake screen wash, and fire protection. The PINGP may withdraw up to 235,000 million gallons of water per year from the Mississippi River. Over a period of five recent years (2001 through 2005), a maximum of 207,650 million gallons of water was withdrawn, occurring during the year 2005.

The plant's cooling system was heavily modified in the early 1980s to reduce impacts of plant operation on aquatic communities. A new intake screen-house with improved traveling screens was constructed across the mouth of intake canal. A fish return line was installed to convey organisms washed from the traveling screens back to the Mississippi River. A new, half-mile-long discharge canal with a north-south orientation was created by building a 2,350-foot-long dike that paralleled the river shoreline. A new discharge structure was built at the southern terminus of the canal, and connected to the river's edge by four underground discharge pipes. The new submerged jet discharge was intended to promote rapid mixing of the heated effluent, keep fish out of the discharge canal, and prevent recycling of warm discharge water. The intake and discharge modifications were completed in 1983.

The circulating water system removes heat from the generating plant. Excess heat from the steam leaving the turbine is transferred to circulating water flowing through the condenser tubes. Based on seasonal limitations heat is transferred to the environment either by the use of the cooling towers, discharge to the river or a combination of cooling towers and river discharge. Operating restrictions are governed by the National Pollutant Discharge Elimination System (NPDES/SDS) permit issued by the Minnesota Pollution Control Agency (MPCA).

A detailed description of the circulating water system and various modes of operation are contained in Sections 8.2.4.3 and 8.2.4.4, of the Xcel Energy Certificate of Need Application, dated May 16, 2008.

The average annual river water withdrawal for years 2000-2005 was 849 cfs (614,880 acre-ft/yr). The estimated average annual water loss due to evaporation and drift is approximately 39 cfs (28,245 acre-ft/yr) with 810 cfs being returned to the river.

1.1.6 WASTEWATER

Wastewater discharges are regulated by the State of Minnesota through an NPDES/SDS permit. The NPDES/SDS permit is periodically reviewed and re-issued by the Minnesota Pollution Control Agency (MPCA). The NPDES/SDS permit for the PINGP (MN0004006) was issued on June 30, 2006 and expires on August 31, 2010. The NPDES/SDS permit authorizes discharges and intakes and imposes limits and/or monitoring/reporting requirements for the discharges listed in **Tables 1-2 and 1-3**.

Thermal limits in the current permit (issued on June 30, 2006) are keyed to temperatures in the Mississippi River up-and downstream of the plant, which are referred to in the permit as spring and fall "trigger points." From April 1 through the fall "trigger point" the PINGP is required to operate cooling towers in such a way that the discharge temperature requirements are such that the river downstream of the plant shall not exceed a daily average of 86° F.

Additionally, the water temperature below Lock and Dam 3 (Outfall SD 001) shall not be raised by more than 5 degrees above ambient (upstream) temperature. Also, if ambient (upstream) temperature reaches or exceeds 78° F for two days, the PINGP is required to operate the cooling towers "to the maximum extent practicable" (NPDES/SDS Permit No. MN0004006), meaning two cooling tower per operating unit. In addition, PINGP operating procedures has administrative targets for canal discharge temperature of 95° F in summer and 85° F in winter.

1.1.7 SOLID AND HAZARDOUS WASTE GENERATION

Construction activities associated with the EPU will generate non-radioactive solid wastes. The volume will be comparable to the waste generated during a typical refueling/maintenance outage. No ongoing solid waste generation will be generated due to the EPU after construction activities have been completed.

A Hazardous Waste Generator License Application is one of many reporting tools used by the Minnesota Pollution Control Agency (MPCA) to evaluate hazardous waste compliance. Hazardous Waste generators must submit an annual license application itemizing the hazardous waste generated the previous year. The PINGP holds a hazardous waste generator's license from the MPCA; the generator ID number is MND049537780. An electronic database displays data submitted to the MPCA by individual generators.[5] No changes to the MPCA hazardous waste generator license are required due to the EPU.

Radioactive Solid Wastes
See Section 4.13 for a discussion of radioactive solid waste generation, handling and disposal.

Radioactive Liquid Wastes
See Section 4.13 for a discussion of radioactive liquid waste generation, handling and disposal.

1.1.8 ELECTRICAL INTERCONNECTION

The Midwest Independent System Operator (MISO) has not yet definitively determined whether the transmission system will need to be upgraded to support the EPU. However, preliminary studies have indicated that the steady state power flow is supported satisfactorily by the existing system, even taking into account additional generation in the MISO queue. Dynamic stability studies have not been completed to date.

1.1.9 OPERATION AND MAINTENANCE

How the PINGP is operated will not change due to the power uprate. However, the power uprate will result in an increase in cooling needs of the circulating water system. This may result in more frequent operation of the cooling towers to supplement the Mississippi River cooling capacity over the course of a year. If extreme conditions warrant, the facility will reduce power to remain within the constraints of existing permits.

[5] http://www.pca.state.mn.us/waste/hazardousReport.cfm

During each refueling outage under current power levels, a little more than a third of the 121 total fuel assemblies (typically 48), in a reactor are replaced with new ones. As a result of utilizing the larger diameter fuel rods, the number of fuel assemblies replaced each refueling outage is not expected to change under power uprate conditions. The service life of the extra capacity will be until 2033 for Unit 1 and 2034 for Unit 2, assuming the necessary federal and state regulatory approvals are granted.

This capacity should be available 24 hours a day 7 days a week other than during refueling outages, which nominally will occur every 18 to 20 months for duration of approximately 1 month. Assuming a 3 percent forced outage rate annually this translates into availability factor of 92.4 percent for this capacity (**Table 1-4**).

1.2 PURPOSE AND NEED

The stated purpose of the EPU at the PINGP is to meet the growing energy demands of Xcel Energy and its customers. In Xcel Energy's 2004 Resource Plan, the Commission approved its request to pursue a package of uprates – including the PINGP EPU project – as part of an effort to meet the identified base load need (energy and capacity).

Following the passage of major energy initiatives in the 2007 legislative session, the Commission granted Xcel Energy's request to defer implementation of the PINGP EPU project pending a reevaluation of future needs.

In Xcel Energy's Resource Plan filed December 14, 2007, which included compliance with the aggressive new Renewable Energy Standard and DSM initiatives, Xcel Energy's system demand and energy requirements continued to grow at approximately one percent per year. **By 2012, the estimated deficit is 154 MW and by 2022, the deficit grows to over 2,400 MW.**

1.3 SOURCES OF INFORMATION

Much of the information contained within this document was provided by the applicant or the applicant's representatives in the form of: (1) the Application for Certificate of Need for the PINGP Uprate Project; (2) the Application for a Site Permit, PINGP Uprate Project; (3) the Application for Certificate of Need for the PINGP Additional Dry Cask Storage; and (4) Correspondence with Xcel Energy. Additional information was obtained through governmental agencies and published data.

Additional sources of information are listed below:

- Minnesota Pollution Control Agency (http://www.pca.state.mn.us/)
- Minnesota Department of Natural Resources (http://www.dnr.state.mn.us/index.html)
- Minnesota Department of Health (http://www.health.state.mn.us/)
- U. S. Environmental Protection Agency (http://www.epa.gov/)

- Electric Power Research Institute (http://www.epri.com/default.asp)
- Nuclear Energy Institute (http://www.nei.org/resourcesandstats/nuclear_statistics/usnuclearpowerplants/)
- United States Nuclear Regulatory Commission, Power Uprates (http://www.nrc.gov/reactors/operating/licensing/power-uprates.html)
- Minnesota Geological Survey (http://www.geo.umn.edu/mgs/)
- Federal Emergency Management Agency (http://www.fema.gov/)
- U. S. Department of Energy, Energy Information Administration (http://eia.doe.gov/)
- Xcel Energy CON Application for the Blue Lake Generating Plant Expansion Project, January 16, 2004.
- Xcel Energy 2007 Minnesota Resource Plan, December 14, 2007 (http://www.xcelenergy.com/XLWEB/CDA/0,3080,1-1-1_41994_43524-2835-0_0_0-0,00.html).
- Northern States Power Company, Application for Certificate of Need for Prairie Island Spent Fuel Storage, Docket E-002/CN-91-19. April, 1991.
- Minnesota Department of Commerce, Final Environmental Impact Statement to Establish an Independent Spent Fuel Storage Installation at the Monticello Generating Plant, Docket E-002/CN-05-123. March 20, 2005.
- Applicant's Environmental Report – Operating License Renewal Stage Prairie Island Nuclear Generating Plant Nuclear Management Company, LLC. April 2008. Units 1 and 2 Docket Nos. 50-282 and 50-306 License Nos. DPR-42 and DPR-60
- Cultural Resources Assessment for the Prairie Island Nuclear Generating Plant in Goodhue County, Minnesota. The 106 Group Project No. 07-32. January 2008.

Copies of Xcel Energy's CON and LEPGP Site Permit applications can be viewed and copied at the EFP web site at:

http://energyfacilities.puc.state.mn.us/Docket.html?Id=19602

1.4 HISTORY OF UPRATES

As of January 2008, the NRC has approved 118 uprates, resulting in a gain of approximately 15,600 MWt (megawatts thermal) or 5,263 MWe (megawatts electric) at existing plants. Collectively, these uprates have added generating capacity at existing plants that is equivalent to more than five new reactors.[6]

The design of every U.S. commercial reactor has excess capacity needed to potentially allow for an uprate, which can fall into one of three categories:

- **Measurement uncertainty recapture power uprates** are power increases less than 2 percent of the licensed power level, and are achieved by implementing enhanced

[6] http://www.nrc.gov/reactors/operating/licensing/power-uprates.html

techniques for calculating reactor power. This involves the use of state-of-the-art devices to more precisely measure feedwater flow which is used to calculate reactor power. More precise measurements reduce the degree of uncertainty in the power level which is used by analysts to predict the ability of the reactor to be safely shut down under possible accident conditions.

- **Stretch power uprates** are typically between 2 percent and 7 percent, with the actual increase in power depending on a plant design's specific operating margin. Stretch power uprates usually involve changes to instrumentation settings but do not involve major plant modifications.
- **Extended power uprates** are greater than stretch power uprates and have been approved for increases as high as 20 percent. Extended power uprates usually require significant modifications to major pieces of non-nuclear equipment such as high-pressure turbines, condensate pumps and motors, main generators, and/or transformers.

The Xcel Energy's proposed power uprate to the PINGP is an extended power uprate; Xcel Energy intends on filing an amendment to Prairie Island's operating licenses to allow for an increase in the licensed core thermal power level to 1805 MWt with the NRC in 2010.

2.0 REGULATORY FRAMEWORK

In order to increase the generating capacity of the PINGP, Xcel Energy must comply with three principal sets of requirements:

1. A Certificate of Need authorizing the EPU must be obtained from the Commission (Minn. Stat. § 216B.243, Minn. R. Part 7849);
2. A Site Permit authorizing the EPU must be obtained from the Commission (Minn. Stat. § 216E.03); and
3. An operating license amendment from the NRC must be obtained authorizing Prairie Island to operate at the increased thermal power level and generating capacity (10 CFR 50).

2.1 CERTIFICATE OF NEED

Minn. Stat. § 216B.243 requires a Certificate of Need (CON) be obtained before increasing the generating capacity of a plant by 50 MW or more. Xcel Energy filed an application for a Certificate of Need (CON) with the Commission for the project on May 16, 2008, in accordance with Minnesota Rules Chapters 7829 and 7849. On July 15, 2008, the Commission accepted the application as complete (July 22, 2008 Order).

The docket number for the certificate of need is: E002/CN-08-509.

Environmental Review

The Department of Commerce Office of Energy Security (OES) prepares an Environmental Report (ER) on proposed large electric power generating plants that come before the Commission for a determination of need (Minn. Rules 7849.7030). The ER must contain information on the human and environmental impacts of the proposed project associated with the size, type, and timing of the project, system configurations, and voltage. The environmental report must also contain information on alternatives to the proposed project and address mitigating measures for anticipated adverse impacts.

Minnesota Rule 7849.7100, Subpart 2, provides that in the event an applicant for a certificate of need for a LEPGP or a HVTL applies to the Commission for a site permit or route permit prior to the time the OES completes the environmental report, the OES may elect to prepare an Environmental Impact Statement (EIS) in lieu of the required environmental report. If combining the processes would delay completion of the environmental review, the applicant and the Commission must agree to the combination.

If the documents are combined, OES includes in the EIS the analysis of alternatives required by part 7849.7060, but is not required to prepare an environmental report under part 7849.7030.

Hearing Process
Minnesota Statutes § 216B.243, Subd. 4 requires a public hearing be held for the CON to obtain public comments on the necessity of the project. This subdivision provides that unless the commission determines that a joint hearing on siting and need under this subdivision and section 216E.03, subdivision 6, is not feasible or more efficient, or otherwise not in the public interest, a joint hearing under those subdivisions shall be held.

Final Decision
Once the record is complete, the docket will come before the Commission for the determination of a final decision on the need. If the Commission determines that there is a need for the requested additional power and that increasing the power capacity of an existing nuclear facility is in the best interest of the ratepayers to meet this need, it will issue a certificate of need for that particular size and type of project.

2.2 SITE PERMIT

The proposed EPU of the electrical generating capacity of the PINGP by 164 MW electric falls within the definition of a Large Electric Power Generating Plant (LEPGP) in the Power Plant Siting Act and, thus, requires a Site Permit from the Commission prior to construction (Minnesota Statutes § 216E.03, Subd.1). The Chapter 7849 rules provide for three different procedures for obtaining a site permit: full review, alternative review, and local review.

The proposed PINGP EPU does not qualify for the alternative environmental review process (Minn. Rule 7849.5500); the application is being reviewed under the procedures of the full review process.

LEPGP Site Permit Applications under the full review process must provide specific information about the proposed project, applicant, an alternative site, environmental impacts, and mitigation measures (Minnesota Rule 7849.5220). The Commission may accept an application as complete, reject an application and require additional information to be submitted, or accept an application as complete upon filing of supplemental information (Minnesota Rule 7849.5230).

It should be noted that Minn. Stat. 216B.243, Subdivision 3b, prohibits the issuing of a CON for the construction of a new nuclear-powered electric generating plant, thus the Site Permit application requirement of an alternative site for the proposed project could not be met. However, alternatives to the proposed project (i.e., the extended power uprate) were evaluated as required by the CON process (Minn. Rule 7849.7060, subpart 1).

The review process begins with the determination by the Commission that the application is complete. The Commission has one year to reach a decision from the time the application is accepted.

On August 14, 2008, the Commission considered the completeness of the Site Permit Application at its regularly scheduled meeting. The Commission Order, dated August 15, 2008, adopted the recommendations of the Office of Energy Security (OES), Energy Facility Permitting (EFP), except as modified regarding the advisory task force. In regards to the advisory task force, the Commission decided to take no action at that time.

The docket number for the **Site Permit** is E002/**GS**-08-690.

Advisory Task Force

The Commission may appoint an advisory task force (Minnesota Statute 216E.08). An advisory task force must, at a minimum, include representatives of local governmental units in the affected area. A task force can be charged with identifying additional sites or specific impacts to be evaluated in the EIS and terminates when the Department of Commerce (Department) Commissioner issues an EIS scoping decision. The Commission is not required to assign an advisory task force for every project.

If the Commission does not name an advisory task force, the rules allow a citizen to request appointment of an advisory task force (Minnesota Rule 7849.5580). The Commission would then need to determine at its next meeting if a task force should be appointed or not.

The statutes and rules pertaining to environmental review for Xcel Energy's Application for Certificate of Need (Docket E002/CN-08-509) do not contain provisions for the establishment of an advisory task force. However, in the event that the DOC Commissioner combines the environmental review procedures for a certificate of need (i.e., environmental report requirements) with those for the Site Permit (i.e., environmental impact statement requirements), the procedures of Minn. Rule 7849.5010 to 7849.6500 must be followed (Minn. Rule 7849.7100, subpart 3).

On September 11, 2008, the Commission received two requests from the public for the establishment of an Advisory Task Force. On September 25, 2008, the Commission met to consider the petition for the formation of an ATF. After hearing the interested parties and deliberating, the Commission voted to authorize the OES EFP staff to establish an advisory task force; the Commission also accepted the suggested structure and charge presented by OES staff.

The Advisory Task Force (ATF) met formally three times in October 2008, the 8^{th}, 15^{th} and 22^{nd}. The meetings were open to the public, and frequently additional people attended to listen to the discussion. The ATF, through a facilitated process, reviewed the Xcel Energy proposals, discussed relevant issues, and suggested items for the scope of the EIS. The OES EFP staff released the ATF Summary of Work on November 3, 2008.

Environmental Review

For a full process review of an LEPGP site permit application, the commissioner of the Department of Commerce (DOC) must prepare a document called an Environmental Impact

Statement (EIS). An EIS is a written document that describes the human and environmental impacts of a proposed large electric power generating plant (and selected alternative sites) and methods to mitigate such impacts. The public has the opportunity to comment on the scope of the EIS and the draft EIS through public comment periods and at OES sponsored information meetings.

The first step in the development of the EIS is the "scoping process", intended to reduce the scope and bulk of the EIS and to identify only those potentially significant issues relevant to the proposed project. The scoping process involves a public information meeting and comment period, input from advisory task force (if applicable), participation of other regulatory agencies and culminates in the release of a Scoping Decision by the DOC commissioner. The Scoping Decision describes the major issues to be studied in the EIS, alternatives to the proposed project and the schedule for completion of the document.

The OES EFP staff held a Public Information and Environmental Review Scoping Meeting on September 10, 2008. The purpose of the meeting was to inform the public of the projects (the EPU and the request for additional dry cask storage), the regulatory process, and to solicit input from the public as to the scope of the environmental review document. The comment period for the scoping process closed on October 7, 2008.

Thirty-eight persons signed the attendance sheet at the public meeting, with 10 of those persons pre-registering to speak; another five or so persons raised their hands to speak after the pre-registered speakers had their turn. The major area of concern voiced was the health and safety of the people living in close proximity to the PINGP and the associated ISFSI. Other issues included the environmental impacts from appropriating additional water from the Mississippi River, increased temperatures of the discharge water to the river and potential security of the ISFSI.

After consideration of the public comments, the Commissioner of the Department issued a Scoping Order on November 14, 2008 (**Appendix A**).

Hearing Process
Upon completion of the draft EIS, a public hearing must be held pursuant to Minnesota Statute 216E.03, subd.6 and Minnesota Rule 7849.5330. All hearings held for designating a site or route shall be conducted by an administrative law judge from the Office of Administrative Hearings pursuant to the contested case procedures of chapter 14. Members of the public will have an opportunity to speak at the hearings, present evidence, ask questions, and submit comments.

Final Decision
Once the record is complete, the docket will come before the Commission for the determination on the adequacy of the EIS and of a final decision on the Site Permit; in this case the Commission must determine whether the proposed PINGP site is an appropriate location for this type of project.

The Commission may include conditions in any Site Permit it issues for the PINGP EPU project, if certain conditions are deemed necessary and appropriate. Additionally, any other permits or modifications to existing permits, that Xcel is required to obtain (e.g., water discharge, water appropriations, air emissions discharge, etc.) will include pertinent conditions designed to minimize the environmental impacts of the facility.

An example of a large electric power generating plant site permit is shown in **Appendix B**.

2.3 NUCLEAR REGULATORY COMMISSION

When the Nuclear Regulatory Commission (NRC) issues a license for a commercial nuclear power plant, the agency sets limits on the maximum heat output, or power level, for the reactor core. This power level plays an important role in many of the analyses that demonstrate plant safety, so NRC approval is required before a plant can change its maximum power level. A "power uprate" only occurs after the NRC approves a commercial nuclear power plant's request to increase its power. The process for requesting and approving a change to a plant's power level is governed by 10 CFR 50.90-92. The operating license amendment for the EPU is anticipated to be filed with the NRC in 2010.

Additionally, the change to the larger diameter fuel rods will require NRC approval. The switch to the new fuel is anticipated to take place over time prior to the implementation of the EPU. **Xcel Energy filed for NRC approval for the use of the larger diameter fuel on June 26, 2008, and Xcel Energy anticipates receiving NRC approval by July 2009.** This will allow Xcel Energy to start utilizing the new fuel in the reactors starting with the 2009 fall outage, so that the PINGP will have a full core of the new fuel by the 2012 outage.

2.4 OTHER PERMITS

In addition to the State and NRC permits mentioned above, the EPU project will require interconnection approval and an updated transmission service agreement with the Midwest Independent System Operator (MISO). At this time Xcel Energy has not filed the generator interconnection request or the request for transmission service. Xcel Energy is working with MISO on the review process and will file the appropriate requests prior to the projects implementation.

If a Site Permit is issued for the EPU, no other zoning, building or land use rules by a regional, county or local government apply (Minn. Stat. § 216E.10).

The PINGP possesses a number of the necessary operating permits: Air Quality, Water Appropriations, and Wastewater Discharge Permits; it is not anticipated that any of these will require amendments.

Air Quality

Non-radiological air emissions are not expected to increase or decrease as a result of the EPU. Diesel engines, a boiler, and other sources currently associated with the PINGP 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 Minnesota Pollution Control Agency (MPCA); the Air Emission Permit number is 04900030-004. A copy can be viewed at the MPCA's website.[7] Emission units consist of thirteen (13) diesel-fired engines that are used for emergency purposes, and one (1) distillate-oil fired boiler used for plant steam. There are fuel-use and emissions limits for all of the emission units.

No changes to the MPCA air permit are required due to the EPU.

Water Appropriation

The PINGP uses ground water for potable and industrial use from six wells installed within the alluvial aquifer located on the plant property. Five of these wells are permitted by the Department of Natural Resources (DNR), appropriation permit numbers 69-171-G, 78-5153, 86-5114, and 96402. The sixth well does not require a water appropriation permit because it is below the minimum flow requirements of 10,000 gallons per day or 1,000,000 gallons per year set by DNR. Although the maximum combined pumping rate of the five wells equals approximately 850 gpm, ground water limits the usage to a total of 354.7 million gallons per year.

The PINGP uses surface water from the Mississippi River to cool and condense the steam leaving the turbine. Surface water use at Prairie Island is limited by the DNR water appropriation limits (69-0172 amended in June 1995). Under the DNR surface water appropriation permit the facility may withdraw up to 235,000 Million Gallons of water per year from the Mississippi River.

Wastewater Discharge Permit

The PINGP operations require a number of wastewater discharges, which are regulated by the state of Minnesota through the facility's National Pollution Discharge Elimination System/**State Disposal System** (NPDES/**SDS**) permit. The present NPDES/SDS permit for the plant, permit number MN0004006, was issued **September 23, 2005**, and expires August 31, 2010 (MPCA 2006b). **The permit was modified twice in 2006, on January 23, and again on June 30.** This permit authorizes intakes and discharges and imposes limits and/or monitoring/reporting requirements for the discharges.

THE MISSISSIPPI RIVER and COORDINATION BETWEEN AGENCIES

Riparian water rights in Minnesota arise from owning shoreline. Water can be used for multiple purposes (swimming, fishing, taking water for drinking or irrigation) but cannot unreasonably interfere with the riparian rights of others.

[7] http://www.pca.state.mn.us/air/permits/issued/04900030-004-aqpermit.pdf

Minnesota "waters of the state" are any surface or underground waters that are confined. This includes all lakes, ponds, marshes, rivers, streams, ditches, springs, and underground aquifers.

Water planning has been mandated in Minnesota since the mid-1930s. Minnesota recognizes that water resources are best managed through many public bodies and levels of government with different levels of expertise. State agencies that have a role in water regulation and management are the Bureau of Water and Soil Resources (BWSR), DNR, Environmental Quality Board (EQB), Minnesota Department of Agriculture (MDA), Minnesota Department of Health (MDH), and MPCA.

The Minnesota Pollution Control Agency (MPCA) helps protect the State's water by monitoring its quality, setting standards and controlling discharges. The MPCA is the largest single regulator of water in Minnesota. It enforces federal and state law including the administration of the federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES). The MPCA also issues water quality certifications under §401 of the Clean Water Act.

The water appropriation program, established in 1937 and administered by the DNR, provides a water policy for the state that balances the development and protection of the State's water resources. Minnesota Statutes, section 103G.285, subdivision 2 directs the DNR to limit consumptive appropriations of surface water under certain low flow conditions. The purpose of the limit is to safeguard water availability for in-stream uses and for downstream higher priority users located reasonably near the site of appropriation. In-stream uses include fish and wildlife habitat, navigation, water-based recreation, and aesthetics.

Minnesota law (MS 103G.261) sets the priorities for water use in circumstances when there is a water shortage. State Rules (Minn. Rules 6115.0600 – 6115.0810) were promulgated pursuant to this statute. From highest to lowest priority these uses are:

1. Domestic water supplies and power production with contingency water use plans

2. Uses of water consuming less than 10,000 gallons/day

3. Agricultural irrigation and processing of agricultural products

4. Power production without contingency water use plans

5. Nonessential uses of water

A water use permit from the DNR Waters Program is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. All permitted water users are required to submit annual reports of water use. Information on permitted water users and reported water use can be used to evaluate impacts from pumping on surface and ground water resources. Water use data are also used for water supply planning and resolving water use conflicts.

The DNR Waters Program provides state leadership for the cooperative management of the commercially navigable Mississippi River, which extends from Minneapolis to the mouth of the Ohio River near Cairo, Illinois, and also includes the St. Croix River from Stillwater to the confluence with the Mississippi and the Minnesota River from Shakopee to the confluence with the Mississippi River. This involvement includes DNR representatives from Ecological Resources, Forestry, Fisheries, Wildlife, Trails and Waterways, and Waters, who work together to develop state positions on issues related to the Upper Mississippi River System (UMRS), as well as technical analysis required for specific issues dealing with the river ecosystem.

The DNR Waters staff also represents the State in the Upper Mississippi River Basin Association (UMRBA), which coordinates policy development and federal lobbying activity for the five UMR states. The DNR Water staff participates in the Environmental Management Program Coordinating Committee (EMPCC) that provides policy advice to the U.S. Army Corps of Engineers in administration of the Federal Environmental Management Program (EMP) on the UMRS.

The Mississippi River Resources Forum (MRRF) establishes policy on field-level management of the UMRS within the Army Corps of Engineers' St. Paul District (north of Guttenberg, Iowa), including such matters as fish and wildlife refuge management, recreation management, recreation beach maintenance, dredged material disposal and navigation system improvements. DNR Waters represents the State on the MRRF and several of its subcommittees, coordinating positions both within the DNR and among other state agencies.

Water Level Management Task Force

Construction of a series of locks and dams on the Upper Mississippi River created the 9-foot navigation channel. Over the decades, the lock and dam system has, in general, reduced habitat diversity and resulted in a loss of aquatic vegetation on the impounded portion (i.e., pools) of the Upper Mississippi River system. River resource management agencies (including the Water Level Management Task Force) and the public have expressed a growing interest in summer draw-downs of the navigation pools to promote growth of aquatic vegetation.

The St. Paul District, Corps of Engineers (COE), in cooperation with the Water Level Management Task Force (WLMTF) of the River Resources Forum, has been evaluating navigation pool draw-downs on the Upper Mississippi River for the purpose of improving fish and wildlife habitat since 1996. The River Resources Forum is a coordinating body made up of Federal and State agencies with independent regulatory and management responsibilities on the Upper Mississippi River within the St. Paul District.[8]

A major objective is to maximize habitat benefits while minimizing adverse biological effects, as well as effects on commercial and recreational interests and river resources, and to minimize additional channel maintenance requirements. The purpose behind growing

[8] http://www.mvp.usace.army.mil/environment/default.asp?pageid=122

season draw-downs is to mimic the occurrence of low water conditions that would occur naturally on the Upper Mississippi River if it were not impounded and regulated to maintain adequate water depths for commercial navigation.

A Problem Appraisal Study, completed in November 1996, concluded that partial pool drawdown of Upper Mississippi River navigation pools had the potential for providing substantial habitat restoration benefits while at the same time having minor effects on other river uses.

Draw-downs of small isolated areas in pools 5 and 9 were accomplished during 1997- 1999. During the summers of 2001 and 2002, a 1.5-foot drawdown (at the dam) of pool 8 was implemented. During the summers of 2005 and 2006, a 1.5-foot drawdown was conducted in Pool 5. Draw-downs (1.0 foot at Lock and Dam 6) were planned by the St. Paul District for summer 2003, summer of 2004, and summer of 2008. However, recreational access issues could not be overcome during 2003 and 2004 and hydrologic conditions and subsequent main navigation channel conditions prevented lowering of water levels during 2008, and these draw-downs were not implemented.

Each successive pool draw-down increases the level of knowledge regarding the effects of pool draw-downs ability to support an adaptive management approach to future decisions concerning the use of this management measure.

Upper Mississippi River System (UMRS) Pool 3 is used to describe the region of the Upper Mississippi River that is impounded by Lock and Dam 3. It extends from Lock and Dam 3 located near Hager City, Wisconsin upstream to Lock and Dam 2 located near Hastings, Minnesota. The PINGP intake structure is located approximately 8,000 feet upstream from Lock and Dam 3.

Consideration of a draw-down in Pool 3 by the WLMTF is preliminary at this point. Prior to implementation of a draw-down the U.S. COE would develop an Environmental Assessment Report containing a description of the project and its impacts.

3.0 PROJECT ALTERNATIVES

Under Minn. Rules part 7849.7060, subpart 1, the Environmental Report must include certain items with regards to the alternatives that are considered. These items include a general description of the alternatives considered, an analysis of the potential human and environmental impacts of these alternatives and possible mitigative measures, and an analysis of the feasibility and availability of each alternative. In this case the Scoping Order identifies the following alternatives that will be analyzed in this document: the no build alternative, demand side management, purchase power, alternative fuels (fossil fuel technologies and renewable resource technologies), up-grading existing facilities, and new transmission. Each of these alternatives is addressed in turn below.

In its CON application, Xcel Energy identified two alternatives via its qualitative screening process for further consideration. The screening process selected a 164 MW biomass plant and a 164 MW long-term coal Power Purchase Agreement (PPA); a third alternative was added after the qualitative screening was expanded to the "unconstrained" mode. This added a 164 MW natural gas combustion turbine plant to the list of alternatives evaluated by Xcel Energy.

3.1 NO-BUILD ALTERNATIVE

The no-build alternative means that the PINGP EPU project is not undertaken. Electric power will continue to be supplied in the manner and with the facilities that are presently in existence.

Impacts. Often, in conducting environmental review, the analysis of the no-build alternative involves a discussion of the environmental impacts of continuing the status quo. For example, with a proposed highway project, the no-build alternative would take into account the impacts associated with continuing to have traffic increase along existing roads and highways and for development to occur along these existing arteries.

When a certificate of need is required for a proposed project, however, the no-build alternative takes on a different aspect. If the Commission determines that the need for additional power has not been established, no certificate of need will be issued and nothing new will be constructed. Whatever impacts would result from the expansion of the PINGP will not occur.

If Xcel Energy establishes that there is a need for additional power, but no new facility is authorized, the potential impacts are twofold. One, there could be a shortage of electricity, with all the ramifications that result from a shortage of electricity on hot days in the summer. Two, the electricity will come from someplace else, with the impacts that result from the generation and transmission of electricity from these other sources. These impacts are explored below with the various alternatives.

One impact of not building the proposed facility is that anticipated wages and tax revenues to the local economy would be lost. It is anticipated that the PINGP power uprate project will provide tax benefits, including local, state and federal. Xcel Energy estimated that the local property tax benefits due to the project will results in an additional $3.5 million annually; the total estimated increase in property taxes paid due to the EPU is $79 million between 2010 and 2035.

Xcel Energy also estimated that implementation of the EPU will result in the payment of approximately an additional $80 million in federal income taxes and $14.5 million in state income taxes between 2010 and 2035. The estimated property, state and federal income taxes due to the EPU are in addition to the estimated $42 million in state income taxes, $231 million in federal income taxes, and $122 million in state property taxes the company will pay between 2010 and 2035 for Prairie Island.

PINGP does not emit significant levels of any of the criteria pollutants or green house gases that are emitted from coal or other fossil fuel burning plants. The PINGP EPU project will result in over 16.1 million less tons of carbon being emitted to the atmosphere as compare to the next “best” alternative - a natural gas combustion turbine (CT).

Feasibility and Availability. The no-build alternative is not one that requires any analysis regarding its feasibility or availability. If the EPU project were not to be undertaken, Xcel Energy has stated that it would experience a deficit starting in 2010 that would grow to **over 2,400 MW** by 2022. Xcel Energy believes that if the PINGP project or an alternative is not undertaken, that it would place Xcel Energy in opposition to their requirement to provide safe, adequate and reasonable electric service pursuant to Minn. Stat. § 216B.04.

3.2 DEMAND SIDE MANAGEMENT

Demand Side Management (DSM) is the practice of reducing customers’ demand for energy through programs such as energy conservation and load management so that the need for additional generation capacity is eliminated or reduced. More detail on Xcel Energy’s conservation and load management programs is available in Appendix C of Xcel Energy’s Certificates of Need Application, dated May 16, 2008.

The Next Generation Energy Act of 2007 approximately doubled the DSM goals approved in Xcel Energy’s 2004 Resource Plan. The Act sets a mandatory minimum savings goal from Conservation Improvement Programs, or “CIP”, programs at 1.0 percent and an overall conservation goal of 1.5 percent.

Xcel Energy has committed to achieving a 1.15 percent energy reduction as its CIP/DSM goal by 2010 and increasing to a 1.3 percent goal by 2012. This commitment was approved by the Commission on July 9, 2009, in Xcel Energy’s approved 2007 Resource Plan (Docket E002/RP-07-1572). Meeting this goal will be very challenging. Xcel Energy will likely launch new conservation programs as well as expand existing programs to meet the 1.3 percent target. Such aggressive expansion of DSM programs pushes the limits of achievable potential in the Xcel Energy service territory and creates significant uncertainty

regarding the size and timing of actual savings. Until Xcel Energy implements its plan to meet the 1.3 percent target and gains some experience operating a significantly larger DSM portfolio, it may be unreasonably risky to rely on increased DSM in order to replace the energy and capacity from the PINGP EPU project. If the DSM alternative was selected and the company failed to achieve the necessary savings, Xcel Energy would be forced to buy replacement capacity and energy from the market.

Impacts. Demand side management can minimize environmental effects by avoiding the construction and operation of new generating facilities. The impacts that would result from the construction of the proposed facility, or from the supply of the additional power through other means, would be avoided if DSM were sufficient to reduce the need for additional power.

Feasibility and Availability. A determination of whether demand side management can reduce the anticipated need for additional power is what the Public Utilities Commission will determine in the certificate of need proceeding. A conclusion that DSM will eliminate the need for additional power is essentially a decision to deny the requested certificate of need.

The information reviewed for this document regarding the feasibility of DSM is that information provided by Xcel Energy in its Certificate of Need Application, dated May 16, 2008 and the information in Xcel Energy's March 20, 2009 Supplemental filing to the Certificate of Need. Xcel Energy concludes that additional DSM above the 1.3 percent included in its analysis is not a feasible alternative to the proposed project.

According to Xcel, the demand for electrical power will continue to grow at an average rate of 0.86% percent per year or an average of an additional 89 MW for the Xcel Energy service area each year. The methodology used to develop the forecast demand and other forecast details required by Minnesota Rules part 7849.0270 were described in Appendix B of the CON Application.

Xcel Energy's current DSM program has achieved 50 to 100 MW of demand reduction per year. Xcel has in place over 800 megawatts of load management opportunities. Xcel Energy is in compliance with the demand side management (DSM) goals as ordered by the Commission in the 2000 Resource Planning process.

Xcel also notes that it has been experiencing some difficulty in maintaining its customer base for its load management programs. New customers are being signed up for these programs, but Xcel Energy has seen an increase in the dropout rate of current customers.

3.3 PURCHASE POWER

Purchased power is exactly what it says – the purchase of electricity from another entity. Utilities like Xcel Energy enter into power purchase agreements (PPA) with other generators of electricity. A power purchase agreement is a contract between a wholesale supplier of electricity and an entity that sells the energy to retail consumers. Xcel Energy has a form power purchase agreement at the following webpage:

http://www.xcelenergy.com/docs/corpcomm/RDFpowerPurchAgrmt.pdf

In addition to generating electricity at its 22 major generating plants in Minnesota, Wisconsin, and South Dakota, Xcel Energy relies on both short-term and long-term power purchase agreements to satisfy the demand for electricity in its Minnesota service area and to meet the Mid-Continent Area Power Pool (MAPP) capacity reserve requirements. (MAPP requires power suppliers to have sufficient accredited generation capacity to provide 15% reserves above the actual summer peak demand.) Short-term power purchase agreements are normally for a two or three month period, often the summer peaking time. Long term agreements usually provide for the purchase of power over a ten or even twenty year period.

Xcel has traditionally made long-term purchases and generation capacity additions to meet a median (50^{th} percentile) demand forecast and then has augmented those resources with short term seasonal purchases to cover to the 80^{th} to 90^{th} percentile forecast.

Impacts. The environmental impacts associated with the purchase of electricity depend for the most part on how the electricity that is purchased was generated. Presently, Xcel purchases significant amounts of electricity in the summertime. This electricity comes from various sources, including some from coal-fired power plants and some from hydro facilities. It is difficult to discuss with any specificity what the comparable impacts are at this juncture.

Feasibility and Availability. The feasibility and availability of short term and long power purchase agreements are discussed separately below. The information is taken from Xcel Energy's certificate and Xcel Energy's 2007 Resource Plan.[9]

Short-Term Power Purchase Agreements. At this time Xcel Energy believes it cannot rely on short-term seasonal power purchases from distant utilities to meet its reliability obligations. The main reason for this is the significant uncertainty about regional transmission capacity now and into the future. Historically, Xcel Energy has depended on short-term power purchases to cover about the last 5 to 10 percent of their projected capacity and energy needs. Notwithstanding the uncertainty of regional transmission concerns, Xcel Energy believes that this level of short-term power purchases can be achieved for the near future. The 2007 Resource Plan incorporated 750 MW of short-term purchases.

Long-Term Power Purchase Agreements. Xcel Energy believes that it does not appear that the long-term market can meet the project's primary objectives because of transmission constraints and lack of unconstrained generation capacity available in the near-term.

[9] http://www.xcelenergy.com/XLWEB/CDA/0,3080,1-1-1_41994_43524-2835-0_0_0-0,00.html

Xcel Energy did model an estimate of a long term PPA from a coal-based resource to include as a possible alternative. The hypothetical coal PPA price was modeled to have the same cost, performance, and emission characteristics of a new conventional coal plant. The PPA may have similar capacity and energy characteristics to the EPU and therefore was selected for inclusion in Xcel Energy's quantitative evaluation.

The cost and availability of a 164 MW long-term coal-based PPA are highly speculative. This scenario assumed a capacity charge equivalent to the levelized revenue requirements of a new plant and energy charges equivalent to the cost of fuel at a 10 mmBtu/MWh heat rate plus small variable O&M costs. The contract was assumed to deliver 164 MW continuously for a 20-year period. It is expected that a coal-based contract would be structured such that responsibility for the associated emissions would be assigned to the buyer. The emission rates for the hypothetical coal PPA are based on typical emission rates for Xcel Energy's existing coal units.

Table 3-1 presents a cost comparison of the 164 MW coal PPA and the proposed PINGP EPU project. Xcel Energy's estimates put the present value of revenue requirements for a coal PPA at approximately 619 million dollars above that of the PINGP EPU. **Table 3-2** presents a comparison of the total system emissions for the 164 MW coal PPA and the proposed PINGP EPU project. Xcel Energy's estimates the additional tons air emissions from a coal PPA over the proposed EPU at 24,110 of NO_X, 3,158 of PM_{10}, 32,290,370 of CO_2, 39,616 of SO_2, 578 of VOCs and 4,767 of CO.

3.4 ALTERNATIVE FUELS

One of the issues to be examined in the Environmental Report (Minn. Rules part 7849.7060, subpart 1) is the possibility of using a different energy source than the one proposed by the project proposer. In this case Xcel Energy has proposed to increase the capacity at an existing nuclear generating facility.

In Appendix D of its Certificate of Need Application, Xcel Energy addressed to some extent a number of other possible types of facilities including Fossil-Fuel technologies, Renewable Resource Technologies, Composite Resource Technologies and Developing Resource Technologies. Although no specific project is reviewed in this screening analysis, the various technologies are evaluated on their applicability, reliability, economics, and environmental performance.

3.4.1 FOSSIL-FUEL TECHNOLOGIES

Fossil fuel technologies considered in Xcel Energy's screening included: integrated gasification combined cycle (IGCC); coal-fired boiler, and natural gas-fired advanced combined cycle. These units have similar operating characteristics to the PINGP project and are potentially viable alternatives.

Supercritical Pulverized Coal-Fired boiler. A supercritical pulverized coal-fired steam power plant consists of a steam boiler, a steam turbine and an electric generator side. In the simplest terms, steam is generated when water is heated by the thermal energy released when pulverized coal is burned in the boiler. The steam from the boiler is piped to, and drives, a steam turbine, which in turn drives an electric generator. The term "supercritical" refers to a particular range of thermodynamic conditions (pressure and temperature) under which such a plant is designed to operate. Supercritical boilers are typically several percentage points more efficient than boilers not designed to operate under supercritical conditions.

Integrated Gasification Combined Cycle (Coal). An integrated gasification combined cycle (IGCC) power plant consists of a coal gasifier, a combustion turbine, a heat recovery steam generator and a steam turbine. In the gasifier, coal is heated to produce a "syngas" that is burned in a combustion turbine that turns a generator to produce electricity. Waste heat in the exhaust gases from the combustion turbine are used to produce steam in a heat recovery steam generator. Steam from the heat recovery steam generator is piped to, and drives, a steam turbine, which in turn drives an electric generator.

Natural Gas Combined Cycle. A gas-fired combined cycle power plant is a combination of combustion turbine technology, heat recovery and electric generation. In the combustion turbine, incoming air is compressed and mixed with the natural gas fuel. Igniting this mixture results in an expansion of gases (the combustion products and excess air) through a power turbine that in turn drives an electric generator. Hot exhaust gases exiting the combustion turbine pass through a heat recovery steam.

Natural Gas Simple Cycle. A simple cycle power plant uses natural gas as its primary fuel and may use fuel oil as a backup fuel during times of gas supply interruption. A simple cycle combustion turbine is less expensive per kW of capacity and also significantly less efficient than a combined cycle facility because the heat from the combustion turbine exhaust gases is not recovered for secondary electric generation from a steam turbine.

Impacts. Environmental impacts refer to the effects the alternative is expected to have on the environment. Potential environmental impacts associated with fossil-fuel generation technologies include air emissions, effects on land, water consumption, wastewater generation, noise, aesthetics, and traffic.

Pulverized coal-fired plants typically operate in a range of 32 to 35 percent efficiency. When designed for supercritical operating conditions, a pulverized coal-fired plant can be up to 37 percent efficient. The direct environmental impacts of coal burning include air emissions, solid waste (ash) generation, waste-heat discharge to air and water, and rail or barge traffic. Typical carbon dioxide emission rates for new supercritical pulverized coal units are in the range of 200 lb CO_2 per million btu heat input.

IGCC plants are predicted to typically operate in the range of 35 percent to 40 percent efficiency. The direct environmental impacts of coal gasification include air emissions, solid waste (ash) generation, waste-heat discharge to air and water, and rail traffic. Without CO_2 sequestration, an IGCC plant is projected to have similar CO_2 emissions to a supercritical pulverized coal generating plant (in the range of 200 lb CO_2 per million btu fuel consumed).

Environmental impacts show distinct advantages for a natural gas combined-cycle project vs. a coal-fired plant. The energy efficiency for a combined cycle plant can be expected to be in the range of 45 to 50 percent with the efficiency of an advanced combined cycle plant exceeding 50 percent. The direct environmental impacts of operating a natural gas combined-cycle plant include air emissions, wastewater discharge, waste heat discharge to air and water and the potential for on-site ammonia storage if post-combustion NOx control is required. Air emissions from an advanced gas-fired combined cycle plant are lower than that of a coal-fired plant, especially in terms of SO_2 and CO_2 (150 lbs per mmbtu of fuel input). A gas-fired combined cycle plant does not produce any ash.

Environmental impacts would not show a distinct advantage for a natural gas simple cycle turbine-driven project vs. a natural gas combined-cycle plant. The energy efficiency for simple cycle combustion turbine generator can be expected to be in the range of 25 to 30 percent. The direct environmental impacts of operating a simple cycle plant burning natural gas include air emissions, waste heat discharge via the stack and the potential for on-site ammonia storage if post-combustion NO_x control is required.

Feasibility and Applicability. Applicability of the technology refers to the technology's appropriateness for the Applicant's stated purpose and need, including timing and operational mode. One of the objectives of the PINGP project is to provide energy and capacity for base load service (i.e., operational mode). Base load resources normally operate in the range of 50 percent to 100 percent annual capacity factor, with typical capacity factors of newer base load resources being in the range of 80 percent to 90 percent. Base load resources generally have few starts per year (<10) and may be operated at reduced output levels to follow system load during off-peak periods.

An important factor relating to the feasibility of an alternative is its implementation time. The primary activities that affect implementation time are obtaining necessary regulatory approvals, acquiring necessary transmission services, negotiating financing agreements, selecting and acquiring a site, design and engineering, procuring, construction, and testing facility equipment.

Although the fossil fueled alternatives have similar operating characteristics, the IGCC, coal, and natural gas combined cycle units cannot be built to the appropriate 164 MW scale. None could be constructed in time to meet the 2011 capacity need. Additionally, the advanced combined cycle is currently not a commercially viable technology.

Natural gas simple cycle plants are typically employed for peaking duty and are not well suited to economically meet intermediate and base load needs. Simple cycle combustion turbine generators exceeding 20 percent capacity factor would likely defer to intermediate load facilities or be considered for conversion to a combined cycle unit. Advantages of simple cycle turbine generators include flexibility in siting, relatively low capital costs and, a relatively short construction period.

At the expense of dispatch economics, a simple cycle plant can generally demonstrate high reliability (both the adequacy and security aspects). A simple-cycle combustion turbine facility may utilize fuel oil as a backup to address the potential interruption of natural gas supply. However, environmental permitting may be substantially complicated if fuel oil is utilized as a back-up fuel due to the potential for higher air emissions related to there being more sulfur in fuel oil than in natural gas. This consideration limits siting flexibility for additional units at existing peaking plant sites and/or near areas that have little available room to permit any additional air emissions.

The total capital requirement for a simple-cycle gas-fired combustion turbine power plant installation is much lower than for other fossil-fuel technologies. However, the typical energy cost for a simple-cycle gas-fired combustion turbine power plant is estimated to be much higher than for other fossil fuel units, making it a better option for meeting low capacity factor needs.

Building a simple-cycle power plant is a major construction project with about a 12-18 month time frame for permitting and 12 months for construction. The time required to implement transmission upgrades necessary to accommodate the output of such a facility is highly variable, depending on the particular site chosen.

The “unconstrained alternative” Xcel Energy selected through its evaluation process was not a specific resource. In this scenario, the model is allowed to select the most cost-effective combination of resources from the available generic resources including coal, natural gas combined cycle, and natural gas simple cycle resources. In this case, the capacity need was filled by the addition of a natural gas CT. New and existing resources filled the energy needs.

Table 3-1 presents a cost comparison of the natural gas CT and the proposed PINGP EPU project. Xcel Energy’s estimates put the present value of revenue requirements for the natural gas CT at approximately 519 million dollars (**433 million in the supplemental filing**) above that of the PINGP EPU. **Table 3-2** presents a comparison of the total system emissions for the natural gas CT and the proposed PINGP EPU project. Xcel Energy’s estimates the additional tons air emissions from a natural gas CT over the proposed EPU at 7,580 of NO_X, 1,370 of PM_{10}, 16,059,200 of CO_2, 9,526 of SO_2, 283 of VOCs and 2,235 of CO.

3.4.2 RENEWABLE RESOURCE TECHNOLOGIES

Renewable resource technologies considered as potential alternatives include wind, solar, biomass, hydropower, and landfill gas.

Wind. Wind energy conversion technology consists of a set of wind-driven turbine blades that turn a mechanical shaft coupled to a generator, which in turn produces electricity. The major components of the wind turbine include: Rotor blades, Gear box, Generator, Nacelle (gearbox/generator housing), Tower, and Collection system of electrical lines connecting a number of wind turbines to a substation (applicable only to multiple wind turbine projects).

Solar. Solar energy to electricity conversion technologies includes thermal conversion (typically using sunlight to generate steam to turn a turbine) and photovoltaic (direct conversion of sunlight to direct current power). Thermal, or concentrating solar power technology (parabolic troughs, power towers, and dish/engine systems), converts sunlight into electricity efficiently with minimal effects on the environment. The heat generated is transferred via a heat exchanger to produce steam. The electricity is produced in conventional steam turbine generators.

The "photovoltaic effect" is the basic physical process through which a photovoltaic (PV) cell converts sunlight into electricity. Solar energy (composed of photons) is transferred to the electrons of atoms making up the PV cell. Higher energy electrons begin to flow and become electric current. By grouping single PV cells into arrays, and then placing many arrays together, power plants of up to 6.5 megawatts have been built.

Biomass (Direct-Fired). The process of direct-firing biomass fuels is very similar to the firing of other solid fuels. Fuel handling and storage, fuel firing, ash handling and disposal, air emissions, water consumption, and wastewater management will have many similarities to coal-fired systems. The primary activity steps for a biomass plant include: Biomass fuel receiving; On-site processing (size reduction, drying, screening); Fuel storage/conveying; Boiler (usually a stoker design); Ash and flue gas handling; Air emission controls (baghouse/ESP for particulate; ammonia for NO_x control); Steam turbine; and Cooling tower.

Biomass fuels can be harvested from the forest, collected as waste materials from processing plants or agriculture, or grown in biomass plantations. Fuel may be shipped to the power plant by truck, rail or barge depending on the plant location and type. Fuel will generally be stockpiled as insurance against interruptions in supply. Depending on fuel characteristics, drying and size reduction may be necessary prior to firing. Drying is sometimes accomplished by utilizing the heat from stack gases. Prepared fuel is fed to the furnace and the resulting heat is used to generate steam. The steam from the boiler is piped to, and drives, a steam turbine, which in turn drives an electric generator to produce saleable electrical power.

Hydropower. Hydroelectric power plants convert the potential energy of water, pooled at a higher elevation, into electricity by passing the water through a turbine and discharging it at a lower elevation. The water turns the turbine connected to an electric generator, thus producing electrical energy. The turbines and generators are installed in, or adjacent to, dams, or use pipelines (called penstocks) to carry the pressurized water below the dam or diversion structure to the powerhouse. Hydropower projects are generally operated in a run-of-river, peaking, or storage mode.

Run-of-river projects use the natural flow of the river and produce relatively little change in the stream channel and stream flow. A peaking project impounds and releases water when the energy is needed. A storage project extensively impounds and stores water during high-flow periods to augment the water available during low-flow periods, allowing the flow releases and power production to be more constant.

The capacity of a hydropower plant is primarily a function of two variables: (1) flow rate expressed in cubic feet per second (cfs); and (2) hydraulic head which is the elevation difference the water falls in passing from the reservoir through the turbine. Depending on the particular waterway being considered, project design may concentrate on either of these variables (high head/low flow or low head/high flow).

Hydrokinetic power refers to the generation of electricity from moving water without impoundments or diversionary structures that are typically used at conventional hydropower facilities, basically placing a turbine within the current.[10]

Landfill Gas. The most common use of landfill gas (LFG) is for on-site electricity generation by firing stationary engine generator sets. Some LFG is used to fire boilers or turbines and LFG, sufficiently processed, could be an energy source for fuel cell operation. Electric generating plants using LFG and those using natural gas or distillate oil are nearly identical; however, firing LFG does require gas processing and careful monitoring of equipment because LFG tends to be more corrosive. Significant quantities of LFG are emitted from municipal solid waste where it has been deposited in landfills; however, LFG typically has a medium Btu content and is not typically a source of energy on a scale larger than a few MW.

LFG recovery for energy is practiced in the United States, Europe and other countries around the world. A typical system consists of the following components:

- The gas collection system, typically a series of wells strategically placed throughout the landfill, which gathers the gas being produced within the landfill;
- The gas processing system and engine/generator set, which cleans the gas and converts it into electricity; and

[10] http://www.marketwatch.com/news/story/First-Commercial-Hydrokinetic-Power-Project/story.aspx?guid=%7B0107E465-4D2F-485A-B507-44D37FC4F7C3%7D

- The interconnection equipment, which delivers the electricity from the project to the final use.

Impacts. Environmental impacts refer to the effects the alternative is expected to have on the environment. The potential environmental impacts associated with renewable resource technologies can be highly variable depending on the technology and may include air emissions, effects on land, water consumption, wastewater generation, noise, aesthetics, and traffic.

Wind turbine generation has many environmental advantages over fossil fuels because there are no air emissions nor solids or water discharges associated with operating the turbines. Turbines may encounter some siting opposition with regard to noise and aesthetics. In many cases, the original use of the land (i.e., agriculture) can continue in the presence of the turbine installation with less than 5 percent of the original land area taken out of production.

Solar power generation has many environmental advantages over fossil fuels because there is no air emissions or solids discharges associated with operating the systems. Trough/gas hybrid systems do utilize a steam loop, which requires process and cooling water, some water treatment and some wastewater discharge (blowdown).

Waste streams from a Biomass fueled furnace include stack gases, bottom ash, and boiler water blowdown. Bottom ash produced in many biomass combustion plants is often of a quality that can be sold, or used as a soil conditioner/fertilizer due to the lack of many trace metals, which often contaminate coal ash. Boiler blowdown, along with other process wastewater streams, will typically be treated to remove solids, oils, and grease prior to discharge. Cooling water used to condense the steam exhausted from the turbine would most likely be cooled using a direct-contact cooling tower. The use of a cooling tower represents a significant consumption of water.

The stack gases will contain particulate matter as well as gaseous pollutants – depending upon the fuel source used. If a thermal drier with auxiliary firing is used, the drying step will increase energy use and environmental emissions. Typically, stack gases will pass through an air pollution control device where particulate matter is removed. A large new boiler will likely be required to also address the control of NOx and CO emissions.

Biomass-fired plants typically operate in a range of 20 – 30 percent efficiency. Biomass power production is affected by a greater variability in biomass fuel quality than is coal-fired power production. Variability in moisture and ash content are characteristic of a diverse fuel source and leads to variability in heat value on a mass basis. The direct environmental impacts of biomass burning are similar to those for coal combustion and include air emissions, solid waste (ash) generation, waste heat discharge to air and water, and truck and/or rail traffic.

A biomass plant utilizing a closed-loop biomass fuel, such as switchgrass or hybrid poplar trees, would have less environmental impact per unit of energy produced with regard to CO_2 emissions because the uptake of CO_2 during the growth of fuel feedstocks would offset CO_2 emissions from the plant when the fuel was burned.

Hydropower projects are not typically associated with air emissions, water discharges or the solid waste disposal issues associated with solid fuel-fired power production; however, hydropower may involve other significant environmental impacts such as altered river basin hydrology, fish mortality, fish migration interference, decrease in water quality, and flooding of land.

Landfill gas projects are expected to be a net benefit to the environment by reducing the amount of LFG emissions to the atmosphere; however, some of the landfill emission reductions are offset by the combustion emissions such as NOx and CO from the combustion equipment. LFG collection systems (i.e., the well networks) are not totally efficient, and combined with the inherent inefficiencies of combustion equipment, the overall energy efficiency of an LFG system generally less than 30 percent.

Feasibility and Applicability. Applicability of a technology refers to the technology's appropriateness for the Applicant's stated purpose and need, including operational mode. One of the objectives of the PINGP project is to provide energy and capacity for base load service (i.e., operational mode). Base load resources normally operate in the range of 50 percent to 100 percent annual capacity factor, with typical capacity factors of newer base load resources being in the range of 80 percent to 90 percent. Base load resources generally have few starts per year (<10) and may be operated at reduced output levels to follow system load during off-peak periods.

Wind turbines can help meet overall system energy needs, but offer inadequate dispatch flexibility to support intermediate or peaking load needs. Wind generation can help meet base load energy needs, but cannot meet the capacity component of base load needs on its own; it must be coupled with other technologies or resources.

Utilization of taller wind turbine towers and the ever-greater geographic diversity of wind resources in the region can reduce the intermittency of wind generation on a system-wide basis and, thus, offer a correspondingly greater capacity contribution to base load capacity needs. However, there are limitations to the benefits these techniques can provide.

Wind turbines are generally expected to have a high availability, but actual availability is dependent on the quality of wind resources of the geographic location in which the resource is located. Even when wind energy is present, wind turbines can only generate power within an optimum range of wind speeds.

A wind turbine installation cannot have an objective of providing a guaranteed performance from the perspective of the utility customer. At best, wind-generated power can replace a percentage of base load generation during periods of low to moderately high wind conditions and subsequently conserve fossil fuels.

The total costs associated with wind vary according to market conditions. Two important factors are the availability of the production tax credit and supply conditions for wind turbines. Permitting and construction for large wind turbine installations can be completed in as little as 12 to 24 months. However, transmission upgrades necessary to accommodate energy production from wind turbines may take as long to implement as transmission upgrades for other base load options, particularly in areas where significant wind generation development has already occurred (i.e., Buffalo Ridge) or where little or no transmission infrastructure currently exists.

The applicability for solar generation to meet capacity needs is defined primarily by problems with reliability. Solar power systems generally represent less capacity than a wind turbine installation and, combined with a dependence on quality insolation rates, cannot meet intermediate load and peaking service needs. Siting of a large solar power plant is also predicated on locating candidate areas that have the solar energy data that would support the project economics.

Solar generating facilities are generally expected to have a high availability, but actual availability is dependent on the quality of solar resources of the geographic location in which the resource is located. A solar power installation cannot meet an objective of providing a guaranteed performance to the end user of generated power. The hybrid design of some solar plants, utilizing natural gas during periods of poor solar intensity, may enable the facility to maintain a capacity rating.

The total capital requirement for either a photovoltaic power plant or a trough/gas hybrid plant continues to be significantly higher than for other resources, making it cost prohibitive for large-scale applications.

A biomass facility may serve as an intermediate load unit; however, biomass-fired power boilers are best suited for base load (steady, high-capacity) duty. Boiler-based biomass-fueled plants are not well suited to operate as peaking plants because of the long lead time (a day or more) necessary to bring a solid fuel-fired plant on-line at full capacity. The forest products and agriculture industries in Minnesota and the Midwest offer a wide and expanding variety of biomass fuels.

The net availability of biomass-fired units is expected to be reasonably high, potentially 85 percent. A biomass-fired plant can generally demonstrate high reliability (both the adequacy and security aspects) for base load and intermediate load service if an adequate supply of fuel is available. Overcoming the logistical and economic challenges of collecting enough fuel to support the operation of a biomass-fueled power plant at a nominal 85 percent capacity factor is a substantial undertaking. Competition for economic fuel feedstocks can be fierce, depending on the feedstock(s) in question and the location of the biomass-fueled plant. This has been especially true of forest product waste fuels and urban wood waste fuel feedstocks.

The total capital requirement for a biomass power plant is highly variable and size dependent. Higher capacity plants will generally be less expensive. Due to the variability, it is important to analyze specific proposals before making cost estimates.

Building a biomass-fired power plant is a major construction project with 12 to 24 months required for permitting and 24 to 36 months for construction. Transmission upgrades necessary to support such a project could take as long to implement as the transmission upgrades for other types of base load options. The relatively small size of biomass power plants (under 100 MW) could minimize the transmission upgrades implementation timeframe.

A 164 MW base load type biomass plant was determined to be a reasonable alternative to the Prairie Island power uprate project. Such a plant will have roughly the same capacity and energy characteristics, but lower expectations for reliability and availability due to technology and fuel supply considerations. The capital costs for a new biomass plant are expected to be similar to other base load type steam plants. This analysis assumed that a plant commissioned in 2013 would cost $3,182 per kW or $522 million. The fuel costs and operating characteristics were based on other existing plants and fuel forecasts.

Table 3-1 presents a cost comparison of the 164 MW biomass plant and the proposed PINGP EPU project. Xcel Energy's estimates put the present value of revenue requirements for a biomass facility at approximately **974** million dollars above that of the PINGP EPU. **Table 3-2** presents a comparison of the total system emissions for the 164 MW biomass plant and the proposed PINGP EPU project. Xcel Energy's estimates the additional tons air emissions from a biomas plant over the proposed EPU at 103,722 of NO_X, 4,701 of PM_{10}, 65,357,790 of CO_2, 21,551 of SO_2, 837 of VOCs and 18,498 of CO.

Hydroelectric plants are operated in several modes; plants with large water storage capability lend themselves well to peaking power production and hydroelectric plants are able to come on line much quicker than steam generating systems. Run-of-river plants are more likely to produce a more constant power output though that output is dependent on water levels and, in cold climates, ice conditions.

The U.S. Department of Energy's (DOE) Hydropower Program has estimated that there is additional hydropower in this region. While it is possible that some of the identified potential hydropower could be developed, decisions to do so would need to also consider that transmission systems may not exist in remote areas containing hydropower potential. Development of hydropower, and associated transmission systems, faces the scrutiny of a general environmental trend toward releasing water reservoirs where possible. Developing capacity of a hundred MW or more would require development of multiple existing and/or potential hydropower sites. Such an effort would take several years of environmental study and negotiation to acquire water use and land rights, and permits and licensing for dams and/or transmission lines. During periods of normal precipitation and ice-free conditions, the availability of established hydropower generation is typically very high.

The hydropower sector of power generation is well established with proven technologies installed as standard design. In mechanical terms, hydroelectric plants are highly reliable. Because hydropower depends on water flow, hydroelectric plants are susceptible to fluctuations in output as a function of weather patterns. Reliability can suffer during periods of drought or during periods of freezing conditions in northern climates. Weather-induced fluctuation in power output may be less pronounced than it is for wind or solar power; however, for long-term planning to meet projected demand, hydropower may be better suited to reliably provide peak load capacity.

The total capital requirement for a hypothetical hydropower power plant can be very high, although the all-in energy requirements are reasonable as compared to other alternatives. Most of the potential sites within the region have capability of less than 10 MW and economies of scale would not be realized. Annual operating expenses would likely be less than for a fuel-fired power plant because the hydropower energy source (pooled water) is not typically a purchased input. Building a hydroelectric power plant is a major construction project with a several-year time frame.

The nation's first ever, commercially-operational hydrokinetic power station is scheduled to come on-line in 2009 (City of Hastings, Minnesota). The City of Hastings is installing the project at its 4.4-megawatt hydropower plant on the Army Corps of Engineers' Lock & Dam No. 2. The power generated by the two hydrokinetic units, which each hold a nameplate capacity of 100 kilowatts (0.1 MW), will be placed on the electric power grid through Hastings' existing electrical infrastructure. Once the project is operational, extensive water quality, fish survival and avian studies will be performed.[11]

Landfill gas power generation projects are generally sited on large landfills and produce power in the range of kilowatts to a few megawatts. The driver for LFG power generation is the utilization of a fuel source that would otherwise be flared to avoid an explosion hazard and to avoid an emission source by producing saleable energy. A LFG plant could reasonably be viewed as an emission control technology. LFG does not exist at the levels needed to support large energy needs.

The availability of a LFG-fired generation system is expected to be high, similar to systems firing natural gas. However, the corrosive nature of landfill gas does introduce more potential for equipment problems. Because of the small-scale nature of most LFG plants, a LFG power installation project typically does not have an objective of providing a guaranteed performance from the perspective of the utility customer. Power output for LFG plants depends upon the LFG production rate that does not adjust to power demand. LFG-generated power can replace a percentage of base load generation and subsequently conserve fossil fuels.

The total capital requirement for developing a hypothetical LFG power plant is not very high and all-in costs are also quite competitive. However, the LFG volumes do not exist within one site

[11] http://www.theengineer.co.uk/Articles/309142/Hydrokinetic+power.htm

necessary to fuel a plant with a hundred MW or higher capacity. Most landfill sites will not support more than 10 MW of generation. Annual operating expenses may be less than for a typical fuel-fired power plant because the LFG is not typically a purchased input. However, some municipalities associated with landfills may require a royalty to be paid from energy sales.

3.4.3 DEVELOPING TECHNOLOGIES

Concerns about the adequacy of future generation, air quality and longer-term impacts of global warming have caused many industry participants, policy makers and the public to focus more on renewable and emerging technologies. As with wind power, the higher energy prices during the past few years have improved the commercial viability, stimulated R&D, and encouraged the rapid development of emerging technologies.

Fuel Cell. A fuel cell converts energy directly, without combustion, by combining hydrogen and oxygen electrochemically to produce water, electricity, and heat. Fueled with pure hydrogen, they produce no pollutant emissions. Even if fueled with natural gas as a source of hydrogen, emissions are orders of magnitude below those for conventional combustion generating equipment. The principle of operation of a typical fuel cell consists of the following processes:

- When hydrogen is fed into a fuel cell a catalyst on the anode converts hydrogen gas into negatively charged electrons (e^-) and positively charged ions (H^+).
- The electrons (e^-) flow through an external load to the cathode.
- The hydrogen ions (H^+) migrate through the electrolyte to the cathode where they combine with oxygen and the electrons (e^-) to produce water.

There are a variety of fuel cell designs (referring mainly to the electrolyte style) including solid oxide, alkaline, phosphoric acid, molten carbonate, and proton exchange membrane. The main components of a fuel cell system include:

- A porous anode (example materials are graphite, and nickel, chromium and zirconium alloys);
- An electrolyte (example phosphoric acid);
- A porous cathode (same materials as anode);
- Precious metal catalyst;
- Fuel reformer (to generate hydrogen from fossil fuel); and
- Power conditioner (to convert from DC to AC and to regulate power production in accordance with load).

Mircoturbines. Microturbines are a type of combustion turbine that is used for stationary energy generation applications. They are usually small units (common refrigerator size) with outputs that are very small, usually in the kilowatt range. Microturbines operate similar to a combustion turbine except on a much smaller scale. Generally, microturbines contain the following design features:

- Radial flow compressors;
- Low pressure ratios (single or possibly two stage compression);
- Minimal use of van or rotor cooling;
- Recuperation of exhaust heat for air preheating;
- Use of materials that are amenable to low cost production; and
- Very high rotational speeds on the primary output shaft (25,000 rpm or more).

Microturbines are capable of using many alternative/optional fuels including natural gas, diesel, ethanol, landfill gas, and other biomass-derived liquids and gases.

Energy Storage. The application of energy storage technologies is best suited to peaking power needs since it presumes that there is excess or underutilized generating capacity at some point during which energy can be stored and released at a later point in time. Energy storage technologies have long been considered as a means of leveling the load on existing generating plants, thus allowing them to operate closer to their peak efficiencies. Energy storage is not well suited for meeting base load energy needs and must be combined with other energy resources to address reliability issues. Types of energy storage systems include:

- battery energy storage systems (BESS);
- compressed air energy storage (CAES);
- pumped storage hydroelectric; and
- flywheel energy storage.

Impacts. Environmental impacts refer to the effects the alternative is expected to have on the environment.

Fuel cells can boast great potential for improving energy efficiency. Fuel cells generate significant quantities of waste heat that can be recovered in a cogeneration configuration. The proximity of fuel cells to the end user of generated power greatly reduces transmission losses. Fuel cell environmental impacts directly related to operating the cell are minimal. By eliminating the combustion step of fossil fuel utilization, air emissions are virtually eliminated relative to conventional fuel-fired power generation. Indirect impacts may arise if a preliminary fuel processing step (e.g., coal gasification) is utilized to provide fuel for a fuel cell.

Environmental impacts associated with mircoturbines in terms of energy efficiency show a distinct disadvantage versus natural gas combined-cycle and coal-fired plants. Direct environmental impacts of operating a natural gas combustion microturbine include air emissions and waste heat discharge. Microturbines have manufacturer listed NOx levels from 9 to 50 ppm (typical generator natural gas combustion sources range from 45-200 ppm NOx).

Values for efficiency of each storage system have not been identified here. A feature of all storage systems is that less energy will be extracted than was originally stored. The process of storage requires an energy expenditure that cannot be recovered. None of the four systems will directly release air pollutant emissions in significant amounts, nor will they directly discharge significant quantities of wastewater or noise; these impacts will depend on the sources of energy that is being stored Pumped storage hydro development will have impacts similar to any hydroelectric project development. Substantial areas of land and habitat may be lost due to hydro development.

Feasibility and Applicability. The feasibility and applicability of a technology refers to the technology's appropriateness for the Applicant's stated purpose and need, considering both economics and operational mode.

Fuel cell installations are viewed as an extended generation strategy and thus are typically sited adjoining the end user. Currently, fuel cell installations remain small, just a few megawatts. The fuels potentially used by fuel cell installations are widely available.

Power industry estimates for significant fuel cell technology implementation range from 5 to 10 years. As design improves with experience, fuel cells will provide high availability. Fuel cells have demonstrated high reliability in pilot installation settings. Current manufacturing capacity of fuel cells is not yet established to the point where fuel cell installations are expected to address significant demand.

The total capital requirement for developing a hypothetical fuel cell power plant is estimated to be prohibitively high. The size of fuel cell installations would require hundreds of fuel cell sites to provide capabilities in the range of a hundred MW or more.

Microturbines are well suited to meet intermediate, base load, peaking, or co-generation load needs. High kW output needs may not be feasible because existing power conditioning equipment does not allow easy interconnection between microturbine systems.

Microturbines have relatively few moving parts and can operate continuously with little maintenance. Existing microturbine based power generation systems have demonstrated extremely high availability. Microturbine systems can generally demonstrate high reliability (both the adequacy and security aspects). Natural gas-fired systems typically do no have alternative fuel options for backup. A reliable natural gas or other primary fuel source is required to have a reliable system.

The total capital requirement for a microturbine power plant varies significantly, making it important to evaluate specific proposals before making economic conclusions. However, at this time large-scale implementation of this resource does not appear to be feasible.

Energy storage projects require an energy producer with excess or underutilized generating capacity to charge the storage system. Where this excess capacity exists, energy storage technologies are a means of leveling the load on existing generating plants thus allowing them to operate closer to their peak efficiencies. However, energy storage technologies do not meet intermediate or base load energy needs well.

By their nature, energy storage systems have high availability so that power may be readily extracted and used. These systems would typically back up less reliable parts of the overall electric supply system and are best suited for peaking power needs. Implementation times for the energy storage technologies would be variable due to the differences in issues between them. Small, disperse battery and flywheel systems could likely be installed within months, whereas CAES and pumped storage hydro facilities may require years of development effort likely involving contentious approval processes.

The capital costs for constructing an energy storage facility are variable and dependent on the technology selection. However, as noted previously, energy storage projects require an energy producer to charge the storage system. The costs for energy storage typically assume that underutilized energy production facilities exist. Operating costs are primarily dependent upon the operating costs associated with the original energy source.

None of the developing technologies pass the initial screening as being viable for current implementation to meet the purpose and need as stated for the PINGP project.

3.5 UP-GRADING EXISTING GENERATING FACILITIES

This alternative is a consideration of whether Xcel Energy could upgrade one of its existing generating facilities to provide the additional electricity requested in the CON for the PINGP project. Indeed, Xcel Energy's proposal is essentially one to upgrade an existing facility – the Prairie Island Nuclear Generating Plant.

Combined Heat and Power at PINGP

The waste heat that is generated from the PINGP comes in the form of circulating water that has been warmed by 27 degrees Fahrenheit (when the plant is operating at 100% power) over the temperature of the water within the plant's intake cooling canal as it enters the plant. Prior to condensing the plant's steam back to water, as much of the energy as practical has already been extracted from the steam to either produce electricity or preheat water before it goes back into the reactor or steam generators. At that point minimal heat value remains.

The factors to be considered in utilizing the waste heat contained in the plant's circulating water include finding a use for water that has been heated by 27 degrees, transporting the warmed water for its intended use without losing heat content in transport, and the energy consumed in moving the water to where its remaining heat can be used. To minimize heat loss during transport, Combined Heat and Power plants (CHP) are typically located in close proximity to the structures they will be heating. Close proximity also minimizes the amount of energy needed to move water. To maximize efficient use of waste heat, this effort is typically done as part of the initial design of both the power plant and facility to be heated. It is more difficult and usually less cost-effective to construct as an add-on.

By their nature, nuclear power plants have relatively large buffer areas around the plant's immediate perimeter for security purposes. The large required buffer area would not allow an industrial facility, which might utilize the waste heat, to be placed on the plant site. As a result in order to utilize the heat content of PINGP's circulating water, the water would need to be moved and returned via a relatively long distance as compared to other CHP facilities. This would require long runs of insulated pipe to transport circulated water without losing heat along the way. In addition because of the long distances, pumps would be sized larger and use more energy than other CHP facilities.

Use of waste heat from a nuclear facility would pose additional regulatory, security; monitoring and other issues even if the limited heat value and proximity issues and costs were overcome.

Black Dog

Xcel Energy is evaluating the repowering options of the Black Dog facility. The Preferred Plan in Xcel Energy's 2007 Resource Plan assumed an additional 300 MW at Black Dog. This has since been updated to 750 MW (but also eliminated a 600 MW natural gas combined cycle unit). Xcel Energy's analyses show a need for both additional megawatts from Black Dog (and/or other natural gas facilities) and the proposed EPU at the PINGP. The EPU is lower cost and reduces emissions compared to any of the generic natural gas fired alternatives or Black Dog options being considered.

The reference case used to evaluate the EPU at PINGP did not include any specific potential changes at Black Dog. The analysis was performed with generic alternatives that were available to be selected instead of the EPU. These generics cost more than the EPU and had higher emission levels. The most cost-effective generic alternative was a new natural gas combustion turbine combined with the additional use of existing resources. The EPU also cost less than either the 300 MW or 750 MW Black Dog configurations.

Impacts. It is difficult to determine the impacts of upgrading another facility without knowing what the facility is. The actual physical construction of an expansion to an existing facility could result in environmental effects. The potential environmental impacts of operating an expanded facility have been discussed to some extent in Xcel Energy's Certificate of Need Application through the discussion of the various alternatives that Xcel Energy considered.

Feasibility and Availability. Xcel Energy has identified and is also pursuing uprate/upgrade projects for its existing Monticello Nuclear Generating and Sherco generation plants and has incorporated estimates of these projects in their recently filed resource plan. Xcel Energy's next three largest plants King, Riverside, and High Bridge are all part of the Metro Emission Reduction Program (MERP) and are undergoing significant modifications to reduce their emissions and increase their electrical output. This leaves few opportunities for additional efficiency projects.

3.6 NEW TRANSMISSION

This alternative considers constructing new transmission facilities rather than new generation.

Impacts. The impacts associated with a transmission line depend to a large degree on the location of the line. Landowners whose property will be crossed by a new transmission line are often opposed to the project, particularly if the landowner perceives no personal benefit from the line.

Feasibility and Availability. Additions to or improvements in the electric transmission system are not viable alternatives to the PINGP power uprate proposal. The underlying assumption with this alternative is that additional transmission infrastructure would provide access to additional capacity resources. However, since the capacity construction boom of the late 90's there had been relatively little capacity built in the region. The result has been very tight capacity markets with little or no excess capacity available. Thus, no opportunities exist for new transmission to bring in additional capacity. Timing is also an issue for transmission as an alternative. The planning, permitting, and construction of transmission facilities is a multi-year process. It is unlikely that additional transmission could be planned, permitted and built to import additional energy by the 2013 in-service date.

3.7 DISTRIBUTED GENERATION

Distributed generation is usually considered to be small, modular, decentralized, grid-connected or off-grid energy systems located in or near the electric loads they serve. The term generally is used to refer to power plants that are small enough to be connected to distribution instead of transmission. Depending on the size of nearby loads and the capacity of the distribution line to which it is connected, the maximum size of distributed generation can vary from a few hundred kW to 5 MW.

The smallest DG units commercially available today can produce 30 kW.

Impacts. DG technologies range from emissions-free photovoltaic modules to combustion technologies that can emit much more smog-forming pollutants than the most efficient natural gas power plant technologies.[12] A substantial use of DG equipment in Minnesota could yield important benefits in overall electricity reliability, cost, and power quality. However, the air quality effects from a more widespread use of DG equipment are unknown.

[12] Bluestein, J. Environmental Benefits of Distributed Generation. Energy and Environmental Analysis, Inc. December 18, 2000

At present, most Minnesotans receive electricity from large central-station power plants that generate tens or hundreds of megawatts and distribute it through the supply grid. Recent advances in the development of DG equipment, however, have made it technologically feasible for businesses and individuals to generate their own electricity onsite. Moving from central generation units to local facilities would result in significantly different emissions profiles, with increased and widely dispersed emissions closer to the general population.

Currently, most combustion DG equipment is fueled by diesel, gasoline, or natural gas which emits varying degrees of pollutants such as nitrogen oxide (NO_X) and particulate matter (PM).

Nitrogen oxide emissions would certainly increase from a greater use of diesel generating units, triggering increases in secondary PM formation that could threaten compliance with the federal $PM_{2.5}$ standard or increase violations of the state PM_{10} standard. Widespread combustion DG implementation could also increase direct PM emissions. Increased NO_X emissions could also increase ambient ozone (smog). It is unknown whether a greater use of combustion DG would result in increased ambient ozone levels that would violate the federal 1-hour ambient air quality standard or the proposed 8-hour ozone standard.

Feasibility and Availability. Compared to large utility base load generating technologies, distributed generation technologies have higher capital costs, higher operating costs, or both. Thus there are relatively few applications or markets today in which DG is economically competitive on a pure base load energy basis. Instead, DG applications tend to fill some special requirement that justifies the additional cost. Most DG applications fall into either emergency generation or peaking/load shaving categories.

3.8 COMBINING WIND and NATURAL GAS TECHNOLOGIES

The Action Plan from Xcel Energy's 2007 Resource Plan, Docket Number E002/RP-07-1572, and subsequently updated via Reply Comments filed September 2008, includes a diverse mix of resources. A diverse resource allows Xcel Energy to reliably meet its customers' energy needs and the RES requirements, while also significantly reducing carbon emissions.

Xcel Energy's Action Plan already includes 2,600 MW of new wind generation, approximately 1,800 MW of new natural gas generation, and 1,880 MW of DSM savings (a 15 percent peak load reduction in 2022 and an energy reduction of 5,740 GWh).

Between 2010 and 2023, the bulk of new energy coming onto the Xcel Energy system is wind, followed by natural gas. The PINGP is base load and also helps to maintain system diversity. Replacing any of the energy that is provided by the EPU at PINGP with natural gas will lead to increased carbon emissions – impacting Xcel Energy's ability to meet the legislated carbon initiative. Additionally, the same individual challenges regarding cost and availability discussed previously would exist for a combined alternative.

4.0 HUMAN AND ENVIRONMENTAL IMPACTS

Under Minn. Rules part 7849.5300, subpart 6, the Environmental Impact Statement must include an analysis of the human and environmental impacts of the proposed project, and mitigative measures that could reasonably be implemented to eliminate or minimize these impacts.

This section contains site specific information on the human and environmental impacts of the proposed PINGP EPU project and mitigative measures taken to minimize these impacts. The impacts evaluated include those resulting from construction and implementation of the proposed project and include potential impacts of the proposed project on water resources, air quality, noise, vegetation, fish, wildlife, traffic, land use, socioeconomic factors, and cultural resources.

The Final Environmental Statement related to the Prairie Island Nuclear Generating Plant, dated May 1973 (United States Atomic Energy Commission) and the Prairie Island Nuclear Generating Plant License Renewal Application Units 1 and 2, Appendix E - Environmental Report dated April 2008, provide additional descriptions of the environmental setting in which the PINGP was built and is situated.

4.1 AIR QUALITY

The region surrounding the City of Red Wing is an “attainment area” that currently meets all federally allowed air concentration limits for criteria air pollutants. The EPU 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 EPU. No changes to the MPCA air permit are required due to the EPU. Gaseous radioactive effluents are discussed in Section 4.13.

4.2 BIOLOGICAL RESOURCES

Biological resources include the identification and assessment of the vegetation, wildlife and wetland resources in the project area and the impact of the project on those resources.

Aquatic Communities

The Upper Mississippi River near the PINGP 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 Redwing.

Although big river ecosystems show a high degree of natural variability and aquatic populations in these rivers can experience dramatic changes between years, fish populations in the area of

Prairie Island show a high degree of stability. Fish populations in the vicinity of Prairie Island today look remarkably like fish populations in the 1970s.

A relatively small number of native species (carp, planted in the Mississippi River in the 19th century, are the exception) has dominated collections for 35 years. All indications are that these populations are healthy, composed of fish in good condition, and are reproducing successfully year after year.

Mississippi River aquatic communities upstream of Lock and Dam No. 3 have been monitored since 1970 to determine if the operation of the PINGP was having an effect on distribution, abundance, and overall health of aquatic biota. Since the mid-1970s, fish have been the focus of biological monitoring and study.

The Minnesota Pollution Control Agency has listed the portion of the Mississippi River between the St. Croix and the Chippewa Rivers in Wisconsin as impaired waters (303d List) for 2006 for aquatic consumption, due to the presence of mercury and polynuclear chlorinated biphenyls (PCBs), and for aquatic life due to turbidity. **The current (2008) 303d List of Impaired Waters identifies these impairments, as well as an impairment for aquatic consumption due to Perfluorooctane Sulfonate (PFOS) in fish tissue**.[13]

Various agencies (DNR, MPCA and the Wisconsin DNR) have been directly involved with negotiations and consultations for the licensing, permitting, and general operation of the PINGP. A wealth of biological, physical, and water chemistry data has been gathered and reviewed by these agencies over the operating life of the PINGP. The required monitoring of the fish populations, upstream and downstream of the plant discharge, has been conducted to provide assurance that any impairment to aquatic biota of the river is avoided or reduced to the lowest practical level. The monitoring has demonstrated that the discharge resulting from past operation of the PINGP has not caused appreciable harm to aquatic organisms, and that the protection and propagation of a balanced, indigenous biota has been maintained.[14]

Impingement and Entrainment

Fish and other aquatic organisms can be killed or harmed when they are pulled into power plant cooling water intake systems. Section 316(b) of the Clean Water Act (CWA) requires the location, design, construction, and capacity of cooling water intake structures to reflect the best technology available for minimizing adverse environmental impacts.

The current PINGP NPDES permit already reflects major modifications in design and operation of the Cooling Water Intake Structure (CWIS) made in the early 1980s to minimize entrainment and impingement mortality and constitutes the current CWA Section 316(b) determination for the PINGP. In addition to the hardware changes to the CWIS structure, the

[13] http://www.pca.state.mn.us/water/tmdl/tmdl-303dlist.html
[14] Minnesota Department of Natural Resources Comment Letter on the PINGP Scope. October 7, 2008.

NPDES permit also imposes limits on plant withdrawal of cooling water over the April 15 to June 30 period:

April 15 – 30 97 million gallons per day (mgd) when river flow < 15,000 cubic feet per second (cfs)

April 15 – 30 194 mgd when river flow > 15,000 cfs

May 01 – 31 194 mgd

June 01 – 15 259 mgd

June 16 – 30 517.5 mgd

The design changes and flow/withdrawal restrictions in spring and early summer are intended to reduce both impingement and entrainment mortality. NPDES permit No. MN 0004006, Chapter 6, Section 4.1, contains specific requirements related to intake screen operation. The PINGP is allowed to operate with a 3/8-inch mesh screen from September 1 – March 31, but must employ fine mesh (0.5 mm) screens over the April 1 – August 31, period to minimize the mortality of fish and other organisms.

The EPU will not affect impingement and entrainment significantly. There is not expected to be any significant increases in the mortality of fish or other aquatic organisms above present levels due to the EPU. The EPU does not introduce any significant changes to the screen wash, service water, or circulating water flow requirements and does not involve any changes to the water appropriation requirements of the NPDES permit.

Themophilic Organisms and Pathhogens

The thermal plume is normally formed by the cooling tower discharge during spring, summer, and fall. During the winter, helper-cycle operation is typically used, subject to permit limitations on downstream river temperature and the need to deice intake screens and other associated equipment. Thus, the size and characteristics of the thermal plume vary over the course of the year, depending on the mode of operation of the circulating water system. The current NPDES permit limits act to minimize the size of the plume and resultant stress to aquatic biota when the ambient river temperatures are high.

Thermophilic bacteria generally occur at temperatures from 77°F to 176°F, with maximum growth at 122°F to 140°F. While water at the PINGP discharge temperatures could, in theory, allow limited survival of thermophilic microorganisms, these temperatures are well below the optimal for growth and reproduction of thermophilic microorganisms. The probability of the presence of thermophilic microorganisms due to plant operations is low.

During the early 1980s, PINGP identified the presence of the parasitic amoeba *Naegleria fowleri* at high population densities within the plant's circulating water system. In cooperation with the Minnesota Pollution Control Agency and Minnesota Department of Natural Resources, Prairie

Island conducted chlorination and subsequent dechlorination of the circulating water system in August 1980, September 1981, and August 1983. The chlorination processes were successful in controlling and reducing the populations of the organisms; however, the dechlorination process does impact the fish populations in the Mississippi River. Although the Minnesota Department of Health did not consider the presence of the organism to be a public health threat, it was recognized as an occupational health hazard and plant personnel were instructed to wear protective equipment when in contact with the circulating water system components. **Chlorination for the treatment of *Naegleria fowleri* was last conducted in 1985; sampling and testing for the organism was last conducted in 1992. The organism was not detected in any of the samples.**

The PINGP continues to periodically treat (chlorine/bromine) the circulating water system to control microbiological organisms and zebra mussels in accordance with the NPDES/SDS permit limits. Monitoring requirements for PINGP's discharge water incorporate TRO (total residual oxidane) which includes residual chlorine; the standard limitation for TRO is set to be protective of the aquatic environment.

Given the thermal characteristics at the PINGP discharge and the fact that Xcel Energy periodically chlorinates the circulating water system, it is not expected that a less than 3° F inlet temperature increase to result in any significant increase in harmful thermophylic organisms in the discharge canal. Under certain circumstances, these organisms might be present in limited numbers in the station's discharge, but would not be expected in concentrations high enough to pose a threat to recreational users of the Mississippi River.

Cold Shock

Cold shock is caused by an unplanned shutdown. The probability of an unplanned shutdown is independent of the EPU. The projected increase in discharge-canal-inlet temperature of less than 3°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 at the PINGP by the construction of a discharge structure at the end of the discharge canal and by the construction and operation of the intake screenhouse. The discharge structure and intake screens limit the number of fish in the discharge canal and reduce the impact of cold shock on aquatic species of the river.

In its comments on the EIS scope, the DNR expressed concern that the increased thermal loading during open cycle winter operation would contribute to the loss of fish life from cold shock. The DNR also noted that there have been at least nine cold shock events since 1985 that resulted in fish mortality. Due to this and the general concern over additional thermal loading to the Mississippi River, the DNR has requested that Xcel Energy consider the addition of expanded cooling tower capacity. Without this additional cooling capacity, the DNR will recommend to the MPCA that the historical level of environmental

monitoring be maintained as a condition of the PINGP's NPDES/SDS permit. The current NPDES/SDS permit expires in 2010.[15][16]

Terrestrial Communities

Approximately 240 acres of the Prairie Island site were disturbed and modified by plant construction activities in the early 1970s. Approximately 60 acres of the 240 disturbed acres support the generating facility and associated buildings, maintenance facilities, parking lots, and roads. After plant construction was completed, the remaining 180 acres of disturbed land were landscaped and today most of this is mowed grass or unmowed prairie-like grassland. The remainder of the site (approximately 338 acres) consists primarily of scattered wooded areas.

Wildlife species in the forested and the open grassy portions of the Prairie Island site are those typically found in similar habitats of southeastern Minnesota. Upland areas tend to be dominated by burr oak (*Quercus macrocarpa*), red oak (*Q. rubra*), bitternut hickory (*Carya cordiformis*), and Eastern red cedar (*Juniperus virginiana*). Common trees in lower areas along the Mississippi River, Sturgeon Lake, the Vermillion River, and river sloughs include silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), box elder (*Acer negundo*), river birch (*Betula nigra*), and willows (*Salix spp*.) The topography of the site is level to slightly rolling, and elevations range from about 690 to 700 feet above mean sea level (msl).

Rare and Unique Natural Resources

The proposed EPU will be limited to the existing plant footprint. Therefore, no incremental impacts to native plant communities or terrestrial organisms, including birds, are anticipated. The only impact to natural resources will be the off-site impact of the slight increase in the temperature of the cooling water discharged to the Mississippi River (up to 3^{o} F) primarily during the fall and winter, when "once through" cooling is used.

Minnesota DNR was contacted, by the applicant, to obtain records from the Natural Heritage Information System ("NHIS") database of known locations of sensitive species. The NHIS database includes known locations of endangered, threatened and special concern species, as well as occurrences of unique or uncommon plant communities and habitat types (**Appendix C**).

The species indicated in the October 2007 DNR response include birds, fish, mollusks, plants, and amphibians. All six species that are state-listed as endangered are mollusks; each of these species has been observed in the Mississippi River within one mile downstream of the plant. The Higgins' eye pearly-mussel (*Lampsilis higginsii*) is also listed as endangered at the federal level and the sheepnose (*Plethobasus cyphyus*) is a federal candidate species. The Higgins' eye

[15] DNR Correspondence to DOC, October 7, 2008.
[16] DNR Correspondence to DOC, May 8, 2009.

pearly-mussel has been observed both upstream (~0.3 miles) and downstream of the PINGP plant (just under one mile).

The sheepnose has been documented approximately one mile downstream of the plant. Of the remaining species, there are three state-threatened species – the paddlefish (*Polyodon spathula*), Blanding's turtle (*Emydoidea blandingii*) and the peregrine falcon (*Falco peregrinus*). The remaining species on the NHIS records for the area are special concern species.

Impacts to mollusks and other aquatic organisms would be related to changes in water quality, such as increases in thermal discharge from the plant into the Mississippi River. Water temperature can influence the timing of certain aspects of the mollusk life cycle, including the timing and length of release of the immature form of mollusks to attach to host fish species.
The slight increase in the temperature of cooling water discharge due to the EPU should not affect mollusk species or other aquatic organisms.

Prairie Island is located in the Mississippi flyway, a major route for migratory bird species. A variety of birds follow this route when migrating to and from their breeding or wintering grounds. State-threatened peregrine falcons (*Falco peregrinus*) have been observed nesting within the site since 1997. A nesting box was mounted to a ledge on the containment dome of the power plant in 2006. Bald eagles *(Haliaeetus leucocephalus)*, a state-listed species of special concern and previously listed as threatened at the federal level, have been observed in the vicinity of the Prairie Island plant. In addition, the original Prairie Island FES (AEC 1973) stated that trumpeter swans (*Cygnus buccinator*), which are state-listed as threatened, might migrate through the plant area. The MN DNR database shows this species in Dakota County and records maintained by the Minnesota Ornithologists' Union indicate that trumpeter swans are occasionally observed in Goodhue County (MOU 2006). The slight increase in discharge temperature to the Mississippi River in the area will not affect these bird species.

Higgins Eye pearly-mussel

Mussel surveys conducted by the Corps of Engineers in 1986, 1999, 2000, and 2003 did not reveal any Higgins' eye pearly-mussels in the area around Lock and Dam 3 (USACE 2006). However, this species has been cultured (reared in cages) and recently re-introduced into lower Pool 4 and both upper and lower Pool 3 (Sturgeon Lake) of the Mississippi River. The Sturgeon Lake relocation site, where 195 sub-adult *Lampsilis higginsii* were placed in 2003 and 1,400 more sub-adults were placed in 2005 (Mussel Coordination Team 2005), is approximately 0.5 mile up-river of the PINGP Intake Screenhouse.

The life cycle of *L. higginsii* is complicated, with sessile adults releasing planktonic larvae (known as glochidia) that are parasitic, attaching to the gills of fish. Glochidia develop on the gills of host fish for several weeks and drop off as juveniles, ultimately settling on suitable substrate and (if successful) growing into adults. In the genus *Lampsilis*, the mantle of the female grows into a ribbon-like appendage that resembles a minnow and is believed to have evolved to attract fish hosts. Females are known to expel glochidia in the presence of these fish, increasing the likelihood that they will attach to fish gills and survive. Sauger, walleye, yellow perch, largemouth bass, smallmouth bass, and freshwater drum all serve as hosts for Higgins eye glochidia. When glochidia are released into the water column in the absence of fish, survival is greatly reduced.

State (MN DNR) and federal (FWS and USACE) agency partners determined that the area 0.5 mile north of the PINGP intake was suitable area for the relocation of *L. higginsii*, notwithstanding the fact that it was a short distance upstream of the plant's intake. Sub-adult *higginsii* planted upstream of the PINGP intake screenhouse in 2003 reached adulthood (sexual maturity) in 2005 and are assumed to be releasing glochidia into Sturgeon Lake. It is conceivable that some larval *higginsii* will be carried downstream into the power plant's intake screenhouse. It should be noted, however, that mortality rate of early life stages of mussels is very high under the best of circumstances, and glochidia that do not attach to fish hosts soon after being released have a very low probability of survival.

The Mississippi Flyway

The Mississippi Flyway is a bird migration route that generally follows the Mississippi River in the United States and the Mackenzie River in Canada. The main endpoints of the flyway include central Canada and the region surrounding the Gulf of Mexico. Some birds even use this flyway to migrate from the Arctic Ocean to Patagonia.

Birds use this route along the Mississippi River typically because no mountains or ridges of hills block this path over its entire extent. Good sources of water, food, and cover exist over its entire length. About 40% of all North American migrating waterfowl and shorebirds use this route as well as many birds of prey. The longest migration route of any in the Western Hemisphere lies in this flyway. Its northern terminus is on the Arctic coast of Alaska and its southern end in Patagonia. During the spring migration some shorebirds travel the full length of the flyway and several species that breed north in Yukon and Alaska cover the larger part of it twice each year. This route is used by large numbers of ducks, geese, shorebirds, blackbirds, sparrows, warblers, thrushes, hawks, owls, and eagles.

4.3 CULTURE, ARCHEOLOGICAL and HISTORIC RESOURCES

In September and October of 2007, The 106 Group Ltd. (106 Group) conducted a cultural resources assessment of the PINGP.[17] The assessment was conducted under contract with the Nuclear Management Company (NRC), which was preparing an application to renew PINGP's federal nuclear power plant operating license.

The methodology utilized by the 106 Group for the Archaeology Study included an extensive review of the collected site files, reports, and other literature to aid in determining the areas of

[17] Cultural Resources Assessment for the Prairie Island Nuclear Generating Plant in Goodhue County, Minnesota. The 106 Group Project No. 07-32. January 2008.

previous disturbance within the study area and assess archaeological sites potential. Additional documentary sources were consulted, including aerial photographs, historical plat maps, General Land Office survey maps, and USGS topographic maps. The original 1853 land survey map was also reviewed.

In addition to the resources above, the architectural history investigation included background research at the SHPO to identify recorded architectural history properties or surveys within the study area. No site visits were undertaken.

The study area for the Cultural Resources Assessment included the entire area within the boundaries of the PINGP plant and grounds. A railroad line running diagonally from northwest to southeast through the study area is not part of the PINGP property and, thus, splits the study area into two sections (**Figure 4-1**).

The PINGP is located on Prairie Island, near the city of Red Wing, a region that is extremely rich in pre-contact Mississippian Period archaeological resources. Eight pre-contact villages and hundreds of mounds have been recorded at the confluence of the Cannon and Mississippi Rivers. Other sites date to the Woodland Period, earlier than the Mississippian tradition. Prairie Island was also the site of at least one French fur trading post during the contact period. Historically, Prairie Island has been the reservation home for the Mdewakanton Dakota since 1889. In the late 1960s, Northern States Power (NSP) purchased a portion of the island to construct their nuclear energy facility.

Information gathered from the cultural resources assessment is shown on **Table 4-1 and Figure 4-2**. There are six National Register historic sites located within five miles of the PINGP: five of the historical sites are in Goodhue County, Minnesota and one is in Pierce County, Wisconsin (**Table 4-2 and Figure 4-3**).

The proposed EPU will be limited to the footprint of the existing buildings, thus no impacts to archaeological artifacts are anticipated as a result of the EPU project. Xcel Energy will follow standard procedures during implementation of the EPU to avoid potential impacts to artifacts that may have not yet been discovered on the site. To avoid impacts to potential archaeological artifacts during any construction projects on the site, Xcel Energy has developed a corporate procedure ("Excavation and Trenching Controls," number FP-IH-EXC-01) that protects cultural resources at all its plant sites. The procedure requires a review of any planned excavation (greater than 6 inches deep) to ensure the protection of archaeological and historical resources.

The Site Environmental Coordinator is responsible for determining if proposed land-disturbing activity will occur in the vicinity of a culturally significant site, and if so, consulting with the SHPO to mitigate potential impacts. The Site Environmental Coordinator is also responsible for evaluating any cultural artifacts inadvertently discovered during construction to determine if the material discovered has potential archaeological or historic significance and thus should be reported to the SHPO.

In accordance with the procedures, the discovery of cultural artifacts requires employees to stop work until the Site Environmental Coordinator has evaluated the situation. Work can resume only after the situation had been addressed, disposition of any material or artifacts has been documented, and the Site Environmental Coordinator agrees that culturally significant material is not at risk.

4.4 GEOLOGY and SOILS

The PINGP site occupies an outwash terrace formed on the Minnesota side of the Mississippi River. The site is located at an elevation of about 690 feet above mean sea level (msl), about 15 feet above the normal pool elevation of the river. The general area is nearly level, with a local relief ranging from about 675 feet above msl (along the river frontage) to about 700 feet above msl. There are a few scarps along the Mississippi River shoreline that have resulted from river scouring.

The type of bedrock beneath the area is predominantly composed of sedimentary rock of the St. Lawrence and Franconia Formations, both within the Upper Cambrian System. The St. Lawrence Formation is comprised of tan to gray, well-cemented, thin- to medium-bedded silty dolostone and siltstone. There are also thin shale beds. The dolostone in this formation contains variable amounts of clay, silt, sand and glauconite. Thin to medium beds of very fine grained sandstone are common, particularly in the upper 20 feet of the formation. This formation is typically about 40 to 50 feet in thickness.

The Franconia Formation is mostly comprised of glauconitic, feldspathic, very fine to fine-grained sandstone. There is also green and gray shale, and pink or tan, sandy, glauconitic dolostone. Intraclasts and burrow mottling are common in this formation. The Franconia Formation is generally coarser grained and more poorly cemented than the St. Lawrence Formation. This formation is typically about 165 to 175 feet in thickness. Three members of the Franconia Formation are recognized; these are the Reno Member, the Tomah member and the Birkmose member.

The Reno Member comprises the upper 90 to 100 feet of the Franconia Formation. It consists of very fine grained to fine-grained glauconitic sandstone interbedded with siltstone and shale.

The Tomah Member comprises the medial 40 feet of the Franconia Formation. It consists of interbedded, very fine-grained sandstone, siltstone and shale, with minor amounts of the mineral glauconite. This member is finer grained and has more shale than adjacent members.

The Birkmose Member comprises the basal 30 feet of the Franconia Formation. It consists of very fine grained to fine-grained sandstone, with abundant glauconite. Dolomite cement and sandy dolostone beds are common.

The depth to bedrock beneath the PINGP site is approximately 100 feet. Overlying the bedrock is sand and gravel of the Holocene and Pleistocene age Grey Cloud terrace. The Grey Cloud terrace is comprised of coarse, clean sand and gravel derived from the Mississippi valley train and reworked by the swift water of the River Warren, an ancient river formed by the meltwater of the combined ice lobes of the Minnesota and western Wisconsin glaciers.

The prevalent soil types at the PINGP are the Plainfield loamy sand and the Sparta loamy sand. The Plainfield loamy (PaB) sand is a nearly level to steep, excessively drained soil on benches and escarpments along major streams. This soil formed in sandy outwash. Permeability is rapid and water capacity is low in this soil, and the hazard of drought is severe with respect to crops. The hazard of erosion or soil blowing is moderate in areas without vegetative cover. This is the dominant soil mapped in the area, comprising the entire northern and central portions of the essentially inverted triangle-shaped PINGP site.

The Sparta loamy sand (SpA) is a nearly level, excessively drained soil on benches of major streams. This soil formed in sandy outwash. Slopes are smooth and decline in the direction of the escarpments adjacent to the flood plain. Permeability is very rapid and water capacity is low in this soil, and the hazard of drought is severe with respect to crops. The hazard of erosion or soil blowing is also severe in areas without vegetative cover. Some deep gullies occur along escarpments where surface runoff spills over. This soil is mapped in the southern part of the PINGP site.

The EPU will not impact the geologic or soil resources on the site.

4.5 HEALTH and SAFETY

This section identifies the potential impacts on public health and safety that could result from implementation of the proposed EPU. Public health and safety are not necessarily environmental factors, but it is important for public decision makers to consider how features of the proposed EPU may affect health and safety issues.

The EPU does not create any new or different sources of offsite radiological doses from PINGP 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. For further analysis of radiological impacts see Section 4.13 of this chapter and Chapter 2, Section 5.0.

Health Studies
See Section 4.13 for a discussion of public health studies.

Emergency Planning
See Section 4.13 for a discussion of emergency planning.

Electric and Magnetic Fields (EMF)

Voltage on any wire (conductor) produces an electric field in the area surrounding the wire. The electric field associated with high voltage transmission lines (HVTLs) extends from the energized conductors to other nearby objects, such as the ground, towers, vegetation, buildings, and vehicles. The electric field from a transmission line gets weaker with increasing distance from the transmission line. Nearby trees and building material also greatly reduce the strength of transmission line electric fields. The intensity of electric fields is related to the voltage of the transmission line.

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with HVTLs surrounds the conductor and decreases rapidly with increasing distance from the conductor.

The question of whether exposure to power frequency [60 Hertz (Hz)] magnetic fields can cause biological responses, or even health effects, has been the subject of considerable research for the past three decades. The most recent and exhaustive reviews of the health effects from power frequency fields conclude that the evidence of health risk is weak. The National Institute of Environmental Health Sciences (NIEHS) issued its final report, *NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields,* on June 15, 1999, following 6 years of intensive research. NIEHS concluded that there is little scientific evidence correlating extra low frequency electromagnetic field (EMF) exposures with health risk.

The Prairie Island Nuclear Plant currently has four existing 345kV electric power transmission lines. No additional lines are necessary to support the extended power uprate.

The average magnetic field strength from each of these lines, measured in milliGauss or mG, is 107 mG directly under the power line (based on 2008 peak flow). **An estimated 15 percent increase due to the power uprate would result in a reading of 123 mG.** This number reduces to 7 mG at 100 feet from the line, 2-3 mG at 200 feet and 1 mG at 300 feet. The average electric field strength from each of these lines, measured in kilovolts per meter or kV/m, is 5.8 kV/m directly under the power line. This number reduces to 0.16 kV/m at 100 feet from the line, 0.05 kV/m at 200 feet and 0.03 kV/m at 300 feet.

The earth contains natural electric and magnetic fields. Some levels of these fields are always present. Customers located 300 feet or more from the transmission lines only receive EMF levels consistent with naturally occurring levels of EMF.

The amount of electricity flowing in the transmission lines may increase following the EPU if and when there is an increase in demand for electrical power. If this does occur, there will be no change to the electric field strength (kV/m) but, the magnetic field strength (mG) will increase slightly. Based on an analysis of 2008 peak power flows, assuming the 164 MW increase from the EPU is spread evenly across the four 345 kV transmission lines, the average magnetic field strength directly under the lines would increase by approximately 15%.

Consumption of Local Plants and Animals

The MDH Radioactive Materials Unit, Indoor Environments and Radiation Section conduct annual environmental radioactivity monitoring in Minnesota.[18] Media sampled include milk, air, river water, groundwater, food crops and sediments. Monitoring allows the MDH to develop a database on radioactivity within the state.

The environmental monitoring program consists of:

- sample collection around the two nuclear power generating plants;
- measurement of gamma radiation near the nuclear power generating plants;
- surveying of spent fuel storage casks;
- radiochemical analysis of the samples by the MDH Public Health Laboratory and interpretation of the data; and
- estimation of doses from the nuclear power plants.

In 2006, no federal or state standards or guidelines were exceeded anywhere in the state, including near the nuclear power generating plants. Monitoring data can be accessed through the Minnesota Department of Health and Wisconsin Department of Health Services' web sites.[19, 20] See Section 4.13 for additional discussion of radiological monitoring programs.

Psychological Impacts Associated with Living Near a Nuclear Generating Plant

OES staff conducted a literary search in an effort to obtain information on the potential psychological impacts associated with living near a nuclear generator power plant.

The vast majority of articles dealt with post incident (i.e., Chernobyl, Three Mile Island, Diablo Canyon) surveys or studies. Other studies dealt with public opinions of the nuclear industry generically. Neither of these categories seemed appropriate to the proposed EPU.

Research which has focused on communities living in very close proximity to nuclear facilities, has found that proximity is associated with somewhat higher levels of support for nuclear power. A commonly voiced explanation is that acceptance of, or refusal to overtly criticize, nuclear power by those living close to an existing nuclear facility, stems from the perceived economic benefits it brings to a host community, in particular where a community is otherwise economically marginalized. However, even where support and acceptance is expressed, this can be highly qualified with a degree of underlying unease. For the reader interested in this topic, staff recommends a British study that looked at three communities (South Gloucestershire, Essex and Bridgwater) with nuclear power stations.[21]

[18] 2006 Environmental Radiation Data Report. Minnesota Department of Health, Radiation Control Unit.
[19] http://www.health.state.mn.us/divs/eh/radiation/monitor/pi/index.html
[20] http://dhs.wisconsin.gov/dph_beh/EnvMonitoring/EnvironmentalMonitoringNuclear.htm
[21] Pidgeon, N.F., Henwood, K.L., Parkhill, K.A., Venables, D. and Simmons, P. (2008) *Living with Nuclear Power in Britain: A Mixed Methods Study*. School of Psychology, Cardiff University.

Additionally, considering the comments received during the site permitting process for the Monticello Nuclear Generating Plant uprate (PUC Docket Number E002/GS-07-1567) versus the public comments expressed during these proceedings, it would appear that assessing the potential psychological impacts of a given facility on its host community would be very specific to each community. To adequately assess this impact would require a level of detail (i.e., basic research) that is outside the scope of this environmental review.

4.6 LAND USE

The PINGP is on an approximately 560-acres site in Goodhue County, on the west bank of the Mississippi River, within the city limits of Red Wing, Minnesota. The city of Hastings is approximately 13 miles northwest (upstream) of the plant. Minneapolis is approximately 39 miles northwest and St. Paul is approximately 32 miles northwest of the plant.

The PINGP is located adjacent to the Prairie Island Indian Community Reservation. In 1936, the federal government officially recognized Prairie Island Indian Community (PIIC) as a reservation for the Mdewakanton, awarding them 534 acres. The Prairie Island Indian Community is a Federally Recognized Indian Tribe organized under the Indian Reorganization Act (25 USC 476). Currently, the reservation population is approximately 160, while the total enrollment of the tribal community is 486. The Tribal government employs about 100 members on a variety of service projects. The PIIC owns and operates Treasure Island Resort and Casino, employing about 1500 people. **The Tribe's land holdings have expanded in recent years and now total over 3,000 acres (land and water).**

The Treasure Island Resort and Casino includes a 250-room hotel and convention center that is currently being expanded to include an additional 230 rooms (Treasure Island Resort and Casino undated). The expansion includes a 24-lane bowling center and a multi-use event center with a maximum seating capacity of 2,800. Treasure Island Resort and Casino offers gaming, dining, live entertainment, a 95- space RV park, a 137-slip marina to accommodate visitors arriving by the Mississippi River, and sightseeing and dinner cruises on their river boat.

Goodhue County and the adjacent counties of Dakota and Pierce (in Wisconsin) remain predominantly rural but are rapidly developing. Principal crops include soybeans, corn, oats, hay, and some cannery crops.

Zoning/land Use

The Goodhue County covers approximately 499,369 acres of land. Existing land use in the County is as follows: agricultural land - 64 percent, deciduous forests - 20 percent, grassland - 10 percent, farmsteads and other rural developments - 2 percent, areas that are urbanized or industrialized -1 percent, wetlands - 1 percent, and other – 2 percent.

Goodhue County uses a comprehensive land use plan, and zoning and subdivision ordinances to guide development.[22] The ordinances promote the public health, safety, and general welfare of residents; protect agricultural land from urban sprawl; and provide a basis for orderly development. The ordinances require building permits, conditional use permits, plat development, zoning district controls, and variance requests. The County, however, has no formal growth control measures

Dakota County is located west of the PINGP site and covers approximately 371,200 acres. A very small portion of this County falls within five miles of the site. This area is classified as Vacant/Agricultural on the Dakota County Land Use and Cover map, State of Minnesota 1990.[23] This classification comprises 74% of Dakota County. This information was compiled by the Land Management Information Center and is the most recent Land Use data available for this county.

Pierce County covers approximately 378,240 acres, and is currently in the first phase (data collection) of developing a countywide comprehensive plan. Pierce County GIS contains a rudimentary land cover classification of field and non-field. Additional land use mapping is not planned at this time because of the nonexistent relationship between township zoning classifications and land use. Predominant land use within five miles of the PINGP are Agricultural, and water (Mississippi River). Until a comprehensive land use plan is complete, the County's municipalities through the use of local zoning and subdivision regulations guide land development activities.

None of the EPU-related activities represent any changes in land use or displace other land uses because the site is already developed for power generation.

Demographics

Population information was obtained from Census Bureau Topologically Integrated Geographic Encoding and Referencing system (TIGER) /Line File, Version 2000.[24] The 2000 TIGER/Line file uses town and city boundaries as of January 1, 2000. **Figure 4-4** presents this data for the permanent population within 50 miles of the PINGP by minor civil divisions. Each civil division is color coded by range of population. Based upon this information, the total permanent population within 50 miles of the PINGP is calculated to be 2,949,234. This estimate is slightly conservative since, where the 50-mile radius bisects a civil division; the entire population of the civil division has been included.

The PIIC, which is adjacent to the PINGP, has approximately 250 of the Tribe's 776 members residing within three miles of the PINGP.

[22] http://www.co.goodhue.mn.us/misc/files/CompPlan_2004.pdf
[23] http://www.lmic.state.mn.us/chouse/land_use_recent.html
[24] http://www.census.gov/geo/www/tiger/

Red Wing (approximately 3 miles southeast) is the nearest population center, with a 2000 population of 16,116.[25] Minneapolis (approximately 39 miles northwest), St. Paul (approximately 32 miles northwest), and Rochester (approximately 50 miles southeast) are the largest population centers within the 50-mile radius, with 2000 populations of 382,618, 287,151, and 85,806, respectively (USCB 2000).

From 1990 to 2000, the population of the Red Wing increased from **15,134 to 16,116**, an increase of 8.4 percent. The population of the Minneapolis-St. Paul-St. Cloud, MN-WI CSA increased from 2,809,713 to 3,271,888, an increase of 16.4 percent.[26]

Because approximately 83 percent of employees at the PINGP reside in Goodhue and Dakota Counties, MN and Pierce County, WI, they are the counties with the greatest potential to be economically affected by the EPU.

Over the last couple of decades, all three counties and both states have experienced positive growth rates and are projected to continue to grow. By far, Dakota County experienced the greatest growth from 1980 to 2000. While Dakota County's growth rates are somewhat larger than those of the other counties and states, Minnesota demographers project that growth to slow as 2030 approaches.

The License Renewal Application Environmental Report prepared by Nuclear Management Company, LLC (NMC) provides detailed information on demographic characteristics within 50 miles of the site.

The footprint of the PINGP will not change and the EPU will not affect nearby infrastructure; there will be no displacement of nearby residents or business.

Recreational

There are no National Parks, Monuments, Landmarks, Wilderness Areas, Forests, Trails or Water Fowl Production Areas within five miles of the site. There are no Minnesota State Parks, Wayside Parks, Recreational Areas, State Trails, Zoos, or trout lakes or streams located within five miles of the PINGP. The portion of the Mississippi that passes by the Prairie Island Generating Station is not federally designated as wild and scenic.

There are no State Critical Areas within five miles of the PINGP. The Mississippi River Critical Area Corridor extends southward to the border of Dakota and Goodhue Counties, but is approximately 5.5 miles from the PINGP at its closest point. The Mississippi National River and Recreation Area (MNRRA), a unit of the National Park Service, has been designated as a State Critical Area. The boundaries of the Mississippi River Critical Area Corridor and that of MNRRA are the same.

[25] http://www.lmic.state.mn.us/datanetweb/php/census2000/2000Glance.php
[26] Ibid

There are no Wisconsin State Parks, Wayside Parks, Recreational Areas, State Trails, Zoos, or trout lakes or streams located within five miles of the PINGP.

There are federally-owned recreational areas, wildlife refuges, State Wild and Scenic Rivers, State Forest, State Scientific and Natural Areas, State Wildlife Management Areas, and County/local Parks within 6 miles (**Figure 4-5 and Figure 4-6**) of the PINGP.

The Cannon River from Faribault, Rice County to its confluence with the Mississippi River just north of Red Wing, was added to Minnesota's Wild and Scenic Rivers Program in 1980. The mouth of the Cannon River at the Mississippi River, the nearest the Cannon River is to the PINGP, is located in a large wetland complex known as the Rice Lake Bottoms, approximately 2.7 miles south of the site. The purpose of the State Wild and Scenic Rivers Act (Minn. Stat. § 103F.301 et seq.) is to preserve and protect the outstanding Minnesota rivers and their adjacent lands. The Act's intent is not to restore pre-settlement conditions, but rather to prevent intensive development and recreational overuse from damaging these rivers. The legal extent of lands covered by the program is a maximum of 320 acres per each river mile on both sides of the river. All state, local, and special governmental units (councils, commissions, boards, districts, agencies, etc.), and all other authorities must exercise their powers to further the purpose of the act and adopted management plans. Since the Cannon River does not pass directly by the site, management plans associated with this river do not affect the PINGP.

The Cannon River has been designated as a Minnesota Wild and Scenic River because of its outstanding scenic and recreational value. The portion of the river within five miles of the site is considered to be "scenic." The scenic designation is attributed to those rivers that exist in a free-flowing state and where adjacent land is largely undeveloped. Regulations, which are generally more restrictive than shore-land rules, have been established to protect the river in its present condition. In addition, the Cannon Valley offers a diversity of recreational opportunities to area residents. Biking, camping, hunting, and fishing attract thousands of people each year. As described in the Red Wing Comprehensive Plan, the city recognizes the importance of maintaining the Cannon Bottoms in its natural state.

The Richard J Dorer Memorial Hardwood State Forest surrounds the PINGP. According to the DNR, state forest campgrounds have evolved from traditional camping areas within working forests.[27] They provide access to many self-directed activities in forested areas. Unlike state parks, forest campgrounds do not have resident managers, organized nature programs, or modern facilities such as showers and flush toilets. They are semi-modern areas, designed to furnish the basic needs and provide opportunities for recreationists to pursue a variety of unstructured outdoor activities. Campgrounds are patrolled regularly to provide security and service to visitors. While camping is allowed throughout state forests, there are no designated state forest campgrounds near the Prairie Island site. All designated campgrounds in the forest are south and southeast of the PINGP site.

[27] http://www.dnr.state.mn.us/state_forests/sft00033/index.html

Only 45,000 acres of the nearly 2 million acres of this state forest are owned by the state of Minnesota. The use of mountain bikes, horses, OTVs and ATVs is restricted to designated trails only.

The DNR oversees the Scientific and Natural Areas (SNA) program which serves to preserve natural features and rare resources of exceptional scientific and educational value. SNAs are open to the public for nature observation and education, but are not meant for nor do they support intensive recreational activities. The DNR has identified three types of SNAs in the state of Minnesota: Prairie grasslands, deciduous woods, and coniferous forest. Within five miles of the PINGP, there are two SNAs that are designated as the deciduous woods type. These are described below:

- Cannon River Turtle Preserve – The Cannon River Turtle Preserve, created in 1985, is located along a significant reach of the lower Cannon River. The closest the Cannon River Turtle Preserve is to the Plant is its eastern limit in Harliss, Goodhue County, about 3.2 miles south of the Plant. This 909-acre area contains floodplain forest dominated by silver maple and cottonwood. The site supports habitat for the state-listed threatened wood turtle, which nests on the river's sand bars. This area is accessed by the Cannon Valley Bike trail.
- Spring Creek Prairie – The Spring Creek Prairie SNA is located approximately five miles south-southeast of the Plant. This 145-acre site consists of sandstone and limestone outcrops overlooking open, sandy draws where streams once cut their way down to the Mississippi. At the south edge of the SNA, a small maple-basswood community thrives with maiden-hair fern, hepatica, trillium, blood root, and other woodland species. The southwest-facing bluff gives rise to a bedrock bluff prairie as it climbs to a narrow ridge top. The silvery bladderpod, a state-endangered species, grows in one of its largest known populations.

Wildlife Management Areas (WMAs) are part of Minnesota's outdoor recreation system and are established to protect and enhance land and water bodies that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses. Much of the wildlife managers' work is directed toward protecting and enhancing wildlife habitat on WMA lands. For instance, prairie and grasslands are planted to provide prime nesting cover critical to waterfowl and pheasant production. Wetlands are restored and enhanced to benefit waterfowl and other wetland wildlife species. Within five miles of the PINGP, there are two WMAs; they are described below:

- Gore's Pool #3 – Gore's Pool #3 is located three miles north of the PINGP. This 6,449-acre site consists of flood plain marshes, forest and backwater marshes associated with the Mississippi and Vermillion Rivers. The purpose of this WMA is to preserve this natural resource and provide recreational opportunities (fishing and boating) in this unique environment, as well as provide habitat for waterfowl and furbearers. There are three boat launches located within the area and its vicinity. There is a designated

Migratory Waterfowl refuge at the southern end of the property, which is off limits to all recreational activities.

- Espen Island – Espen Island is located about 4.9 miles south of the PINGP. This 13-acre site is comprised of bottomland hardwood forest. The purpose of the area is primarily for forest wildlife species and riparian/riverine wildlife species. Wildlife viewing and hunting for small game and waterfowl are allowed in this area.

The state of Minnesota administers several canoe and boating rivers. Two of these are within five miles of the PINGP site and are described below

- **Cannon River -** The Cannon River has few rapids and several dams. Downed trees and logjams are hazards in high water. The river varies in width from 50 to 200 feet. Stream flow usually peaks in early April. Very heavy rains can cause the river to flood. From Faribault to its mouth, the Cannon falls 280 feet, an average of 4.8 feet per mile.

  Bounded by rolling hills, bluffs, farmland and woods in its upper reaches, the Cannon River enters a broad gorge below Cannon Falls, where it is flanked by bluffs up to 300 feet high.

- **Mississippi River (Hastings to the Iowa border) -** From Hastings, Minnesota to the Iowa border the river requires some paddling skills in order to avoid snags and downed trees, especially in the backwaters. Motorboats and barges often throw large waves that can "swamp" canoes. Because the river is so wide, the current can be deceptively swift.

  Spring runoff normally brings the river to its highest flow of the year. Though some stretches are fast and can be dangerous, others are restrained by dams and have little current. The water level in this stretch is always sufficient for canoeing, though winds can be strong.

  This segment of the river is towered on the right and left by spectacular bluffs. The main river channel will be along the east bank at times and along the west bank at other times. Extensive backwaters often extend to the bluffs on the side opposite the main channel.

The SNA Program is administered by the Wisconsin Department of Natural Resources' Bureau of Endangered Resources and advised by the Natural Areas Preservation Council. The purpose of SNAs is to protect outstanding examples of native natural communities, significant geological formations, and archaeological sites. They harbor natural features essentially unaltered by human-caused disturbances or that have substantially recovered from disturbance over time. SNAs also provide the refuges for rare plants and animals. More than 90% of the plants and 75% of the animals on Wisconsin's list of endangered and threatened species are protected on SNAs.

Public use of SNAs is two-fold: scientific research and compatible recreation. These areas are not appropriate for intensive recreation such as camping or mountain biking, but they can accommodate low-impact activities such as hiking, bird watching, and nature study. As such, many SNAs contain few or no amenities such as parking areas, restrooms, or maintained trails.

- Trenton Bluff Prairie (Area #136) – Trenton Bluff Prairie State Natural Area is located in Wisconsin just north of Hager City and roughly four miles from PINGP. This site is owned by the Wisconsin DNR and was established as a State Natural area in 1977. Trenton Bluff Prairie is comprised of two separate dry prairies situated on steep Mississippi River sandstone bluffs, which are capped by massive limestone cliffs and are some of the best examples of prairie remaining in the region.

  The western unit has two prairie openings separated by a wooded draw, while the steeper eastern portion contains open cliff which transitions to shrubby oak woods. The bluff summit rises some 300 feet above the flat, sandy river terrace below with vertical cliffs. Dominant grasses include Indian grass, little blue-stem, big blue-stem, side-oats grama, and needle grass. Near the far western edge of the area, several Great Plains species can be found: foothill bladder-pod prairie sage-wort, ground plum, plains muhly, and prairie larkspur. The state-threatened prairie thistle is also found here.

  The upper cliff area has numerous outcrop crevices that harbor several fern species including slender lip fern and smooth cliff brake. Animal species of concern that inhabit this area include the state-listed endangered peregrine falcon, bullsnake, hognose snake and two butterfly species – olive hairstreak and Reakert's blue.

There is one county designated park and recreational area within five miles of the PINGP. The A.P. Anderson County Park is located approximately 4.5 miles south of PINGP. There are no other known county operated resource areas located within five miles of the site. Goodhue and Pierce Counties maintain numerous boat launches and hiking, biking and snowmobiling trails within 5 miles of the PINGP. There are no county forests located within 5 miles of the PINGP.

The Red Wing Wildlife League manages and operates 2,800 acres of bottomland and floodplain just south of PINGP along the Mississippi River. As the largest landowner in Goodhue County, the League funds restoration and maintenance of its land through membership dues, charitable gambling, donations and usage fees. On its property the League supports hunting, fishing and an environmental learning center.

Red Wing has numerous community parks and playgrounds located within the city limits and along the river, however these are all located greater than five miles from PINGP. A portion of the Cannon Valley Trail is located within five miles of PINGP. This trail, which follows the Cannon River offers biking, hiking, in-line skating, skateboarding and cross-country skiing opportunities. As discussed previously, the Prairie Island Indian Reservation supports several recreational resources including a marina and camp ground.

The City of Red Wing, as part of its Comprehensive Plan published in 2006 has developed policies for the continued development and enhancement of parks, trails, open space and public art. These policies are focused on conserving and establishing a network of "Green Infrastructure" in order to improve quality of life for its citizens and provide wildlife habitat.

There are a number of playgrounds and ceremonial grounds located on Prairie Island as part of the PIIC.

Except for transportation of equipment and routine disposal of waste, the EPU construction, operation and maintenance activities will be confined to the inner-plant security fenced area. The EPU project will not affect the storage requirements for above- or below-ground tanks. Other lands located outside the inner security fence will not be modified or changed to support EPU activities.

4.7 NOISE

A sound level survey was conducted on November 15-16, 2006, to document the existing ambient sound levels at the closest residents to the plant. This data was used to assess the noise impact of the construction and operation of the spent fuel storage facility. The plant was operating during the ambient survey, but the cooling towers were not. The wind was mostly calm to 3.5 mph from the north, the temperature around 39^{o} F, with overcast skies and a 46 percent relative humdity.

The State of Minnesota has noise standards found in Minnesota Rule 7030.0040, Subp. 2. These rules limit the daytime L50 sound level to 60 dBA1. The L50 is the sound level exceeded 50 percent of the time.

Six noise measurement locations were used and are shown in **Figure 4-7**. The measured ambient sound level data are summarized in **Table 4-3**. As indicated in the table the daytime sound levels are mostly controlled by local traffic and trains. The highest sound levels were at Location #3 near the casino, which was in the 43-46 dBA range because of casino related traffic. The quietest levels were generally the more distant locations, such as #1 and #6, which were mostly in the 32-36 dBA range or about 10 dBA quieter than the levels near the casino. Locations #2 and #4 were in between, in the range of 40 dBA.

The power plant was only audible at Location #1, with what sounded like ventilation fan noise.

The power uprate will not result in any significant changes to the character, sources, or energy of noise generated at the PINGP. The majority of new equipment necessary to implement the EPU 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 EPU project. No significant increases in ambient noise levels are expected within the plant.

4.8 SOCIOECONOMICS

On a local economic level, the construction activities for the power uprate project are expected to occur primarily during refueling outages in 2012 for Unit-1 outage and 2015 for Unit 2 outage.

The size of the workforce during the two refueling outages when power uprate is implemented is not expected to change significantly from the size of the workforce during a normal refueling outage. In addition, the size of the PINGP's workforce during periods of normal operation will be the same before and after the power uprate.

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.

There is minimal to no impact from the EPU on the size of PINGP or the city of Red Wing's workforce during periods of normal operation. Because no changes to existing workforce are anticipated, no workers will be displaced by the EPU.

No impacts to public activities including recreation are anticipated because the EPU 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 EPU is not anticipated to result in additional traffic generated beyond normal levels currently experienced at PINGP during periods of power generation and refueling outages. Modifications to accomplish the EPU will be completed primarily during refueling outages and equipment deliveries for EPU will not involve deliveries that are materially different from those required during past refueling outages. Post EPU traffic patterns will not differ from levels currently experienced during normal operations.

Since the footprint of PINGP will not change and the EPU will not affect nearby infrastructure, there will be no displacement of nearby residents or business

4.9 TRANSPORTATION

The PINGP is served by a transportation system that includes US Highways, Minnesota State highways, county roads and local access roads. U.S Highway 61 is a two and four lane roadway which runs north/south from the Minneapolis/St. Paul Metropolitan area to the junction of

Minnesota State Routes 50 and 20 where it turns east to Red Wing and the Mississippi River. From US 61, County Road 19 and 18 provide direct access to the PINGP just north of Red Wing.

Route 61 continues south from Red Wing along the Mississippi to La Crosse, Wisconsin. US Highway 63 crosses the Mississippi River at Red Wing north to Hager City, Wisconsin. Route 63 continues north to Ellsworth and ends just south of Lake Superior. Wisconsin State Highway 35 follows the Mississippi River in the vicinity of the plant. Numerous county and local roads feed the major roadway system in both Minnesota and Wisconsin.

The Red Wing Municipal Airport is located approximately seven miles southeast of the PINGP. The Red Wing Regional Airport is located in Wisconsin, five miles East of Red Wing. The airport is currently completing a major expansion. The airport has a runway 5,010 feet long by 100 feet wide, with full night landing facilities. The airport is now an all-weather operation with state of the art Instrument Landing Systems. Minneapolis-St Paul International/World-Chamberlain Airport (MSP) is the closest international airport to PINGP and is approximately 50 miles northwest of the site.

The Federal Aviation Administration high and low altitude enroute charts were reviewed to determine if there are air traffic corridors within five miles of the site. The site is located approximately 3 miles southwest from low altitude VFR airway V2-97 and high altitude airway J36, both which run on a similar path. V2-97 is used for primarily private airplane flights between Minneapolis/St. Paul, MN and Red Wing, MN, Winona, MN, or La Crosse, WI. J36 is primarily used for commercial jet traffic between Minneapolis/St. Paul, MN and Chicago, IL.

Construction will be completed during planned refueling outages in 2012 and 2015 for Unit 1 and Unit 2 respectively. It is not expected that the number of workers at the PINGP will be significantly higher during the refueling outages when EPU is implemented than during non-power uprate refueling outages. There are approximately 500 additional workers on-site during a typical refueling outage. It is estimated the EPU construction will increase that by a few dozen more. Since the EPU project will only minimally increase the number of workers at the PINGP during the outages, the additional traffic generated is negligible. Power uprate equipment deliveries will involve similar types of equipment deliveries as have been made for past refueling outages. After the project has been implemented, the on-going operation of the plant will not require additional employees and traffic will not differ from current levels.

Traffic safety will not be degraded, because the EPU 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.

4.10 VISUAL IMPACTS and AESTHETICS

The EPU 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, resulting in a visible plume, the appearance of cooling tower in operation will not change as a result of the EPU.

4.11 WATER RESOURCES

This section identifies the potential impacts on water resources, including surface waters, groundwater, wetlands, and ice cover that could result from implementation of the proposed EPU.

SURFACE WATER

The PINGP uses surface water taken from the Mississippi River, under authorization granted through a DNR water appropriation permit, to cool and condense the steam leaving the turbine. The heat from the steam is transferred to circulating water flowing through the condenser tubes. Based on seasonal limitations, this heat is transferred to the environment either by the use of the cooling towers, discharged to the river, or a combination of both. These wastewater discharges are regulated by the MPCA through the NPDES/SDS permit (MPCA NPDES Permit Number MN0004006).

Figure 4-8 shows the location of the surface water intake and discharge structures.

Water Appropriation

Flow in the reach of the Mississippi adjacent to PINGP is controlled in part by the Army Corps of Engineers Lock and Dam 3, which creates a pool that, extends upstream to Lock and Dam 2, and also influences stream levels in the St. Croix River. The lock and dam was created by the Army Corps of Engineers as part of a flood control and navigation project. During the initial rise in pool level, Sturgeon Lake was created by the flooding of low lying areas in the floodplain adjacent to the Mississippi River.

At PINGP, the surface water withdrawal from the Mississippi River (Sturgeon Lake) occurred at an average rate of approximately 381,031 gallons per minute (gpm) (849 cfs) for the period from 2000 through 2005. PINGP's water withdrawal from the Mississippi River represents approximately 4.6 percent of the average river flow (18,380 cfs) and 11 percent of the lowest annual mean (7,656 cfs in 1977) at Prescott since completion of Lock and Dam 3. The rate of consumptive use at PINGP is 39 cfs. This value is the difference between PINGP's surface water withdrawal and the average annual blowdown rate discharged under the site's NPDES permit back to the river or the amount of water consumed by PINGP.[28]

[28] Applicant's Environmental Report – Operating License Renewal Stage Prairie Island Nuclear Generating Plant Nuclear Management Company, LLC. April 2008. Units 1 and 2 Docket Nos. 50-282 and 50-306 License Nos. DPR-42 and DPR-60

The 39 cfs represents approximately 5 percent of PINGP's average river withdrawal during the 2000 to 2005 period. This rate of consumptive use represents approximately 0.2 percent of the Mississippi River's annual average flow and approximately 0.5 percent of the lowest annual mean at Prescott. The storage capacity curve for this section of the river shows that the consumption of 39 cfs , (849 cfs – 810 cfs = 39 cfs) translates into a maximum local water elevation decrease of approximately 0.1 inch. Under normal circumstances, consumptive use of water at PINGP (evaporative losses from cooling towers) represent a small reduction in Mississippi River flow and an imperceptible (0.1 inch) reduction in stream level. A reduction in flow (or stream level) of this magnitude would have only small impacts on instream and riparian ecological communities.[29]

Based on a range of assumptions, the EPU will increase surface water appropriations by approximately 1300 acre ft/year or 10 percent. This increase is within the limits of the current surface water appropriation permit (DNR Water Appropriation Permit Number 690172).

Assuming that evaporative rate is proportional to the proposed power increase of about 10 percent, the EPU could potentially cause an increase in evaporation rate to about 43 cfs. The water loss of 43 cfs by evaporation is about 0.23 percent of the 18,380 cfs average Mississippi River flow and is approximately 1 percent of the lowest annual mean of 4,367 cfs. Based on this comparison, impacts caused by higher evaporative losses of 43 cfs from the Mississippi river are very small and will likely have insignificant impact on the Mississippi River flow.

Water Discharge: Temperature

The EPU project will slightly increase the temperature of the circulating water discharged to the Mississippi River (3°F maximum). Discharge temperatures will be maintained within current NPDES permit (MPCA NPDES Permit Number MN0004006) limits by increasing the use of cooling towers, which can operate in various modes or, if necessary, by derating the plant to meet permit requirements for water appropriations and thermal discharge. No physical modifications or operational changes are required for these systems to implement the EPU.

The PINGP can be operated in any one of three modes: open cycle (once-through flow, with no cooling towers in operation), helper cycle (once-through flow with cooling towers in operation), and closed cycle (recirculation of up to 95 percent of the cooling water flow). Operation of PINGP's circulating water system is governed by spring and fall "trigger points." The spring trigger point is the point in time that the daily average ambient river temperature increases to 43° Fahrenheit (F) or above for five consecutive days, or April 1, whichever occurs first. The fall trigger point is the point at which the daily average upstream ambient river temperature falls below 43° F for five consecutive days.

[29] Applicant's Environmental Report – Operating License Renewal Stage Prairie Island Nuclear Generating Plant Nuclear Management Company, LLC. April 2008. Units 1 and 2 Docket Nos. 50-282 and 50-306 License Nos. DPR-42 and DPR-60

In addition, from the spring trigger point to the fall trigger point, PINGP is required to operate the cooling towers as necessary to meet the following requirements:

1. The temperature of the receiving water immediately below Lock and Dam No. 3 cannot be raised by more than 5° F above ambient;
2. the cooling-water discharge can not exceed a daily average temperature of 86° F; and,
3. if the daily average ambient river temperature reaches 78° F for two consecutive days all cooling towers must be operated to the maximum extent practicable (NPDES Permit No. MN0004006).

From the fall trigger point through March 31, the temperature of the receiving water immediately below Lock and Dam No. 3 cannot be raised above 43° F for an extended period of time. If the receiving water temperature exceeds this limit for two consecutive days, Xcel Energy must notify the MPCA Commissioner and the MN DNR. The Commissioner may require Xcel Energy to operate the cooling towers or take alternative action to meet the 43° F criterion (NPDES/SDS Permit No. MN0004006).

The potential maximum 3°F increase in surface-water-discharge temperature due to the EPU would occur when the circulating cooling-water system is operated in open-cycle mode. Open-cycle mode is used primarily in the winter when cooling tower operation is not required to meet NPDES/SDS permit temperature requirements. In contrast, during closed-cycle and modified helper-cycle operation, the temperature of water entering the discharge canal is expected to increase by less than 0.5°F, due to increased heat removal in the cooling towers. Therefore, the temperature increase is lowest in summer and during periods of low river flow, when NPDES permit limits require cooling tower use.

The resultant increase in downstream river temperature in the modified helper-cycle mode is expected to be less than approximately 0.2° F, even under low river flow conditions. These increases will not result in any significant impacts to the environment.

As noted in Section 4.2-*Cold Shock*, the DNR has concerns regarding the additional thermal load to the Mississippi River and has requested that Xcel Energy consider the use of additional cooling tower capacity. The DNR's concerns are that the effects of the increased thermal discharge, acting in concert with changing summer climate regimes, might unsustainably increase the stress to sensitive aquatic organisms during periods of low stream flow with conditions of high temperatures and humidity. The DNR generally works through the MPCA's NPDES/SDS permit authority to recommend permit (operational) conditions; the PINGP's current NPDES/SDS permit expires in 2010. In the past, NPDES/SDS permit conditions have alleviated concerns with maintaining the appropriate winter chill period for egg maturation in certain fish (walleye/sauger) between the fall temperature trigger and March 31.[30, 31]

[30] DNR Correspondence to DOC, October 7, 2008.
[31] DNR Correspondence to DOC, May 8, 2009.

Water Discharge: Sedimentation

The water discharge volume at PINGP will not increase due to the EPU. Thus, the impact on sediment distribution will not increase from current operations.

There are no anticipated changes to the river intake flow limits for operation after the EPU is implemented. However, assuming the evaporative rate is proportional to the power increase, there will be an increase in the percentage of that intake flow that is diverted during cooling processes. This increase in use is primarily due to water lost to the atmosphere through evaporation of circulating water as the cooling towers cool it. The increased water use does not represent an increase in the amount of water discharged into the river.

Water Discharge: Water Quality

In addition to the limitations imposed on temperature discharges, the PINGP NPDES permit imposes water quality standards and monitoring/reporting requirements for each discharge.

Table 4-4 lists the surface water discharge streams.

Specific limits for each discharge are detailed in the NPDES permit; none of these limits will require modification to implement the EPU. The EPU will not introduce any new contaminants or pollutants to the existing surface water discharges.

Lake Pepin Ice Cover

The impact of the PINGP's operation on Lake Pepin's ice thickness is an issue that has been discussed for a number of years. DNR resource professionals at Lake City who are familiar with the Lake Pepin area have reported observing uncharacteristic periods of open water areas at the upstream end of Lake Pepin.[32]

Many long time residence of the area have reported changes in the ice conditions on Lake Pepin from the time when they were young (1940s and 1950s) to the current day. These changes are described as a thinning or weakening of the ice cover; reported observations from the 1940s and 1950s include: 1) MnDOT posting of a temporary road across the lake, 2) city snow plows crossing the lake and maintaining the road, 3) hundreds of ice houses on the lake, and 4) automobiles crossing the lake between Wisconsin and Minnesota for shopping and commuting.

Xcel Energy had taken ice thickness measurements on Lake Pepin for a number of years in accordance with Special Provision number 12 of the PINGP discharge permit (#80-5081).

The Special Provision number 12 data under-went an independent review by Dr. H. G. Stefan of the St. Anthony Falls Hydraulic Laboratory.[33] The study and report by H. G. Stefan analyzed

[32] DNR letter to OES, dated February 20, 2009.
[33] Stefan, HG. Residual Heat Input from the Mississippi River to Lake Pepin During the Winters of 1981/82 to 1985/86. St. Anthony Falls Hydraulic Laboratory. September 1987.

the heat input from the plant and attempted to identify any correlation between plant operations and ice thickness at Lake Pepin. The report did not identify any correlation and formed the basis for the Department of Natural Resources decision to allow Northern States Power Company (i.e., Xcel Energy) to end measurements of ice thickness at Lake Pepin.[34] While concluding that the ice thickness on Lake Pepin did not appear to response to large variations in residual heat input, Dr. Stefan did recommend further analysis to confirm that the warmer river inflow (heat input) formed an interflow passing through the lake at an intermediate depth, well below the ice cover.

In 1999 the Army Corp of Engineers resumed measuring ice thickness at Lake Pepin for the purpose of predicting when ice out in Lake Pepin would occur such that barge traffic on the river might resume.[35]

Table 4-5 shows the average river flow rate at Lock and Dam No. 3 for the three month period from January through March; the thickness of ice at Lake Pepin (mile marker 770) when the thickest ice measurement was taken; and when plant outages occurred (reducing heat input from plant operations to the river). There does not appear to be any correlation between ice thickness, river flow and plant operations.

There are four years shown on the table (2000, 2004, 2005 and 2006) when there was no winter refueling outages at the PINGP. No refueling outages would result in the most heat being inputted into the river for an extended period. If there were a direct correlation between plant operation and ice thickness, one would expect that should result in the thinnest ice occurring during years when there were no refueling outages. In two of the years (2000 and 2006) ice thickness was below average and in two years (2004 and 2005) ice thickness was above average.

The ice thickness in 2005 was the second thickest (25 inches) during the 10 year period. The ice was also 25 inches thick in 2003, a year in which there was a refueling outage on Unit 1 from mid-November to mid-December, 2002. The ice was 26 inches thick in 2008, a year in which there was a refueling outage on Unit 1 from mid-February to mid-March. These results (from 1999 to 2008) tend to support the earlier study (1981 to 1986) that ice thickness at Lake Pepin does not have any direct correlation to the PINGP operations and that ice thickness at Lake Pepin is a complex phenomenon impacted by meteorological conditions and river flow conditions below the ice.

Since the publication of the DEIS, the DNR remains concerned about the potential for operations at the PINGP to have an adverse impact on the formation of ice cover on Lake Pepin. The DNR states that the H.G. Stefan study did not contemplate a 10 percent increase in thermal loading. Additionally, the DNR believes that with the most upstream data points used in the study being five miles downstream from the head of Lake Pepin, the conclusions may not represent the conditions for the upper reaches of the lake. The DNR has requested that the Commission consider as a condition of any LEPGP Site Permit that

[34] Letter from MN DNR to NSP dated November 23, 1987
[35] http://www.mvp.usace.army.mil/navigation/default.asp?pageid=188

it issues, that the applicant be required to conduct additional studies to assess ice cover on the upper reaches of Lake Pepin.[36]

Flooding

According to the U.S. Army Corps of Engineers (COE), the 1965 flood was the highest on record and has a reoccurrence interval of 150 years. The peak stage at Lock and Dam Number 3 during this flood was 687.7 feet.

A study to determine the magnitude of the probable maximum flood was conducted for this area of the Mississippi River by Harza Engineering Company.[37] The probable maximum discharge was determined to be 910.300 cfs and to have a corresponding peak stage of 703.6 feet. The flood would result from meteorological conditions which could occur in the spring and could reach maximum river level in approximately 12 days. It was estimated that the flood stage would remain above 695 feet for 13 days. Wind generated waves would be of maximum height when the wind is from the east to west in the direction of the circulating water intake canal. With persistent wind speed of 45 mph there could be significant waves up to 1.8 feet; maximum highest wave is estimated up to 3.10 feet. Given these assumptions, the maximum water level could be as high as 706.7 feet.

The PINGP is designed such that all areas critical to nuclear safety are protected against the effects of the probable maximum flood and associated wave run-up; the main powerhouse, structure consisting of the reactor buildings, the auxiliary and fuel handling building, the turbine building, D5/D6 diesel generator building, and the pump section of the screen house structure are protected against the flood level of 704.1 feet. The base slabs of these structures have been designed to resist the full hydrostatic head of the probable maximum flood. The top of the substructure and/or superstructure flood walls are at 705.0 feet, and are designed to resist probable maximum flood. These structures are capable of withstanding the hydrostatic forces associated with the probable maximum flood and associated maximum wave run-up of 706.7 feet.[38]

The EPU will not change the elevation of any of these structures.

Wetlands

The National Wetland Inventory (NWI) maps of the following USGS quadrangles indicate numerous wetland systems within five miles of the PINGP site:

- Diamond Bluff East, WI-MN;
- Red Wing, MN-WI;
- Welch, MN; and
- Diamond Bluff West, WI-MN

[36] DNR Correspondence to DOC, May 8, 2009.
[37] Harza Engineering Company
[38] Prairie Island Updated Safety Analysis Report, Revision 29, Section 2.4.3.5.

The PINGP site is located on the Welch, MN quadrangle. There are no wetlands on the Prairie Island site that are designated as protected under Minnesota Statute 103G.005, subd. 15. Although wetland resources are located on the plant property. Essentially, wetlands within five miles of the PINGP are established within the floodplains of the major river systems: the Mississippi, the Cannon and the Vermillion Rivers all have well-established and often extensive wetlands associated within their respective corridors.

The EPU will not affect the hydrology or populations in these wetland habitats.

GROUNDWATER

PINGP is located on Prairie Island, an island terrace associated with the Mississippi River flood plain. The Mississippi River flood plain in this area is confined within a valley approximately three miles wide. Rocky bluffs and heavily forested slopes rise abruptly from both sides of the valley some 300 feet. The bluffs are deeply trenched by numerous streams emptying into the Mississippi River. The site is located on the western limb of the Red Wing anticline. The aquifers in the vicinity of the PINGP include the alluvial aquifer (water table) and the underlying bedrock (confined) aquifers. Generally, wells in the alluvial material in the vicinity of the site are less than 100 feet in depth.[39]

The Prairie Island alluvial aquifer receives recharge from and discharges to surface waters. The aquifer is also recharged through direct precipitation, flood waters, snowmelt, and from underlying aquifers. A USGS study performed in 1997 stated that the amount of water discharged to wells in the Prairie Island study area from the alluvial aquifer was less than one-third of the water that was discharged from the alluvial aquifer to surface waters or to the atmosphere.[40]

As discussed in Section 1.1.5, groundwater use at the PINGP is governed by a water appropriation permit issued by the DNR. Assuming a 10 percent increase in groundwater use applied to the maximum annual usage over the past five years of 61.6 million gallons in 2005, the projected maximum use would be approximately 68 million gallons or 129.4 gpm. The maximum 68 million gallons is still significantly less than the 355 million gallons per year permit limit. Thus, the EPU project will not affect compliance with the permit limits.

The Prairie Island Indian Community draws its groundwater for domestic uses through wells completed in the Mt. Simon-Hinckley aquifer, a confined sedimentary bedrock aquifer.

Impacts from Surface Water Use

The rate of surface consumptive use of water at PINGP is small compared to average monthly discharges at Lock and Dam 3, which ranged from 10,425 (January) to 39,562 cfs (May) in the 1995 to 2006 period. A consumptive loss of 39 cfs represents to 0.1 percent and 0.4 percent of

[39] Nuclear Management Company, LLC., Prairie Island Nuclear Generating Plant License Renewal Application, Appendix E - Environmental Report. April 2008.
[40] Ibid

the highest monthly and lowest monthly average flow at Lock and Dam 3. The average consumptive use relates to a decrease in pool level at Pool 3 of 0.1 inch. The loss of cooling water through evaporation has no significant effect on Mississippi River flows, pool level, or on the adjacent alluvial aquifer. In addition, most groundwater in the vicinity of PINGP is withdrawn from the deeper confined aquifer, not from the alluvium along the Mississippi River.

The impacts of withdrawing additional water from the Mississippi river due to the EPU on the alluvial aquifer would be small and mitigation measures would not be warranted.

Impacts on Nearby Groundwater Users

PINGP used an annual average of approximately 92 gpm of groundwater from 2000 through 2005. However, during 2005, PINGP pumped 118 gpm of groundwater.

In order to determine potential offsite impacts to wells, the 118 gpm well yield from 2005 was used to calculate drawdown as though it had been pumped from a single onsite well. Well number 256121 was used, due to its close proximity to the PINGP property boundary (approximately 1,800 feet) and its proximity to the closest off-site residence (approximately 2,100 feet). The well is also one of the site's primary production wells.[41]

Based on the conservative results of the modeling, pumping at a rate of 118 gpm in Well number 256121 would create a stabilized drawdown of 0.4 foot at a distance of 2,100 feet from the pumping well during the first 10 years of pumping. Based on the modeling performed, there would be no additional drawdown that would occur over the period of the current operating license (40 year period) or during the license renewal period (additional 20 years).

Based on the predicted conservative drawdown (0.4 foot) that would occur during the life of the current operating permit and the fact that no additional drawdown would occur during the license renewal period, the impacts to the aquifer system over the license renewal period would be small, not requiring mitigative measures, such as drilling wells deeper.

Degradation of Groundwater Quality

Xcel Energy monitors groundwater as part of a Radiological Environmental Monitoring Program. See Section 4.13 for a discussion of radiological monitoring and data.

4.12 WASTE MANAGEMENT and DISPOSAL

Non-Radioactive Solid Waste

Construction activities associated with the EPU generate non-radioactive solid wastes. The volume will be comparable to the waste generated during a typical refueling/maintenance outage. No ongoing non-radioactive solid wastes will be generated due to EPU.

[41] Nuclear Management Company, LLC., Prairie Island Nuclear Generating Plant License Renewal Application, Appendix E - Environmental Report. April 2008.

Radioactive Waste
See Section 4.13 for a discussion of radioactive wastes.

4.13 RADIOLOGICAL

Radiation is a public health concern associated with nuclear plant operations and spent fuel storage. It is subject to extensive monitoring, regulation, and incident management planning. This section discusses the radiation monitoring programs at the Prairie Island plant, including monitoring performed by Xcel Energy, the Minnesota Department of Health, and the Wisconsin Department of Health Services. Additionally it discusses emergency response plans. Potential radiological impacts from PINGP operations and the proposed power uprate are discussed in this section. Potential radiological impacts from ISFSI operations are discussed in Chapter 2, Section 5.

Background Radiation[42]
All life forms are exposed to radiation from natural and man-made sources. Natural sources of radiation include cosmic radiation and radiation from radionuclides in the Earth's crust. Cosmic radiation originates from the high energy particles of the sun or other stars interacting with the earth's upper atmosphere. As these high energy particles are absorbed through the earth's atmosphere, they become lower energy particles. Because of this shielding effect of the atmosphere, exposure to cosmic radiation is greater at higher elevations than it is at sea level. For instance, the exposure from cosmic radiation in Denver is typically twice as high as exposure at sea level.

Radionuclides in the Earth's crust have been present since the formation of the planet over four billion years ago. Radioactive decay of the shorter-lived isotopes left behind those radionuclides with very long half-lives of a hundred million years or more. These naturally-occurring isotopes include uranium and thorium along with their decay products such as radon. These elements produce internal exposure from radon gas and external gamma radiation exposure.

Natural sources of radiation account for approximately 82 percent of the radiation to which the public is exposed every year. Man-made sources account for about 18 percent. The most common man-made source of background radiation is medical procedures. Diagnostic x-rays and nuclear medicine procedures are used in more than half of all medical diagnoses.
The average American receives approximately 360 millirem (mrem) of radiation each year. Approximately 300 mrem come from natural sources: the sun's rays, rocks, soil, building materials, and other sources. The other 60 mrem come from human activities and consumer products such as medical/dental X-rays, television sets, and tobacco. Sources of background radiation exposure are summarized in **Table 4.6**.

[42] Adapted from the Prairie Island Nuclear Generating Plant, Certificates of Need Application, May 2008, Appendix E, Radiation Primer.

Man-made sources of radiation are regulated and monitored by federal and state agencies to minimize immediate and long-term public health effects.

Radiological Health Effects[43]

Radiological health effects result from the deposition of radiation energy with the human body. This energy causes cellular damage, which may or may not be able to be repaired by normal cellular repair mechanisms. Health effects can be roughly divided into two types: (1) deterministic, high-dose effects, and (2) stochastic, low-dose effects. High doses of radiation delivered in a short time period can kill cells or damage them such that they cannot repair themselves. Low doses of radiation affect cells, but may or may not damage them. That is the rate of cell repair may or may not be greater than the rate of damage caused by energy deposition. If cell damage does occur, health effects may also occur. The primary low-dose health effect of concern is cancer.

Data demonstrating the relationship between high levels of radiation and deterministic health effects is substantial. Many atomic bomb survivors and Chernobyl emergency responders demonstrated deterministic effects shortly after their exposures. From this data, biological responses can be estimated based on doses received. However, this is not the case for stochastic effects from low doses ($\leq$ 10 rem). Health effects due to low doses of radiation must be extrapolated from studies of exposure to high doses (or determined through epidemiological studies, discussed below). This extrapolation introduces uncertainty. For this reason, the study of long-term health effects is a stochastic (probabilistic) science. The risk of a health effect from a specific low-level dose is expressed as a probability. This probability reflects the uncertainty in the relationship between health risks and low doses of radiation.

The current best estimate of this relationship is that the relationship between dose and risk is linear, even at very low doses.[44,45] This is known as the linear non-threshold (LNT) model. This means holds there is no *de minimis* dose for which risks need not be considered; all doses present some level of risk. As the dose increases, the risk increases in a linear manner. For purposes of this document, a linear relationship between dose and risk (LNT model) is assumed and guides the discussion of potential radiological health effects.

The primary health risk for low level radiation doses is cancer. In this document, estimates of additional cancer diagnoses due to long-term, low-level radiation doses are calculated using a risk coefficient of 1 E-06 (i.e., 1 in a million) incident cancers per mrem received, the coefficient suggested by the National Academy of Sciences' BEIR VII report.[46] Estimates of additional cancer fatalities due to long-term low-level radiation doses are calculated using a risk coefficient

[43] Adapted from the Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix E, Radiation Primer.

[44] United Nations Scientific Committee on the Effects of Atomic Radiation. *Sources and Effects of Ionizing Radiation*. Volume II: Effects. UNSCEAR 2000 Report to the General Assembly, with Scientific Annexes. New York: United Nations; 2000.

[45] BEIR VII Phase 2: Health Risks from Exposure to Low Levels of Ionizing Radiation [hereafter BEIR VII], http://www.nap.edu/openbook.php?record_id=11340&page=R1

[46] Id.

of 5 E-07 fatal cancers per mrem received, the coefficient suggested by the National Council on Radiation Protection and Measurements (NCRP).[47] For purposes of discussion and comparison, estimated cancer incidence and fatality effects are compared to national cancer incidence and fatality data for lifetime cancer risk from all causes.[48]

Minnesota state policy regarding risks due to licensed activities utilizing radioactive materials is not provided as numeric guidance.[49] Rather, licensees must achieve doses to workers and the general public that are as low as reasonably achievable (ALARA).[50] However, Minnesota statutes do provide numeric guidance for other forms of carcinogenic risk, (e.g., chemicals in groundwater or air) to which Minnesota are involuntarily exposed.[51] The acceptable level for additional lifetime carcinogenic risk from contaminants in these mediums is 1 in 100,000 (1 E-05).[52] Though ALARA is the controlling state policy, for comparison purposes, estimated risks of cancer incidence will be expressed in this format (i.e., X in 100,000).

Health Risks for Population Subsets. The dose to risk coefficients suggested by the BEIR VII report and by the NCRP and used in this document to estimate health risks (cancer risks) are coefficients for the general public. They represent a sex and age distribution similar to that of the population of the United States. Thus, they are inclusive of the old and the young, men and women. However, it is known that subsets of the general population are at a relatively higher risk for cancer from radiological exposure. Women have a 5 – 50 percent higher risk for cancer incidence than men for a similar radiological exposure.[53] Children have approximately a 100 percent higher risk for cancer incidence than adults for a similar exposure.[54] Fetuses appear to have a higher risk for cancer incidence than adults for a similar exposure, but the risk coefficients are very uncertain.[55]

Estimates and discussion in this document of health risks report risks for the general public, averaged over all ages and both sexes. That is, text and figures report estimates based on the BEIR VII and NCRP risk estimates. Individual members within populations projected to receive a radiological dose may have a relatively higher (women, children) or lower (men, older persons) health risk.

[47] National Council on Radiation Protection and Measurements (NCRP, 1993), Report No. 115, [hereafter NRCP 115], http://www.ncrponline.org/Publications/115press.html
[48] SEER Stat Fact Sheet, http://seer.cancer.gov/statfacts/html/all.html; SEER Cancer Statistics Review, 1975-2005, http://seer.cancer.gov/csr/1975_2005/results_merged/topic_lifetime_risk.pdf. The average lifetime risk for American citizens of being diagnosed with cancer is 40.35%. The average lifetime risk of dying from cancer is 21.21%.
[49] Minn. Stat. § 4731.2010, Subp. 2.
[50] Id.
[51] Minn. Stat. § 4747.7100, Minn. Stat. § 4717.8000.
[52] Minn. Stat. § 4717.8000.
[53] NCRP 115, Section 6.6; BEIR VII, Chapter 12.
[54] NCRP 115, Section 6.6; BEIR VII, Chapter 12, Figures 12-1A, 12-1B.
[55] NCRP 115, Section 7.

Monitoring Programs

Radiological monitoring programs are required for the PINGP to ensure that controlled radioactive releases are within applicable standards and to provide emergency response information on uncontrolled releases should an incident occur at the plant. Monitoring programs for the PINGP are required at the federal level and at the state level. Xcel Energy is required under its NRC operating license and special nuclear materials license to monitor and ensure that plant operations meet applicable federal regulations. Public health agencies in the states of Minnesota and Wisconsin are required to monitor the Prairie Island plant to ensure compliance with applicable state standards, which typically coincide with federal standards.

Xcel Energy. The radiological monitoring program implemented by Xcel Energy has been developed in accordance with and is required by NRC regulations. The principal regulatory basis for requiring effluent and environmental monitoring at nuclear power plants is contained in 10 CFR 50, Appendix A. Appendix A requires that a licensee control, monitor, evaluate, document, and report all radiological effluents discharged into the environment. Power reactor licensees are required to keep the public dose from radioactive effluents as low as is reasonably achievable (10 CFR 50, Appendix I). Licensees must also conduct operations such that the total effective dose equivalent to individual members of the public from licensed operations does not exceed 100 mrem/yr (10 CFR 20).

To ensure compliance with NRC regulations, Xcel Energy is required to implement a radiological environmental monitoring program (REMP). The REMP provides for radioactive effluent controls and monitoring of the potential impact of radioactive effluents on the environment. The REMP requires sampling of various environmental exposure pathways which are then analyzed for the presence of specified radiological constituents. Several strategies are used to interpret monitoring results and distinguish potential radioactive impacts associated with the PINGP from background radiation levels. These strategies include an indicator – control program design, analysis for radionuclide proportions characteristic of fission products, and trend analysis. For example, most types of samples are collected both at indicator locations (nearby, downwind, or downstream) and at control locations (distant, upwind, or upstream). A plant effect would be indicated if the radiation level at an indicator location was significantly greater than that at the control location. The difference would have to be greater than that which could be accounted for by typical fluctuations in background radiation levels.

Sampling for the Prairie Island radiological environmental monitoring program is extensive with over 80 sampling locations near and around the Prairie Island plant.[56] To monitor the air environment, airborne particulates are collected on membrane filters by continuous pumping at five locations. Airborne iodine is collected by continuous pumping through charcoal filters at these same locations. Filters are changed and counted weekly. Particulate filters are analyzed

[56] 2007 Annual Radiological Environmental Monitoring (REMP) Report, Prairie Island Nuclear Generating Plants Units 1 and 2, May 2008, http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/prai1-2.html

for gross beta activity and charcoal filters for iodine-131. Quarterly composites of particulate filters from each location are determined by gamma spectroscopy.
Offsite ambient gamma radiation is monitored at 34 locations, using thermoluminescent dosimeters (TLDs): 10 in an inner ring in the general area of the site boundary, 15 in the outer ring within a 4-5 mile radius, eight at special interest locations, and one control location, 11.1 miles distant from the plant. They are replaced and measured quarterly. Ambient gamma radiation is monitored at the Prairie Island ISFSI with 20 TLDs. Twelve dosimeters are located inside the earthen berm in direct line of sight from the storage casks and eight dosimeters are located outside of the earthen berm. They are also replaced and measured quarterly.

Ingestion pathways are monitored through targeted food supply sampling. Milk samples are collected monthly from six local farms (five indicator and one control) and analyzed for iodine-131 and gamma-emitting isotopes. The milk is collected biweekly during the growing season (May – October) when animals are likely to be grazing on pasture. Green leafy vegetables (cabbage) are collected annually from an indicator and a control location and analyzed for gamma-emitting isotopes, including iodine-131. Corn is collected annually only if fields are irrigated with river water and is analyzed for gamma-emitting isotopes.

Water resources and the riparian environment are monitored by multiple sampling strategies. Well water and ground water are collected quarterly from four locations near the plant and analyzed for tritium and gamma emitting isotopes. River water is collected weekly at two locations, one upstream of the plant and one downstream. Monthly composites are analyzed for gamma-emitting isotopes. Quarterly composites are analyzed for tritium. Drinking water is collected weekly from the city of Red Wing well. Monthly composites are analyzed for beta, iodine-131, and gamma-emitting isotopes. Quarterly composites are analyzed for tritium. The aquatic environment is also monitored by semi-annual upstream and downstream collections of fish, invertebrates, and bottom sediments. Shoreline sediment is collected semi-annually from one location. All samples are analyzed for gamma-emitting isotopes.

Minnesota Department of Health. The Minnesota Department of Health (MDH) is charged with protecting, maintaining, and improving the health of Minnesotans (Minn. Stat. § 144.05). To this end, the Environmental Health Division, Radioactive Materials Unit conducts an environmental monitoring program focused on the State's two nuclear generating power plants (Monticello, Prairie Island). The program is designed to assess the nuclear generating plants' impact to the environment and the public over time. Data collected is used to determine compliance with appropriate NRC and EPA standards and to establish long-term trends. Trend analysis allows MDH to identify potential problems and, if necessary, initiate corrective actions. Annual environmental monitoring reports are generated and made available for public review.

Monitoring for radioactivity began in Minnesota in 1953 as a response to nuclear weapons testing. Monitoring was designed to determine the level of above ground nuclear testing fall-out within Minnesota. The monitoring program adapted to the construction of nuclear power plants in Minnesota with additional monitoring locations and sampling protocols. Over time, some collection points and types of samples have been discontinued (e.g., sampling shoreline sediment), while others have been added (e.g., pressurized ionization chambers to measure radiation levels at the Prairie Island ISFSI).

The primary components of the present MDH environmental monitoring program are sample collection, data analysis, and interpretation. Sample types and locations are selected based on potential exposure pathways and the likelihood of public health impacts. Potential exposure pathways for radioactivity include: inhalation, ingestion, uptake by deposition on crops or other foods, uptake by fish, and external exposure. Sample types are selected to represent the various potential exposure pathways. Samples that are currently collected around the PINGP include: air, surface water, well water, and milk. Ambient gamma radiation dose levels are monitored through the use of thermoluminescent dosimeters (TLDs).

In addition to these samples, since 1995, MDH has monitored the Prairie Island ISFSI with two pressurized ion chambers (PICs). The PICs constantly measure and report the levels of ambient gamma radiation around the ISFSI. They are designed to alert MDH immediately if radiation levels are exceeded. MDH staff receives reports twice daily indicating current radiation levels at the ISFSI. The monitoring system conveys alarm messages to MDH staff if the radiation levels are significantly high or if electronic reporting from the PICs is disrupted.

Sampling locations for MDH monitoring are shown in **Figures 4-9a and 4-9b**. MDH uses continuous air monitoring from an air sampler located near Lock & Dam #3 to determine the level of airborne radioactivity that could impact the public through inhalation. The location at Lock & Dam #3 was selected based on the predominant wind direction around the plant as the area most likely to receive the largest particulate count. Particulate filters and cartridges are collected every other week and analyzed for radioactive material in the air.

In the event of a radioactive release to the air or water, particulates would most likely enter the Mississippi River and could possibly impact public health since surface water is the drinking water source for many cities in the state. MDH samples Mississippi River water downstream from the PINGP. Quarterly samples are taken at Lock & Dam #3 and analyzed. The results are compared to federal drinking water standards and measured against historical data for changes that may have occurred due to releases from the plant. Because radioactive releases from the plant could move through the soil profile and enter the water table, well water is periodically sampled and analyzed. These samples are collected quarterly and compared to drinking water standards and historical data. Collections are made from a private well on a farm located near the PINGP.

Radioactive releases that could enter the food supply are monitored through milk sampling. In a radioactive release to the environment it is likely that particles would settle on nearby pastures and be consumed by cows. This radioactivity is concentrated and transferred to the milk produced, and thus could enter the public food supply. MDH samples and monitors milk produced on a farm near the PINGP. Since there are no applicable health standards for milk related to radioactivity, except for emergency situations, sample analysis is compared to drinking water standards.

Ambient gamma radiation levels are measured around the PINGP by thermoluminescent dosimeters (TLDs). Currently, seven TLDs are located beyond the plant's boundaries to estimate the dose received by a member of the public if they were to be at that location continuously throughout the monitoring period. TLDs are changed quarterly, analyzed, and dose levels are compared to control readings and historical data.

Wisconsin Department of Health Services. The Wisconsin Department of Health Services (WDHS) is charged with environmental radiation monitoring of nuclear power facilities that impact Wisconsin (Wis. Public Health Stat. § 254.41). The PINGP and Prairie Island ISFSI, being located across the Mississippi River from Wisconsin, have the potential to impact Wisconsin citizens. Accordingly, the WDHS conducts environmental monitoring for the PINGP and publishes monitoring reports on an annual basis.

The WDHS monitoring program is focused on air, water, and terrestrial exposure pathways. Monitoring includes air sampling, water sampling (surface water, well water, and precipitation), soil sampling, milk sampling, sampling of fauna (fish), and sampling of vegetation.[57] Additionally, thermoluminescent dosimeters (TLDs) are used to measure background and direct radiation. Monitoring and sampling is conducted at approximately 23 sites nearby and generally eastward of the PINGP. The WDHS does not anticipate changes to its current monitoring program for the PINGP should the proposed power uprate and ISFSI expansion occur.

Radiation Pathways and Potential Impacts

The PINGP releases small amounts of radionuclides during normal operations in the form of gaseous and liquid effluents. Release pathways for gaseous and liquid effluents are controlled and monitored to ensure that unintentional radionuclide releases are minimized, and to provide a basis for estimating the radiological dose and potential impacts to humans and the environment. Xcel Energy is charged with keeping radiological doses below applicable federal regulations (e.g., 10 CFR 20, 10 CFR 50).

Current radionuclide releases from the PINGP result in radiological doses well within federal regulations and indistinguishable from background radiation. If the activity associated with radionuclide releases increases proportionately with the power uprate, i.e., the activity of releases increases by approximately 10 percent, radiological doses will remain within federal regulations and indistinguishable from background radiation. Impacts to humans and the environment from near-background level radiation are not anticipated to be significant. Studies on potential impacts from low-level, long-term radiation exposure to citizens near nuclear power plants are discussed separately in this section.

[57] State of Wisconsin 2007 Prairie Island Environmental Radioactivity Survey, http://dhs.wisconsin.gov/dph_beh/EnvMonitoring/PrairieIsland/piwww07.pdf

Gaseous Effluents. Gaseous radioactive wastes principally include activation gases and fission product radioactive noble gases resulting from process operations, gases used for tank cover gases, gases collected during venting, and gases generated in the radiochemistry laboratory. During normal power operations at the PINGP, the gaseous effluent treatment systems process and control the release of gaseous effluents to the environment, and there are almost no releases of radioactive gaseous effluents. However, during refueling and maintenance operations, when the primary reactor system is open to the building atmosphere, small quantities of noble gases, halogens, tritium, and particulates are removed by the ventilation systems.

The gaseous-waste management systems include the off-gas system and various building ventilation systems. This air is monitored for radioactivity before undergoing controlled release. Whenever radioactivity is present, the ventilation air is passed through filters to remove particulate material. Releases are controlled and inadvertent releases prevented by valve systems which require multiple, manual operations to effect a release (e.g., unlocking a valve). Xcel Energy projects that the concentration of radionuclides in the gaseous radioactive effluents streams would, at most, increase linearly with power as a result of the proposed uprate, i.e., by approximately 10 percent.

The activity of gaseous effluents from the PINGP and estimated doses to the public is shown in **Table 4-7**. Estimated exposure and dose levels for the general public are indistinguishable from background radiation. Monitoring data from Xcel Energy, MDH, and WDHS support this conclusion.[58] Estimated doses after the power uprate are less than 0.01 mrem/yr. These are below the NRC regulatory level of 30 mrem/yr (10 CFR 50).

Health risks to the general public due to long-term exposure to radioactive gaseous effluents from the PINGP are not expected to be significant. The primary health concern is cancer. If we assume, conservatively, that local residents receive a whole body dose of 0.01 mrem/yr due to gaseous effluents and that they receive this dose continuously for 70 years, it is estimated that an additional 1 person in 1,430,000 (0.07 in 100,000) would be diagnosed with cancer and an additional 1 person in 2,850,000 would die from cancer.

With approximately 450 residents within the immediate vicinity of the Prairie Island plant (2 mile radius), these risks translate into a hypothetical 0.0003 additional cancer diagnoses and 0.00015 additional cancer deaths among these residents during a 70-yr. time period. Approximately 40 percent of these residents (180 persons) would be diagnosed with cancer and 20 percent of these residents (90 persons) would be expected to die from cancer from all cancer causes during this same period.

[58] 2007 Annual Radiological Environmental Monitoring (REMP) Report, Prairie Island Nuclear Generating Plants Units 1 and 2, May 2008, http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/prai1-2.html; Minnesota Department of Health, 2006 Environmental Radiation Data Report, http://www.health.state.mn.us/divs/eh/radiation/monitor/annual2006.pdf; State of Wisconsin 2007 Prairie Island Environmental Radioactivity Survey, http://dhs.wisconsin.gov/dph_beh/EnvMonitoring/PrairieIsland/piwww07.pdf

Liquid Effluents. The liquid radioactive waste management system at the PINGP is designed to: (1) process wastes through filtration and ion exchange, (2) measure and evaluate all radionuclide concentrations and, based on results, (3) reprocess them through the radioactive-waste system for further purification or discharge them to the environment. Liquid wastes are generated during normal plant operations from a variety a sources, e.g., component drains, chemical laboratory drains, sampling systems, steam generator blowdown. Processed liquid wastes are discharged via a monitored double-walled piping system to the Prairie Island discharge canal and from there diffused to the Mississippi River. All releases are monitored and the activity of effluents recorded. As with gaseous effluents, releases are controlled and inadvertent releases prevented by valve systems which require multiple, manual operations to effect a release.

The power uprate will not significantly increase the inventory of liquid normally processed by the liquid waste management system. System functions are not changing and volume inputs will remain nearly the same. However, Xcel Energy anticipates that the discharge liquid effluent radioactivity level would increase linearly with the power uprate, i.e., by approximately 10 percent.

The activity of liquid effluents from the PINGP and estimated doses to the public are shown in **Table 4-8**. Estimated exposure and dose levels are indistinguishable from background radiation. Monitoring data from Xcel Energy, MDH, and WDHS support this conclusion.[59] Estimated doses after the power uprate are less than 0.01 mrem/yr. These are below the NRC regulatory levels of 6 mrem/yr (whole body) and 20 mrem/yr (organ) (10 CFR 50).

Health risks to the general public due to long-term exposure to radioactive liquid effluents from the PINGP are not expected to be significant. Again, the primary health concern is cancer. The estimated dose to local residents is similar to that due to gaseous effluents (< 0.01 mrem/yr). Thus, the above analysis of potential cancer impacts for gaseous effluents is bounding.

Liquid Effluents – Drinking Water Standards. The EPA promulgates standards related to the presence of radionuclides in drinking water supplies.[60] These standards are set to limit the annual whole body dose from the radionuclide tritium (H-3) to 4 mrem/yr. For a person who regularly consumes water from a primary water source (e.g., public water supply, private well), the concentration of tritium corresponding to this dose level is 20,000 picocuries/liter (pCi/L). Thus, EPA rules limit tritium concentrations in drinking water to less than 20,000 pCi/L.

As noted in Table 4-8, the primary radioactive liquid effluent from the PINGP is tritium. Because the Prairie Island plant is located in close proximity to three river systems (Mississippi,

[59] 2007 Annual Radiological Environmental Monitoring (REMP) Report, Prairie Island Nuclear Generating Plants Units 1 and 2, May 2008, http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/prai1-2.html; Minnesota Department of Health, 2006 Environmental Radiation Data Report, http://www.health.state.mn.us/divs/eh/radiation/monitor/annual2006.pdf; State of Wisconsin 2007 Prairie Island Environmental Radioactivity Survey, http://dhs.wisconsin.gov/dph_beh/EnvMonitoring/PrairieIsland/piwww07.pdf
[60] Radionuclides in Drinking Water, http://www.epa.gov/safewater/radionuclides/index.html

Vermillion, Cannon), the potential movement of tritium releases through groundwater or surface waters systems is closely monitored. Movement of tritium to groundwater that could be consumed by local residents, as opposed to released to the Mississippi River, could result in relatively high levels of tritium and adverse health impacts.

In 1989, based on elevated tritium levels in well water at a residence south of the PINGP, Xcel Energy initiated a special water sampling program.[61] In 1991 and 1992, upgrades to the liquid effluent discharge pipe were made to minimize the ability of radioactive effluents to enter groundwater. Monitoring by the special water program indicates that tritium levels in groundwater and well water are near background levels (5 – 150 pCi/L). In 2007, all offsite wells sampled contained very low levels of tritium (< 65 pCi/L).[62] On-site sampling of wells exhibited similar concentrations, with the exception of three locations, which ranged from several hundred up to 2,258 pCi/L. These locations are clustered on-site, just south and east of the PINGP. Xcel Energy believes these relatively higher levels may be due to prior leakage of the discharge pipe or inadvertent discharge of turbine building sump water into the area. In sum, Xcel's monitoring shows on-site groundwater tritium concentrations to be less than 10 percent (2,000 pCi/L) of the EPA standard (20,000 pCi/L) and off-site groundwater concentrations to be less than 1 percent (200 pCi/L) of the EPA standard.

Monitoring by MDH and WDHS supports Xcel Energy's monitoring results. Excepting one year (2002), MDH monitoring indicates tritium concentrations of less than 200 pCi/L in nearby residential well water.[63] WDHS monitoring indicates tritium concentrations below the lower limit of detection used by the WDHS program.[64]

The results of monitoring by Xcel Energy, MDH, and WDHS indicate that tritium concentrations in groundwater and well water near the PINGP are within EPA standards and average less than 1 percent (200 pCi/L) of the standard. It appears that there may be spikes in tritium concentrations in certain areas (Xcel's on-site monitoring wells) and at certain times (Xcel's monitoring prior to upgrading its discharge pipe; MDH's 2002 well water monitoring data). These spikes are most likely related to plant operations. However, these spikes are within EPA standards and short-lived.

As before, the primary health risk due to long-term exposure to low levels of radiation is cancer. Assuming that the dose received is proportional to tritium concentrations, a concentration of 200

[61] 2007 Annual Radiological Environmental Monitoring (REMP) Report, Prairie Island Nuclear Generating Plants Units 1 and 2, May 2008, http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/prai1-2.html
[62] Id.
[63] Minnesota Department of Health, 2006 Environmental Radiation Data Report, http://www.health.state.mn.us/divs/eh/radiation/monitor/annual2006.pdf. The year 2002 was the only exception to this trend. In 2002, median tritium concentrations were near 5,000 pCi/L.
[64] State of Wisconsin 2007 Prairie Island Environmental Radioactivity Survey, http://dhs.wisconsin.gov/dph_beh/EnvMonitoring/PrairieIsland/piwww07.pdf. The lower limit of detection from tritium (H-3) used in the WDHS program is 300 pCi/L.

pCi/L would result in an annual whole body dose of approximately 0.04 mrem/yr. Health risks from this dose are not anticipated to be significant. If we assume that local residents receive a whole body dose of 0.04 mrem/yr due to tritium exposure and that they receive this dose continuously for 70 years, it is estimated that an additional 1 person in 357,000 (0.28 in 100,000) would be diagnosed with cancer and an additional 1 person in 714, 000 would die from cancer during this time period.

Solid Wastes. The solid radioactive waste management system at the PINGP collects, processes, packages, and temporarily stores radioactive dry and wet solid wastes before they are shipped off-site for permanent disposal.[65] The Prairie Island plant produces dry active waste (paper, plastic, wood, rubber, glass, floor sweepings, cloth, and metal), sludge, oily waste, bead resin and filters. Any increase in the volume of solid waste due to the proposed power uprate would likely be insignificant because the uprate would neither alter installed equipment performance nor require changes in system operation or maintenance.

With the power uprate, any increase in volume of solid waste would be expected to be due to increases in disposal of bead resins and filters. This volume increase would not be significant; however, the radioactivity of the waste is expected to increase proportionally with the power uprate, i.e., approximately 10 percent.

The volume and activity of radioactive solid wastes from the PINGP is shown in **Table 4-9**. In recent years (2004 and 2005), the solid waste volume generated at the Prairie Island plant has been above the quantity anticipated in the NRC's Final Environmental Statement for the plant (14, 925 ft^3/yr). This increase in solid waste volume was temporary. It was a direct result of the disposal of equipment associated with the Unit 1 steam generator replacement and the Unit 1 and 2 reactor vessel head replacement projects. As radioactive solid wastes are shipped off-site for proper disposal, health risks due to these wastes will not be significant.

Impacts to Plant Personnel. Plant personnel receive radiological exposure from on-going operations at the PINGP (e.g., direct radiation). Exposure and doses for plant personnel are managed by the PINGP radiation protection program to ensure they are within NRC regulations (10 CFR 20) and as low as reasonably achievable (ALARA). Since beginning operations, the annual collective dose at the PINGP has dropped from approximately 175 person-rem/yr to approximately 111 person-rem/yr.[66] Assuming that plant personnel exposure increases linearly with the power uprate, i.e., by 10 percent, then the annual collective dose for PINGP personnel will be approximately 122 person-rem. If we assume that personnel receive this dose over their working lifetimes at the plant (50 years) there would be an estimated 6.1 additional cancer diagnoses and 3.1 additional cancer deaths among plant personnel during this time period. The average annual dose to plant

[65] For example, radioactive resins and contaminated trash from the PINGP are sent to a federally licensed low level waste disposal facility in Clive, Utah owned by Energy Solutions; http://www.nrc.gov/waste/llw-disposal/locations.html.
[66] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 8.2.5.2.

personnel would be approximately 132 mrem/yr, which is below the occupational limit of 5 rem/yr (10 CFR 20). [67]

Summary – Effluents, Pathways, and Impacts. A summary of radiological exposure pathways and potential impacts is provided in Tables 4-10 and 4-11. Table 4-10 summarizes estimated doses and cancer incidences for the proposed EPU. Table 4-11 summarizes the radiological effluents (curies) from the PINGP for the proposed EPU.

Impacts of Long Term Radiation Exposure – Health Studies

Despite extensive monitoring and regulation of nuclear power facilities, there remains a public concern about possible health effects due to living next to a nuclear facility. As noted above in the discussion of radioactive effluents from the Prairie Island plant, monitoring, sampling, and exposure calculations indicate that possible health effects (primarily, cancer) due to low-level, long-term radiation exposure are not significant. Nonetheless, there are differences of opinion on the subject.

Because estimated dose levels and cancer rates near nuclear power plants are very low, they are difficult to detect in public health studies. Childhood cancer, primarily leukemia, is used in many of these studies to evaluate health risks because children are more susceptible than adults to radiation exposure, and because of early reports of child leukemia clusters near British nuclear processing plants. The studies differ in their methods and hypotheses – e.g., some studies examine cancer mortality rather than cancer incidence; some studies use local control groups and others do not; some studies examine workers rather than the general public.

Most studies use distance from a nuclear facility as a proxy for radiation dose. A recent French study attempted to define geographic zones based on estimated doses to gaseous radioactive discharges.[68] This study found no association between estimated doses and child leukemia around 23 French nuclear sites. The study also noted that due to meteorological and topographical factors, exposure categories based on estimated dose differed substantially from the concentric ring (linear distance) approach used in most other studies.

Two recent German reports published in 2008 have renewed concerns about child leukemia risks near nuclear facilities.[69, 70] These studies examined childhood cancers under

[67] Average annual plant personnel dose estimated from a collective dose of 122 person-rem/yr divided over 923 plant personnel. Actual personnel doses will vary with job functions and will be managed by the PINGP radiation protection program.

[68] Evrard, A. S., D. Hemon, et al. (2006). "Childhood leukaemia incidence around French nuclear installations using geographic zoning based on gaseous discharge dose estimates." *Br J Cancer* 94 (9): 1342-7.

[69] Kaatsch, P., C. Spix, et al. (2008). "Leukaemia in young children living in the vicinity of German nuclear power plants." *Int J Cancer* 122 (4): 721-6.

[70] Spix, C., S. Schmiedel, et al. (2008). "Case-control study on childhood cancer in the vicinity of nuclear power plants in Germany 1980-2003." *Eur J Cancer* 44 (2): 275-84.

age five in counties near the 16 major German nuclear power plants. Spix and colleagues included all childhood cancers (1,592 cases, 4,735 controls), while the analysis by Kaatsch focused only on childhood leukemias (593 cases, 1,766 controls). An increased risk of leukemia was found for children within a 5-km (3-mile) zone around the plants. The authors note however that radiation exposures near German nuclear plants are 1,000-100,000 fold less than background exposures. Therefore, their results "remain unexplained."

Following the German reports, two additional studies were published in 2008 that attempted to partially replicate the age categories and proximity zones used of the German studies. Bithell and colleagues conducted additional analyses of a sub-set of data from a very large population-based British study of childhood cancers.[71] A previous 2005 report from that study found no pattern of excess child cancers within 25 km of nuclear facilities in Great Britain.[72] In the new analyses, the authors tried to match the age and distance categories used in the German studies. The authors concluded from these additional analyses that there is "no evidence that acute leukemia in children aged under five has a higher incidence close to NPSs [nuclear power stations] in Britain" and that the discrepancy with German data "remains unclear."

A critical review of the epidemiological literature of leukemia around nuclear plants has recently been published.[73] This review spans studies published between 1984 and 2008, involving 198 nuclear facilities throughout 10 countries, and includes 82 references. The authors note that the variability in the quality of the data, definitions of study populations, and methodology limit the interpretations that can be made. The authors conclude that although some leukemia clusters exist in specific locations, "multi-site studies around nuclear installations do not indicate increased risk globally."

Only one study of cancer rates near nuclear power plants in the United States has reported an elevated risk of childhood cancer.[74] Several studies indicate that there is no increased risk of cancer attributable to living near a nuclear facility in the United States. A National Cancer Institute survey found no increased risk of death from cancer for persons living in 107 counties near nuclear facilities in the United States.[75] An Illinois Department of Health study found that cancer incidence and mortality rates for children living near nuclear power plants in Illinois were

[71] Bithell, J. F., T. J. Keegan, et al. (2008). "Childhood leukaemia near British nuclear installations: methodological issues and recent results." *Radiat Prot Dosimetry* 132 (2): 191-7.
[72] Committee on Medical Aspects of Radiation in the Environment (COMARE) (2005). Tenth Report. The incidence of childhood cancer around nuclear installations in Great Britain, Health Protection Agency for the Committee on Medical Aspects of Radiation in the Environment. http://www.comare.org.uk/index.htm
[73] Laurier, D., S. Jacob, et al. (2008). "Epidemiological studies of leukaemia in children and young adults around nuclear facilities: a critical review." *Radiat Prot Dosimetry* 132 (2): 182-90.
[74] Elevated Childhood Cancer Incidence Proximate to U.S. Nuclear Power Plants, Archives of Environmental Health, February 2003.
[75] No Excess Mortality Risk Found in Counties with Nuclear Facilities, National Cancer Institute Fact Sheet, http://www.cancer.gov/cancertopics/factsheet/Risk/nuclear-facilities

not significantly different from rates for children living elsewhere in Illinois.[76] There has been substantial study of cancer rates near the Prairie Island plant by the Minnesota Department of Health. These studies are discussed here.

Minnesota Department of Health Studies of Cancer Rates. Since 1995, the Minnesota Department of Health (MDH) has undertaken two analyses and two updates of cancer rates and trends in counties near Minnesota's nuclear power plant facilities. These analyses were undertaken due to either specific allegations of increased cancer rates near the Prairie Island and the Monticello generating facilities or to general public concerns and perceptions about cancer rates and risks near nuclear power plants. Each of these analyses is summarized here.

Breast Cancer Rates and Trends Around Nuclear Power Plants in Minnesota.[77]
An analysis was conducted of long-term trends in breast cancer mortality rates in counties surrounding Minnesota's two nuclear power plants. This analysis was undertaken following suggestions by individuals and environmental groups in 1994 that significant increases in breast cancer mortality rates had occurred in counties (ten counties in Minnesota and four in Wisconsin) close to the Prairie Island and Monticello nuclear power plants.[78] The differences in cancer mortality rates in these counties and other "nuclear counties" in Minnesota and throughout the U.S. were, according to the suggested analyses, attributable to the operation of nuclear power plants. The Minnesota Department of Health (MDH) attempted to replicate and expand these analyses using complete cancer mortality data for the period 1950 through 1992. No significant differences in trends in breast cancer mortality rates were detected for the ten Minnesota counties surrounding the Monticello and Prairie Island plants compared to the overall Minnesota average.

This analysis also examined rates of newly-diagnosed breast cancer (incidence rates) using data from the Minnesota Cancer Surveillance System (MCSS) – the statewide cancer registry which began operation in 1988 at the Minnesota Department of Health. No significant differences were found for the rates of newly-diagnosed breast cancers for the years 1988-1992. A total of 2,208 new breast cancers were diagnosed over that five year period. Based on the population of these counties and the statewide rate, 2,278 new cancers would have been expected. In other words, the breast cancer incidence rate in these counties is virtually identical to the statewide average over this time period. This is consistent with the findings from the mortality data.

Finally, this study also examined cancer incidence and mortality rates for three additional cancers: leukemias, bone cancer, and thyroid cancer. No differences were found in mortality or incidence rates for these cancers in the 10-county region compared to all of Minnesota.

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[76] Pediatric Cancer Incidence and Mortality in the Vicinity of Nuclear Power Plants in Illinois, Illinois Department of Public Health, January 2006,
http://www.idph.state.il.us/cancer/pdf/nuclear%20study%20final%20report%20ERS06_1.pdf
[77] Breast Cancer Rates and Trends Around Nuclear Power Plants in Minnesota. In: The Occurrence of Cancer in Minnesota 1988 - 1992: Incidence, Morality, Trends. Minnesota Department of Health, March 1995.
[78] The ten Minnesota counties included in the analysis by Sternglass and by MDH: Anoka, Benton, Dakota, Goodhue, McLeod, Meeker, Sherburne, Stearns, Wabasha, Wright.

Update 1. In a subsequent biennial report of the Minnesota Cancer Surveillance System,[79] an additional two years of cancer data were available and were re-analyzed for the 10-county region alleged to have had higher breast cancer mortality rates. Rates were examined for the seven-year period 1988-94. The average annual rate of new diagnoses of breast cancer in the ten Minnesota counties was 105.3 cases per 100,000. During that same time period the rate throughout all Minnesota was 109.5 per 100,000. Put in a different perspective, a total of 3,147 new breast cancers were diagnosed among women in these ten counties over that seven year period. That number was 4 percent below the number of expected cases (3,271) based on the population of the counties and the statewide rate, a marginally significant deficit. The incidence of breast cancer in these ten counties was lower than the state average for every year between 1988 and 1994. Breast cancer mortality for that same time period (1988-94) showed a similar pattern. The average annual rate of breast cancer deaths per 100,000 women in the ten counties was 26.1 compared to the statewide average of 26.2 during that same period.

Update 2. A second update[80] was published in 2000 as part of another Minnesota Cancer Surveillance System (MCSS) report on cancer in Goodhue County (see discussion below). This update included cancer data through 1996. For the nine-year period 1988-1996, no excesses were found for newly-diagnosed cancers of the breast and thyroid or for leukemias in the 10-county region. Breast cancer incidence was significantly below the statewide average (4,247 cases observed, 4,426 cases expected). Over the same time period, there was also no excess of breast cancer deaths (1,056 cases observed, 1,044 expected).

Cancer Occurrence in Goodhue County[81]

The primary purpose of this analysis and report was to address ongoing public concerns about cancer rates in Goodhue County, particularly in relation to the Prairie Island Nuclear Generating Plant near Red Wing. This report was not able to address cancer rates in the Prairie Island Indian Community members who reside near the plant. The study examined cancer incidence and cancer mortality rates for Goodhue County for the nine-year period 1988-1996.

This analysis found that a total of 1,828 new cancers were diagnosed among Goodhue County residents during the period 1988-1996. The overall cancer incidence rate for females was the same as the statewide average and the overall rate for males was significantly below average. Childhood cancer rates were the same as the state average for males and significantly below average for females.

[79] The Occurrence of Breast Cancer in Minnesota. In: The Occurrence of Cancer in Minnesota 1988 – 1994: Incidence, Mortality, Trends. Minnesota Department of Health, May 1997.
[80] Appendix A. Cancer Occurrence in 10 Counties Near Nuclear Power Plants: 1988-1996. In: Cancer Occurrence in Goodhue County: MCSS Epidemiology Report 2000:2. Minnesota Department of Health, December 2000. http://www.health.state.mn.us/divs/hpcd/cdee/mcss/documents/goodhue.pdf
[81] Cancer Occurrence in Goodhue County: MCSS Epidemiology Report 2000:2. Minnesota Department of Health, December 2000, http://www.health.state.mn.us/divs/hpcd/cdee/mcss/documents/goodhue.pdf

For specific types of cancer, there were no rates among females that were significantly higher or lower than the statewide average. Among males, two types of cancer occurred less frequently than expected (colon cancer, non-Hodgkin's Lymphoma) and two occurred more frequently than expected (melanoma, Hodgkin's disease).

Overall cancer death rates for the same time period (1988-1996) were the same as or less than the state average for both adults and children. For specific types of cancer, there were fewer than expected deaths for cancer of the esophagus among males and fewer than expected lung cancers among females. For females, there was a greater than expected number of deaths from breast cancer (for 1988-1997). Further analyses using limited data indicated that a significantly higher percentage of breast cancers in Goodhue County were diagnosed at the most advanced stage compared to the state overall.

Analyses of cancer incidence within the county (urban vs. rural) showed a general pattern of somewhat lower rates in rural areas compared to the urban areas. This difference was greatest for females over 65 years of age. An analysis of breast cancer incidence in 20 other comparable Minnesota counties found a similar urban-rural difference.
Taken as a whole, the analyses of the MDH support the conclusion that there is no significant additional cancer risk associated with living near the Prairie Island plant. The analyses are consistent with monitoring data and dose rates reported by MDH, WDHS, and Xcel Energy.

Emergency Response Plans

The State of Minnesota has developed an emergency response plan for potential radiological, non-radiological, and security incidents at the Prairie Island plant. This plan involves state agencies and response systems as well as coordination with counties, federal agencies (NRC, DOE) and Xcel Energy. In the event of **an incident** at the plant, each of these agencies/entities would perform emergency response functions. The emergency response for a security incident, as opposed to a radiological incident, would have unique characteristics depending on the nature of the incursion. Due to concern about facility security, details of security response plans are not available to the public, but only to those with a demonstrated need to know.

The lead federal agency for most radiological incidents at nuclear generating stations is the Nuclear Regulatory Commission (NRC). The NRC reports to the President of the United States and Congress in emergency situations. The NRC coordinates any federal assets that the NRC or states request. A federal agency that will also likely provide assistance is the Department of Energy (DOE). The DOE may provide resources in the form of the Federal Radiological Monitoring and Assessment Center (FRMAC). FRMAC provides technical assistance such as field sampling, sample analysis, and plotting of radiological data to assist county, state, and federal agencies in decision-making.

The State of Minnesota provides direction, coordination, and control in accordance with the Minnesota Emergency Operations Plan. The State Emergency Operations Center (SEOC) is structured on the Minnesota Incident Management System with facilities for planning, operations, finance, logistics, and public information. The governor or governor's delegate participates in the SEOC in the command function.

For actual or projected severe core damage or loss of control of the Prairie Island plant, the plan recommends evacuation for a 2-mile radius around the station and 5 miles downwind, depending on local conditions. Data from the plant and from field teams is continually assessed to determine the need to extend distances or add other areas. People in the plume emergency zone are advised to go indoors and listen to the Emergency Alert System messages. General status is maintained until close out or reduction of the level of the emergency.

If a radiological incident were to occur, the counties surrounding the Prairie Island plant would also respond with their emergency operations plans. Their focus is to maximize the protection of lives and property, ensure that government can survive and continue to provide essential services, and support local units of government. By activating their Emergency Operations Centers they will assure that this is accomplished by exchange of information between county departments and where appropriate, to coordinate operations with other counties, state and federal agencies, as well as Native American communities. All county Emergency Operations Centers will be in direct contact with the state center and participate in the decision process for all protective actions.

Xcel Energy maintains an emergency operations plan that is used if a radiological incident at a plant would occur. The plant's main responsibility is to find the cause of the radioactive release and stop it as soon as possible while keeping the plant safe from further damage. The utility monitors conditions at the plant and determines Emergency Classification Levels (ECL) that are then communicated to the state and counties based on those conditions. The utility makes projections of radiation dose to the public based on plant conditions and makes protective action recommendations. The radiation dose projections and protective action recommendations are sent to the state and counties for review and implementation. The plant dispatches monitoring teams to verify the amount of radioactivity that has been released. As the NRC is the lead federal agency, the utility stays in close communication with this agency.

Emergency drills and exercises are conducted regularly by state and federal agencies to ensure that emergency response plans are effective. Exercises are conducted biennially and evaluated at the state and federal level. The most recent emergency exercise at the PINGP was July 2008. The next exercise is schedule for August 2010.

5.0 UNAVOIDABLE IMPACTS AND MITIGATION

The primary impact of the proposed 164 MW EPU is an increase in the temperature of the circulating water (3 F^{o} maximum) 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. The thermal discharge will remain within the limits of the current NPDES/SDS permit.

No changes are planned for the PINGP intake system or intake-flow velocity; therefore, no change in permitted water appropriation is needed. Increased use of the evaporative cooling towers will slightly increase the amount of water used at the plant, but water consumption will remain approximately 1 percent of the lowest annual mean Mississippi River flow.

The proposed EPU will also increase gaseous radionuclide emissions, but will not measurably change the maximum projected annual off-site radiation dose or on-site cumulative radiation dose. On-site and off-site radiological doses will remain well below federal regulatory limits.

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TABLES

Year	2003	2004	2005	2006	2007
Reported	41.9 MGY 128.63 acre ft 79.72 gpm	54.6 MGY 167.62 acre ft 103.60 gpm	61.6 MGY 189.11 acre ft 117.20 gpm	58.6 MGY 179.90 acre ft 111.49 gpm	44.8 MGY 137.53 acre ft 85.24 gpm

MGY = million gallons per year , gpm =gallons per minute

Table 1-1: PINGP Reported Pumping Permit Appropriation

Stream	Description	Maximum Flow	Average Flow
SD 001	Condenser/circulating water and Cooling Water	864	503
SD 002	Steam Generator blowdown	0.576	0.012
SD 003	Radioactive waste Effluent	0.230	0.002
SD 004	Reverse Osmosis Effluent (Monitoring and Reporting requirements only)	0.244	0.051
SD 005	U 1 Turbine Building sump	0.360	0.030
SD 006	U 2 Turbine Building sump	0.360	0.030
SD 010	Misc Plant Floor Drains	0.015	0.001
SD 012	Intake Screen wash (Monitoring and Reporting Requirements Only)	3.2	2.0
WS 001 & SW 002	Combined U 1/U 2 Cooling water	69	25

Table 1-2: PINGP Surface Water Discharge Streams

Table 1-3: PINGP NPDES Permitted Flow Limits

Dates	Limiting Flow (mgd)	Notes
April 15 to30	97**	River Flow < 15,000 cfs
April 15 to 30	194**	River flow > 15,000 cfs
May 1 to 31	194**	
June 1 to 15	259**	
June 16 to 30	517.5**	
Balance of year	N/A	

NPDES = National Pollution Discharge Elimination, System, mgd = million gallons per day, gpm = gallons per minute, cfs = cubic feet second (cfs).

****** This flow limit may be exceeded if required to maintain condenser inlet temperature to less than 85 F, provided (a) the additional flow to achieve the necessary inlet temperature is minimized, and (b) cooling towers are operating to the maximum extent possible.

Rule Reference	Description	Prairie Island Power Uprate
Capacity		164 MWe
Annual Capacity Factor		• 88.8% during years with refueling outage • 97% during years without refueling outage • Assumes a 3% forced outage rate
Typical Availability		Because nuclear power plants are dispatched and operated whenever they are available, the capacity factor and availability factors are the same.
7849.0250 A (1)	Nominal generating capability	164 MW
7849.0250 A (2)	Operating Cycle	30 day refueling outage every 2 years
Anticipated annual capacity factor		• 88.8% during years with refueling outage • 97% during years without refueling outage • Assumes a 3% forced outage rate
7849.0250 A (3)	Type of fuel used	Uranium
7849.0250 A (3)	Availability of fuel	Both the OECD and IAEA project uranium supplies are adequate to meet the needs of nuclear power plants worldwide, as well as new reactors anticipated in the next decade. The agencies base their conclusion on official projections from 43 uranium-producing countries, as well as independent studies by the agencies.
7849.0250 A (3)	Alternative fuels	None
7849.0250 A (4)	Anticipated heat rate (efficiency) (ISO Conditions)	10.425 mbtu/MWh
7849.0250 C (1)	Capacity Costs In $/kW	$2,011/kW
7849.0250 C (2)	Service Life	2014 to 2034
7849.0250 C (3)	Estimated Average Annual Availability	97%
7849.0250 C (4)	Fuel Costs ($/kWh)	$0.00598kWh
7849.0250 C (5)	Variable Operating And Maintenance Costs ($/kWh)	0.00040 $/kWh
7849.0250 C (6)	Total Cost ($/kWh)	$0.03808/kWh
7849.0250 C (7)	Estimated Effect On Rates System-Wide Assuming Test Year Beginning With Proposed In-Service Date	$0.00103/kWh
7849.0250 C (8)	Efficiency Expressed In Heat Rate	9.94mmBtu /MWh

mbtu = million british thermal units, kWh = kilo watt hour, MWh = mega watt hour

Table 1-4: PINGP EPU Operational Information Summary

Table 3-1: Cost Comparison between the Proposed EPU, a 164 MW Coal PPA, a 164 MW Biomass Plant, and a Natural Gas Plant Present Value of Revenue Requirements (PVRR) Base Case* Assumptions ($ millions)

	Prairie Island Uprate Project	164 MW Coal PPA	164 MW Biomass	Unconstrained
PVRR	**$61,356**	**$61,974**	**$62,535**	**$61,875**
PVRR difference from Prairie Island Project	**-**	**$619**	**$1,179**	**$519**

*The base case uses the same forecast, individual plant information, externality values, and fuel forecasts, and assumes compliance with the RES and DSM legislation.

Table 3-2: Air Emission Comparison between the Proposed EPU, a 164 MW Coal PPA, a 164 MW Biomass Plant, and a Natural Gas Plant

2008 – 2035 Emissions Differences	**NOx** Tons	**PM10** Tons	**CO_2** Tons	**SO_2** Tons	**VOC** Tons	**CO** Tons
Prairie Island Uprate Project	0	0	0	0	0	0
164 MW Coal PPA	24,110	3,158	32,290,370	39,616	578	4,767
164 MW Biomass	103,722	4,701	65,357,790	21,551	837	18,498
"Unconstrained" Natural Gas Combustion Turbine	7,580	1,370	16,059,200	9,526	283	2,235

The table compares differences between the total emissions for the PINGP EPU project and three alternatives. The PINGP EPU project is set at "0" as the baseline, the data showing how much higher or lower other alternatives are.

TABLE 4-1 PREVIOUSLY RECORDED AND REPORTED ARCHAEOLOGICAL SITES WITHIN THE PINGP STUDY AREA

Site No. and Name	Last site visit	Description	Location	Condition (per site form)
Recorded Sites				
21GD0002 Bartron Site	1970	Oneota/Blue Earth phase village on 20 acres	T113 R15W, Sec 4 SW-SW-SW	Moderately disturbed
21GD0058 Birch Lake Mounds (aka Prairie Island Mounds II)	1981	*Possible Burial Site* 8 mortuary mounds on 8.5 acres; Mississippian affiliation	T113N R15W, Sec 5 SW-SW-SE, SE-SE-SW	Unknown Johnson Data Recovery 1969
21GD0059 NSP II	1969	*Possible Burial Site* 6 mounds on 8 acres; Woodland affiliation	T113N R15W, Sec 5, S-NE-SE-SE, N-SE-SE-SE, C-E-WSE-SE	Johnson Data Recovery 1969; Heavily disturbed/ destroyed
21GD0062 Birch Lake Mound	1969	*Possible Burial Site* 1 mound; probable Woodland affiliation	T113N R15W, Sec 5, SE-SW-SE, CE-E-SW-SW-SE	Moderately disturbed
21GD0148 Cooling Tower	1980	Artifact scatter on 5.5 acres; Woodland and probable Mississippian affiliation	T113N R15W, Sec 4, C-S-SW-SW	Minimally disturbed
21GD0149 Substation	1980	*Possible Burial Site* 1 mound and artifact scatter on 3 acres; possible Woodland, probable Oneota affiliation	T113N R15W, Sec 4, SW-NW-NW	Heavily disturbed
21GD0207 Dike Site	1980	Artifact scatter on 1 acre; Woodland affiliation	T113N R15W, Sec 7, C-S-SW-NE SW, C-N-N-NW SW-SW	Unknown
Reported Sites				
21GDl Vergil Larson Mounds II	1999	*Possible Burial Site* – 3 mounds	T113N R15W, Sec 5, E-SW-SW-NW, SW-SE-SW-NW, N-N-NW-SW	Unknown, not field verified

TABLE 4-1 (Cont.) PREVIOUSLY RECORDED AND REPORTED ARCHAEOLOGICAL SITES WITHIN THE PINGP STUDY AREA

Site No. and Name	Description	Location	Condition (per site form)
Minnesota			
21GD0001 Nauer Mound Group	Earthwork, 51 mounds covering 60 acres; Woodland/ Early Oneota affiliation	T113N R15W, Sec 9 NW, NW-NW-SE, NE-NE-SW, SW-SW-SW-NE	Heavily disturbed; perhaps 13 mounds still visible
21GD0060 Vergil Larson Mound I	3 mounds and artifact scatter on 29 acres; probable Woodland affiliation	T113N R15W, Sec 6, SE-NE	Heavily disturbed
21GD0063 Larson Lake Mound	1 mound; probable Woodland affiliation	T113N R15W, N-N-SW-SE, C-S-S-S-NW-SE	Moderately disturbed
21GD0064 Amos Owens Mound Group	1 mound; probable Woodland affiliation	T113N R15W, Sec 6, NW-NE-SE	Disturbed, site location confirmed by testing in 1992
21GD0071 (21GD114) Brink Mound Group *(Mistakenly assigned 2 site numbers)*	4 mounds on 4.5 acres; probable Woodland affiliation	T113N R15W, Sec 6, W-SW-SW	Moderately disturbed
21GD0074 Buffalo Slough Mounds	24 mounds on 46.5 acres; probable Woodland affiliation	T114N R15W, Sec 30 C-SW-SE, S-SE-SE, S-NW-SE-SE	Heavily disturbed; probably destroyed
21GD0075 Leith Mound Group	45 mounds on 28.5 acres; probable Woodland affiliation	T114N R15W, Sec 32, NE-SW, C-W-W-WSE, S-SW-SE-NW	Moderately disturbed; 24 mounds visible in Prairie Island Reservation in 1999
21GD0088 Fort LaJonquire/ Sturgeon Lake Post	Historic French trading post	T114N R15WM Sec 32, SW-SE; overlaps 21GD75	Destroyed
21GD0173 Sturgeon Lake II	Artifact scatter on 1.5 acres; Woodland affiliation	T114N R15W, Sec 32, SW-SE-SE-NW, SE-SW-SE-NW	Undisturbed
21GD0181 Pickeral Slough	Artifact scatter over 3.5 acres; Woodland affiliation	T113N R15W, Sec 9, NE-NW-SE, N-SENW-SE, W-W-NWNE-SE	Minimally disturbed
21GD0189 Rim Site	Artifact scatter; Middle Woodland/Havana affiliation	T114N R15W, Sec 33 SW-NW-SE-NW	Unknown; may be redeposited alluvial material
21GD0202 Prairie Island Marina Site	Lithic scatter; unknown affiliation	T114M R15W, Sec 32NE-SW-NW-NW	Undisturbed

TABLE 4-1 (Cont.) PREVIOUSLY RECORDED AND REPORTED ARCHAEOLOGICAL SITES WITHIN THE PINGP STUDY AREA

Site No. and Name	Description	Location	Condition (per site form)
21GD0208 CSAH 18 Findspot	Single projectile point; precontact	T113N R15W, Sec 7 NW-NE-NW-NW	Unknown
21GD0250	Lithic scatter; precontact	T114N R15W, Sec 31, SE-SE-SW	Unknown
21GD0251	Artifact scatter; precontact	T113N R15W, Sec 6, NW-NW-NW	Unknown
Wisconsin			
47PI0185	6 conical mounds; Woodland affiliation	T25N R18W, Sec 19, NW	Unknown

Name of Historic Site	Location	Approximate Distance from the Plant	Comments
Bartron Archaeological Site	Undisclosed location on Prairie Island	0-1 miles	Prehistoric site
Metro Archeological District	Pierce County Wisconsin Restricted Address	1-2 miles	810 acres prehistoric site
Mendota to Wabasha Military Road	Cannon Bottom Road, Red Wing, MN	2-4 miles	48 acre military roadway
Alexander Anderson Estate	West of Red Wing on U.S. 61	2-4 miles	50 acres, brick, stone structure of architecture and engineering significance
Cross of Christ Lutheran Church	U.S. 61 Red Wing	4.5 miles	50 acres, architecture, engineering, religious significance.
Silvenale Site	Goodhue County Restricted Address	4-5 miles	No Information available

Table 4-2 National Register Sites within Five Miles of the PINGP Plant

	Daytime				Ambient Noise Sources
LOCATION	11-15-06		11-16-06		
	Morn.	Aftnoon	Morn.	Aftnoon	
#1. C. Suter Residence	34	34.6	31.9	32.3	Vents from plant
#2. 1754 Messiah Rd.	38.2	40.7	37.8	37.5	Local vehicle and train traffic
#3. Casino parking lot	42.5	46.1	43.8	43.3	Local vehicle and train traffic and casino vent fans on roof
#4. 1960 Edoka St.	39.9	41.7	40	39.9	Local vehicle and train traffic
#5. 1824 Edoka St.	35.3	35.7	32.2	33.5	Local vehicle and train traffic
#6. 5390 Sturgeon Lake Rd.	36.1	33.1	34.5	40.7	Local vehicle and train traffic

Table 4-3 Summary of Measured Ambient Noise Levels (L90) Around the PINGP

Table 4-4 Sources of Surface Water Discharge Streams from PINGP

Stream	Description
SD 001	Condenser/circulating water and Cooling Water
SD 002	Steam Generator blowdown
SD 003	Radioactive waste Effluent
SD 004	Reverse Osmosis Effluent (Monitoring and Reporting requirements only)
SD 005	U 1 Turbine Building sump
SD 006	U 2 Turbine Building sump
SD 010	Misc Plant Floor Drains
SD 012	Intake Screen wash (Monitoring and Reporting Requirements Only)
SW 001	Mississippi River Lock and Dam #3
SW 002	Plant Intake Channel (Monitoring and Reporting Requirements Only)
SW 003	Main River Channel Upstream Pt. (Monitoring and Reporting Requirements Only)
SW 004	Sturgeon Lake-upstream Pt. (Monitoring and Reporting Requirements Only)
WS 001 & SW 002	Combined U 1/U 2 Cooling water

Specific limits and monitoring requirements for each discharge are described in detail in the NPDES permit and are summarized in Xcel Energy's Certificate of Need application of May 16, 2008. Although the power uprate may require nominal increases in some discharges, none of the permit limits will require modification.

Year	Average Flow Rate Jan-Mar	Ice Thickness Fourth Week February	Thinnest Ice Measured	Thickest Ice Measured	Date Thickest Measured Ice	Outage Start	Outage End	Unit
1999	13,798	18	15	18	Feb W4	11/9/1998	1/1/1999	Unit 2
2000	13,669	10	7	14	Feb W2 & 3	None		
2001	9,153	21	19	26	Mar W5	1/19/2001	2/25/2001	Unit 1
2002	10,869	11	10	13	Mar W2	2/1/2002	3/2/2002	Unit 2
2003	10,178	25	12	25	Feb W4 & Mar W2	11/15/2002	12/6/2002	Unit 1
2004	9,452	21	19	21	Feb W4 & Mar W1	None		
2005	12,068	25	23	25	Feb W3 thru Mar W1	None		
2006	18,941	17	12	17	Feb W4	None		
2007	12,138	13	10	14	Mar W1	11/14/2006	12/15/2006	Unit 2
2008	8,405	26	23	28	Mar W2	2/13/2008	3/23/2008	Unit 1
Ten-year average	11,867	19	15	20				

Table 4-5 Ice thickness measurements for Lake Pepin (Survey Station 770) from 1999 through 2008 (obtained from the U.S. Army Corps of Engineers)

Table 4-6 Background Radiation Sources and Exposure[1]

Sources	Approximate Annual Dose (mrem/yr)	Percentage of Annual Dose
Natural Sources		
Radon in Indoor Air	200	55
Ingested Foods	39	11
Building Materials	28	8
Cosmic Rays (average)	28	8
Man-made Sources		
Medical Procedures	53	15
Consumer Products	11	3
Nuclear Fallout, Nuclear Fuel Cycle	< 2	< 1

mrem = millirem

[1]. National Council on Radiation Protection and Measurements. *Ionizing Radiation Exposure of the Population of the United States*. NCRP Report No. 93. Bethesda, MD: NCRP; 1987.

Table 4-7 Activity and Estimated Dose of Gaseous Effluents[1]

	Activity (Ci/yr)		Estimated Doses (mrem/yr)	
	Noble Gases	Particulate and Iodine	Whole Body	Organ
Average actual releases (2001 – 2005)	11.2	164 E-06	0.0026	0.073
Estimated value with 10% increase due to power uprate	12.3	179 E-06	0.0028	0.080

mrem = millirem, Ci/yr = curies per year

[1] Prairie Island Nuclear Generating Plant, Application for a Generating Plant Site Permit, August 2008, Section 4.3.

Table 4-8 Activity and Estimated Dose of Liquid Effluents[1]

	Activity (Ci/yr)		Estimated Doses (mrem/yr)	
	Non-Tritium[2]	Tritium	Whole Body	Organ
Average actual releases (2001 – 2005)	0.098	626	0.0026	0.0043
Estimated value with 10% increase due to power uprate	0.108	689	0.0028	0.0047

mrem = millirem, Ci/yr = curies per year

[1] Prairie Island Nuclear Generating Plant, Application for a Generating Plant Site Permit, August 2008, Section 4.3.
[2] Non-tritium elements present in liquid effluents include iron, silver, manganese, tin, cesium, sodium, chromium, cobalt, cerium, lanthanum, barium, niobium, strontium, tellurium, antimony, thallium, and zirconium.

Table 4-9 PINGP Volume and Activity of Solid Wastes[1]

	Volume (ft^3/yr)	Activity (Ci/yr)
Average actual releases (2001 – 2005)	15,597	343
Estimated value with 10% increase due to power uprate	15,597	377

Ci/yr = curies per year

[1] Prairie Island Nuclear Generating Plant, Certificates of Need Application, May 2008, Section 8.2.6.

Table 4-10 Summary of Estimated Doses and Cancer Incidences for the General Public and Plant Personnel with Extended Power Uprate[1]

General Public			
Exposure Pathway	**Estimated Whole Body Dose (mrem/yr)**	**Estimated Additional Risk of Cancer Incidence[2]**	**Estimated Additional Cancer Incidences[3]**
Gaseous Effluents	0.01	0.07 in 100,000	0.0003
Liquid Effluents	0.04[4]	0.28 in 100,000	0.0012
Solid Wastes	---[5]	---	---
Plant Personnel[6]			
Plant Operations and Maintenance	132	660 in 100,000	6.1

mrem = millirem

[1] See Chapter 1, Section 4.13 for a discussion of assumptions and calculations.
[2] For residents within 2 miles (approximately 450 persons) who receive the estimated dose annually for 70 years.
[3] Id.
[4] See Chapter 1, Section 4.13 for a discussion of liquid effluents. Estimated dose is based on exposure to tritium through groundwater / drinking water.
[5] Solid wastes are processed, packaged, and shipped off-site for permanent disposal in a federally licensed, low level radioactive waste disposal facility. Accordingly, assuming proper and long-term functioning of the disposal facility, exposure to the general public from these wastes is insignificant.
[6] Average plant personnel dose estimated from a collective dose of 122 person-rem/yr divided over 923 plant personnel. Exposure received for a working lifetime of 50 years. Actual personnel doses will vary with job functions and will be managed by the PINGP radiation protection program.

Table 4-11 Summary of Radiological Effluents from the Prairie Island Plant with Extended Power Uprate[1]

Effluents	Estimated Annual Radiological Release - Activity (curies /yr)
Gaseous Effluents	12.3
Liquid Effluents	689.1
Solid Wastes	377.0
TOTAL	1,078.4

[1] This table incorporates information from Chapter 1, Tables 4-7, 4-8, and 4-9.

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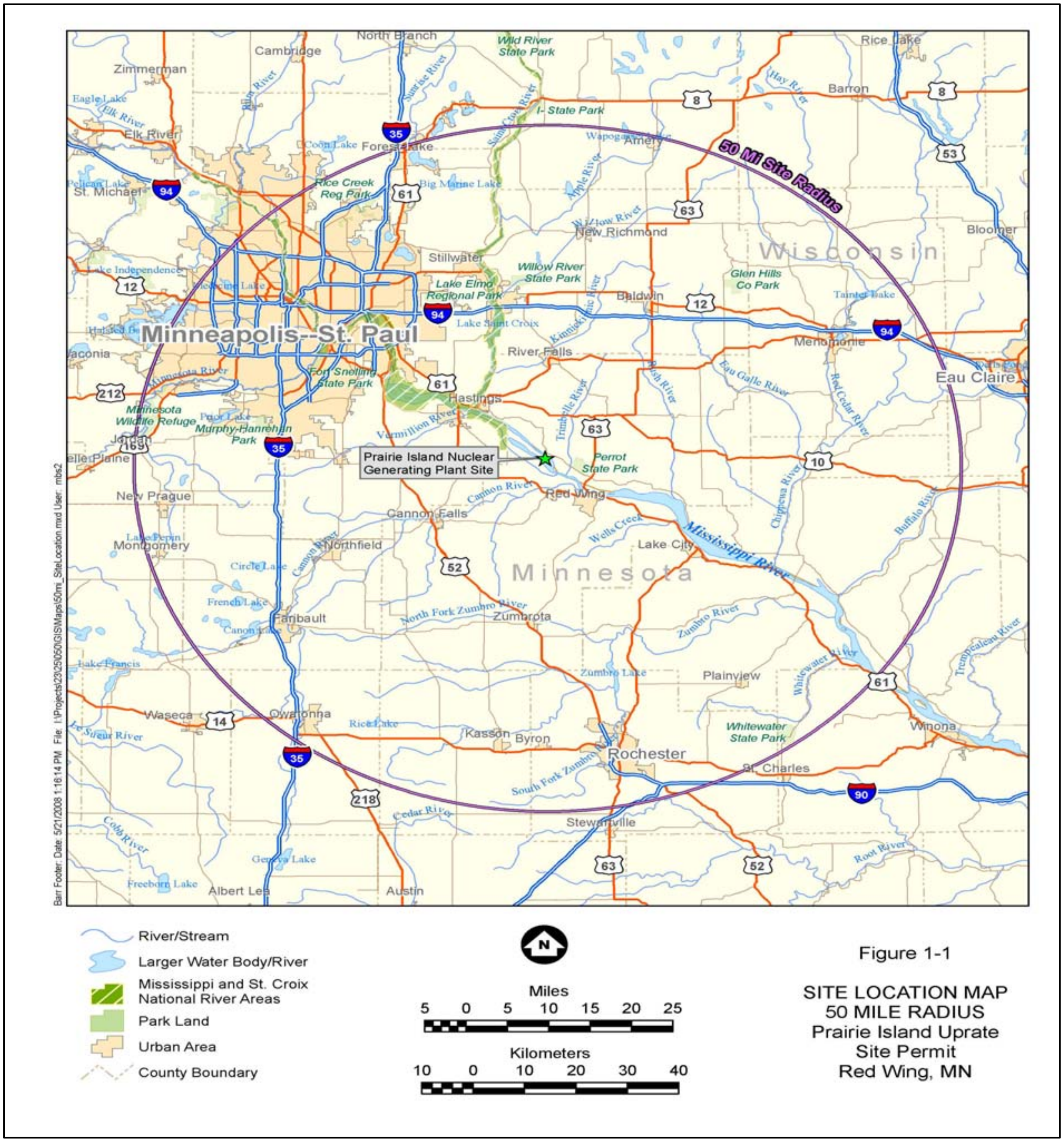
FIGURES

Figure 1-1: PINGP 50-mile Radius Map



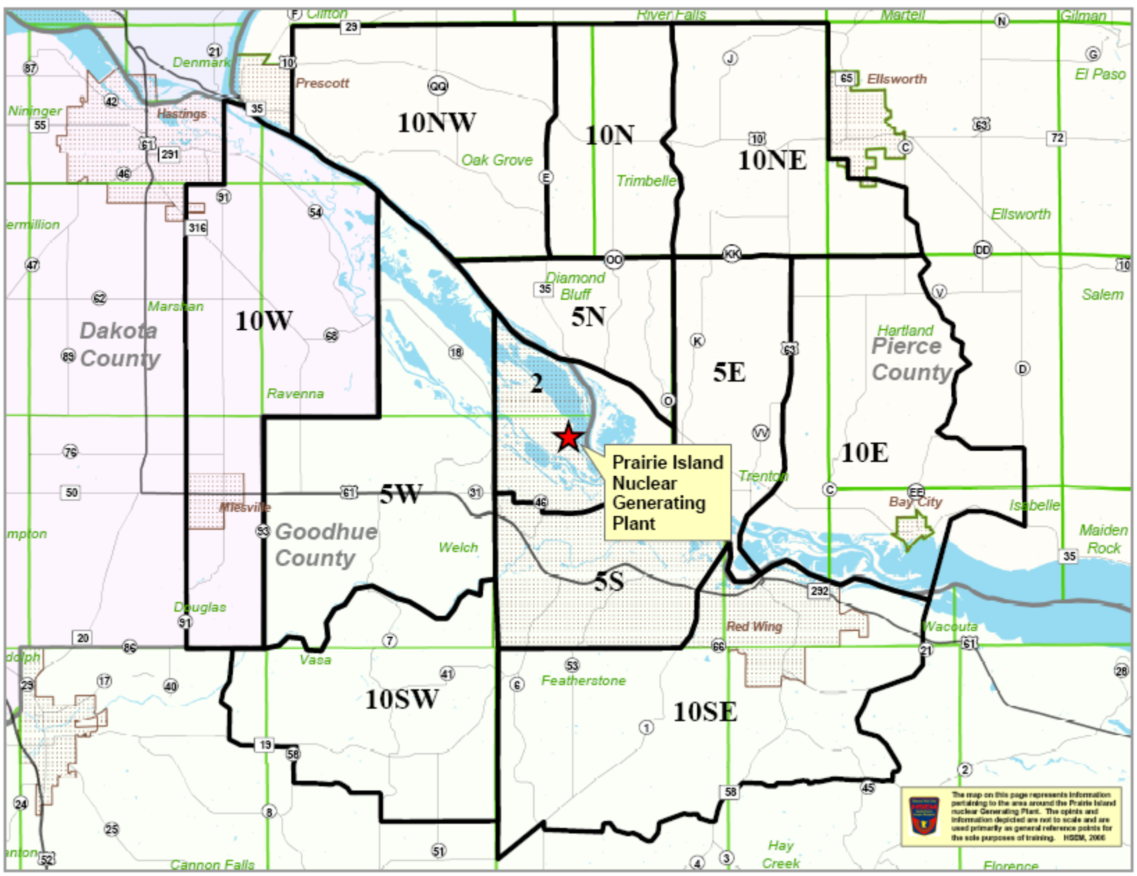


Figure 1-2: PINGP Ten mile Radius Map

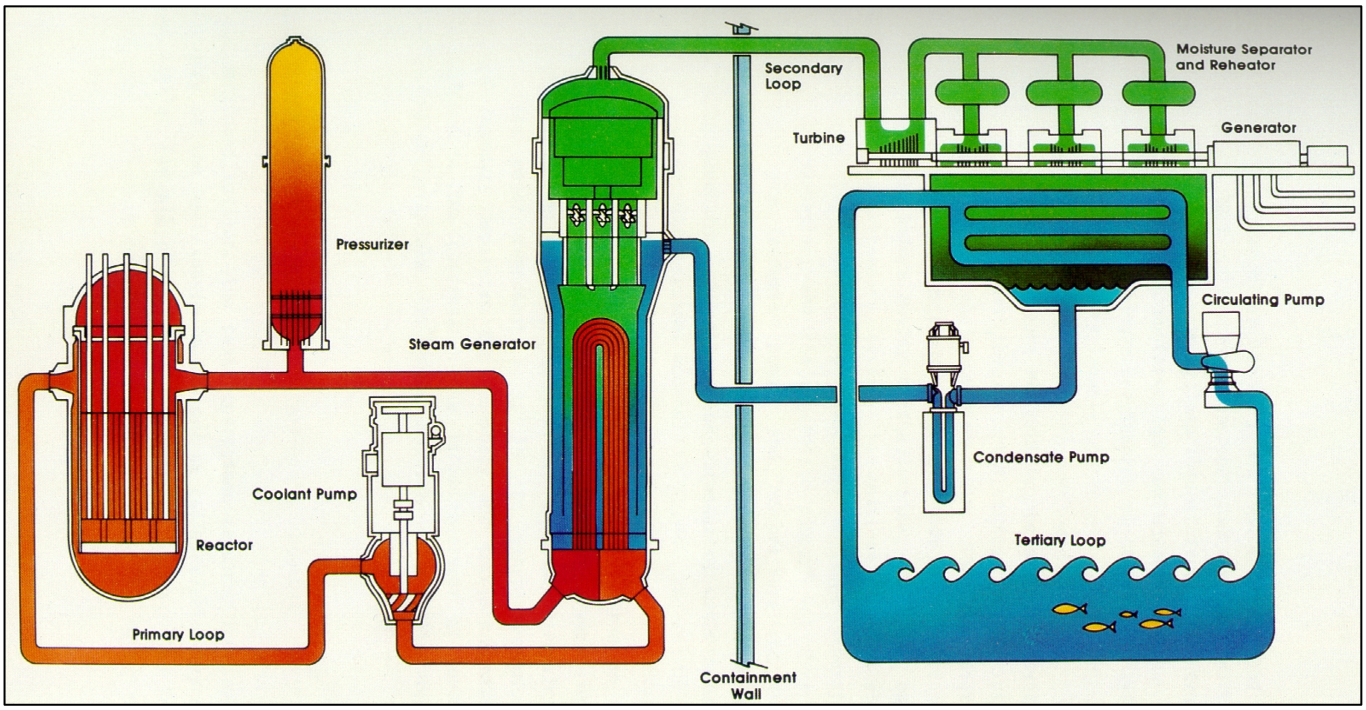


Figure 1-3: Schematic of a Pressurized Water Reactor System

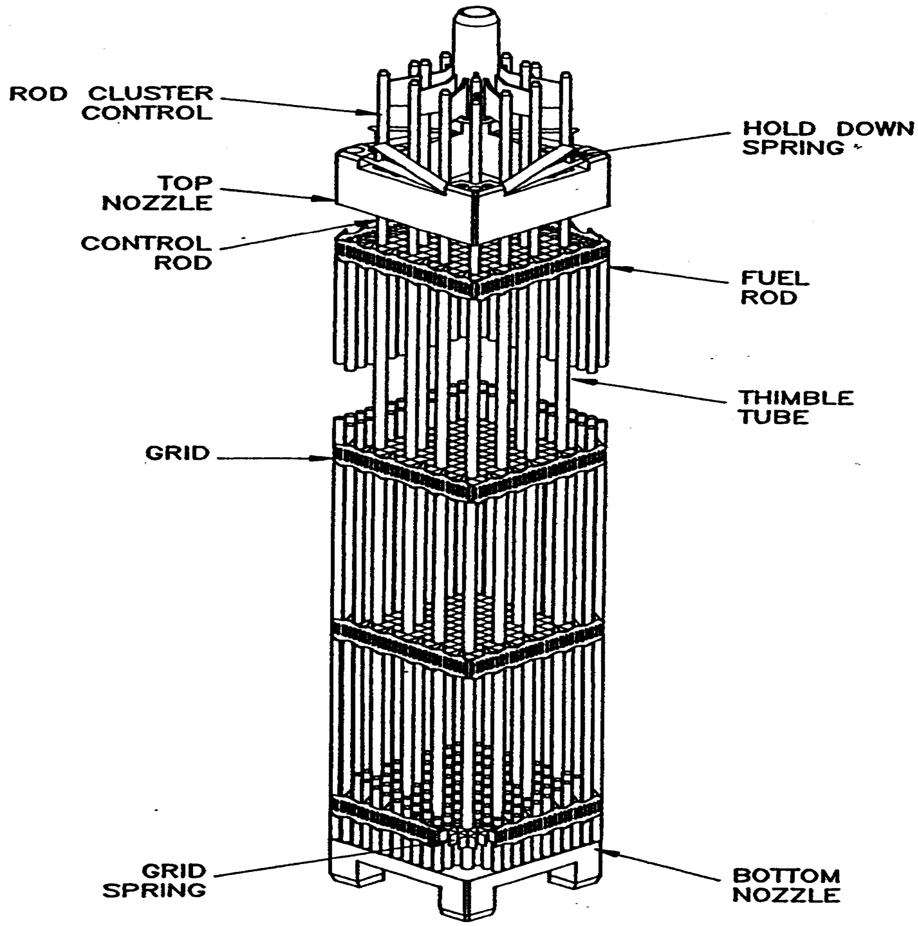
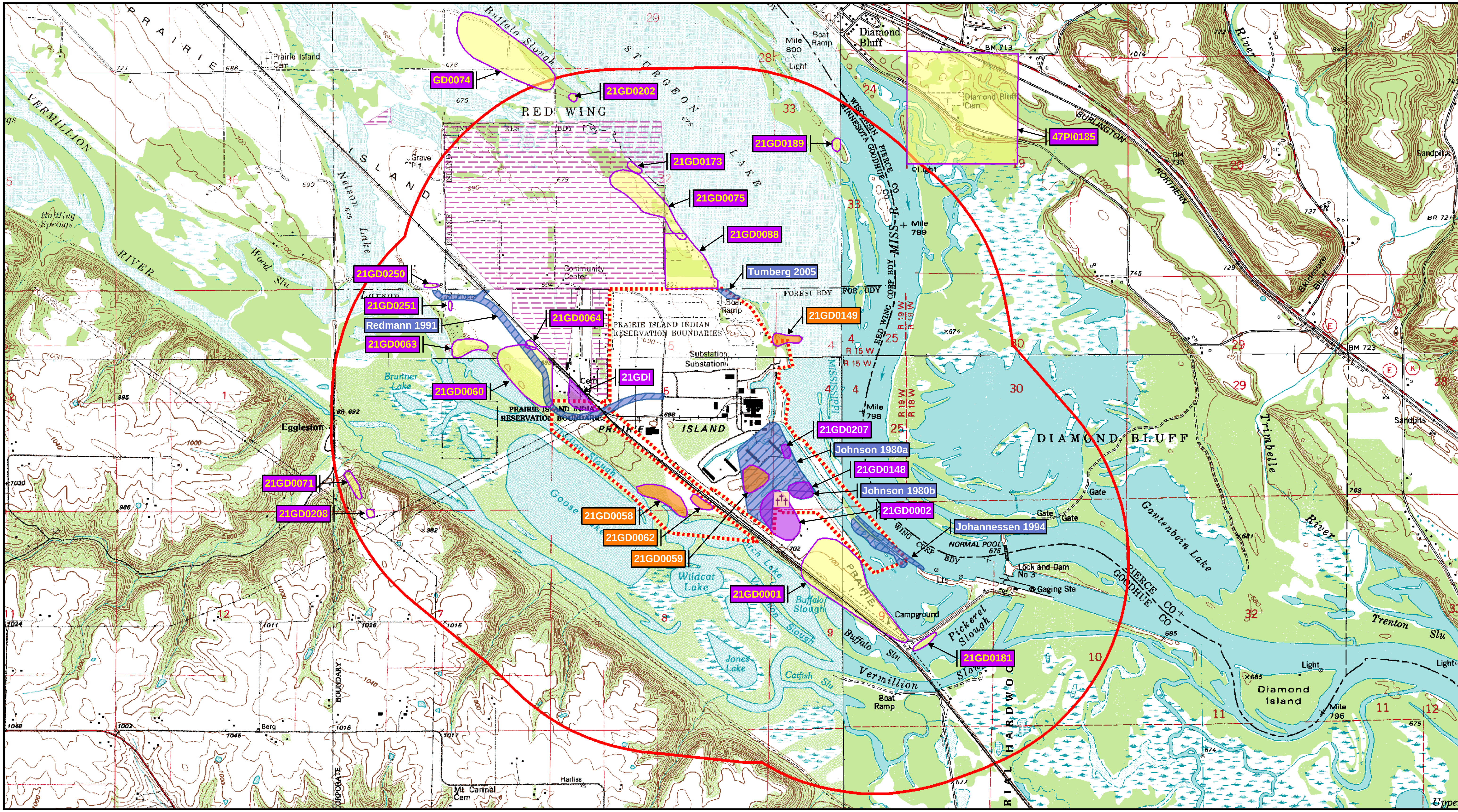


Figure 1-4: Schematic of a Fuel Assembly



Source: USGS 7.5 Minute Series Topographic Quadrangles; MN SHPO, WI SHPO, 106 Group

Map Produced by the 106 Group - 01/02/2008

Prairie Island Nuclear Generating Plant
Cultural Resources Assessment
Goodhue County, Minnesota

0 0.5 1 1.5 Kilometers

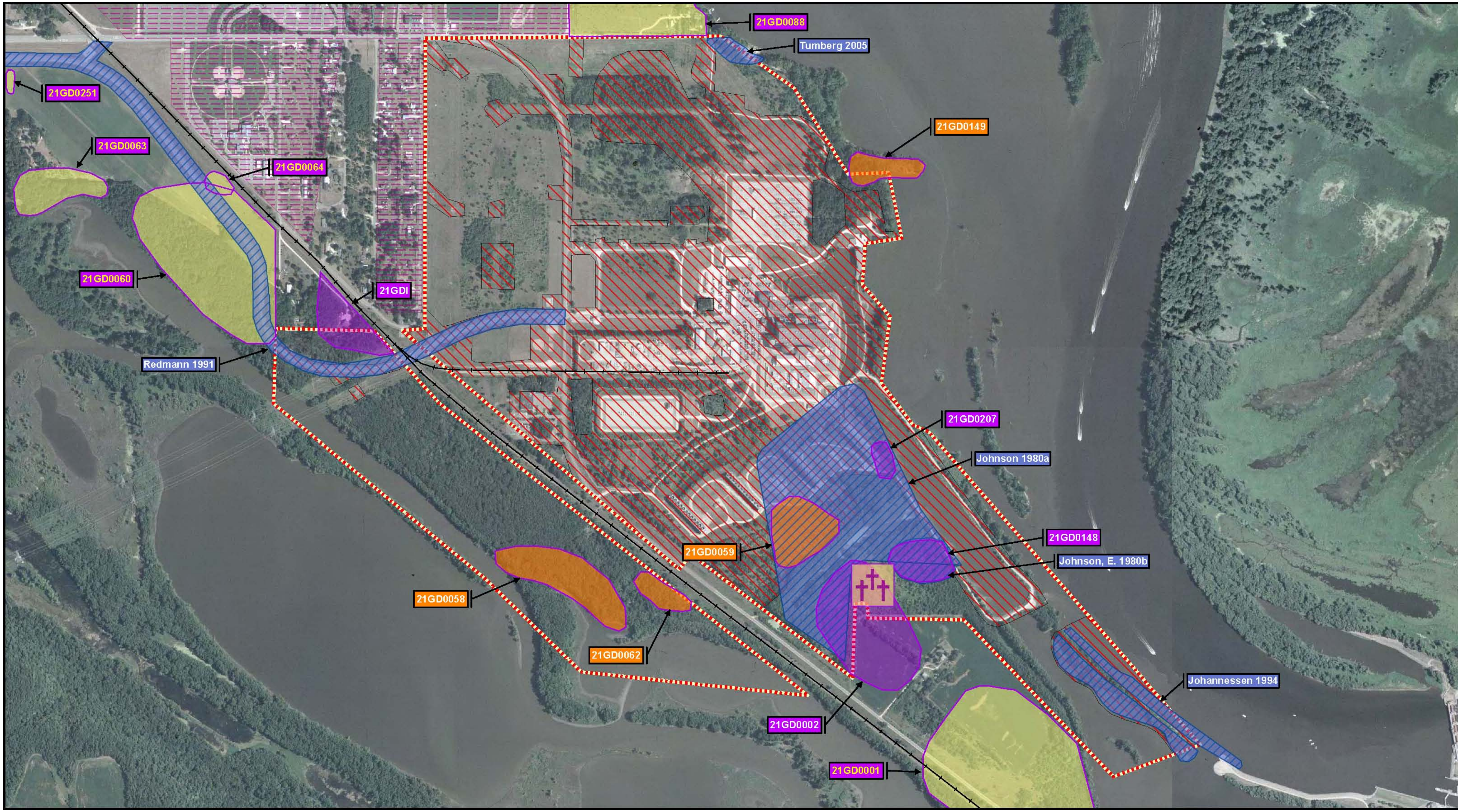
0 0.25 0.5 0.75 1 Miles

1:26,000

Study Area (Plant Boundary)
One Mile Context Study Area
Previously Identified Archaeological Site in Project Area
Previously Identified Mound / Burial Site in Project Area
Previously Identified Archaeological Site / Mound Outside Project Area
Historical Cemetery Location
Previous Archaeological Investigation
Prairie Island Indian Community

Study Location and
Previous Cultural Resources Investigations

Figure 4-1



Source: USDA FSA Aerial Photograph 2003-4; MN SHPO, WI SHPO, 106 Group Map Produced by the 106 Group - 01/02/2008

Cultural Resources Assessment Results

Prairie Island Nuclear Generating Plant Cultural Resources Assessment Goodhue County, Minnesota

Study Area (Plant Boundary)

Historical Cemetery Location

Previously Identified Archaeological Site

Previously Identified Mound / Burial Site

Previously Identified Archaeological Site / Mound Outside Project Area

Historically Disturbed Area

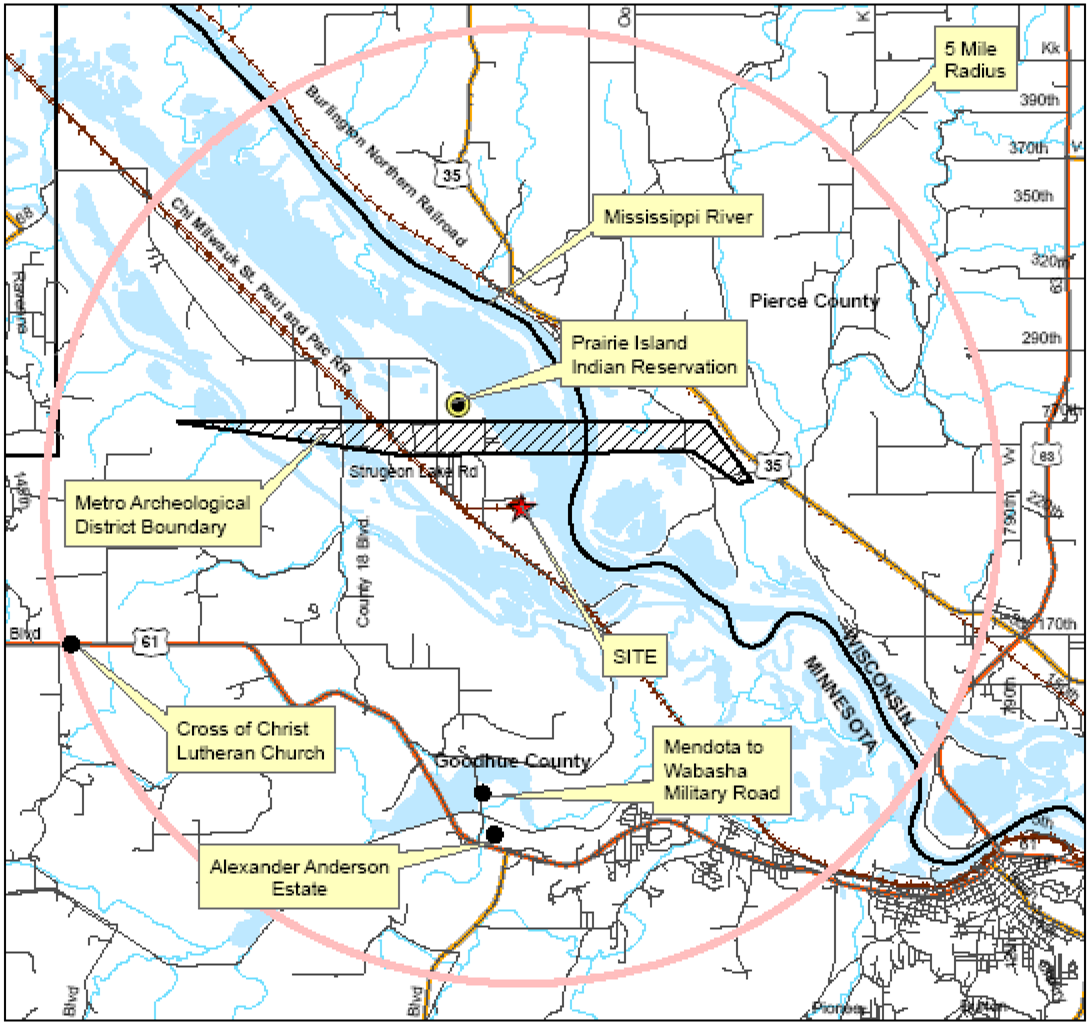
Previous Archaeological Investigation

Prairie Island Indian Community

Figure 4-2

Figure 4-3
Historic and Cultural Resources

PRAIRIE ISLAND NUCLEAR PLANT



Legend

Ferdeal Historic Area

National Register of Historic Places Site

Indian reservation

\\SWBOSFS01\ENVIR\Prairie_Island\Prairie_Island_Historic2.mxd - 01_10_07
Source:http://www.dot.state.mn.us/tda/basemap/county/statewide.html
http://deli.dnr.state.mn.us/
http://data.geocomm.com/

0 0.75 1.5 3 Miles
1 inch equals 1.5 miles

Shaw Environmental, Inc.

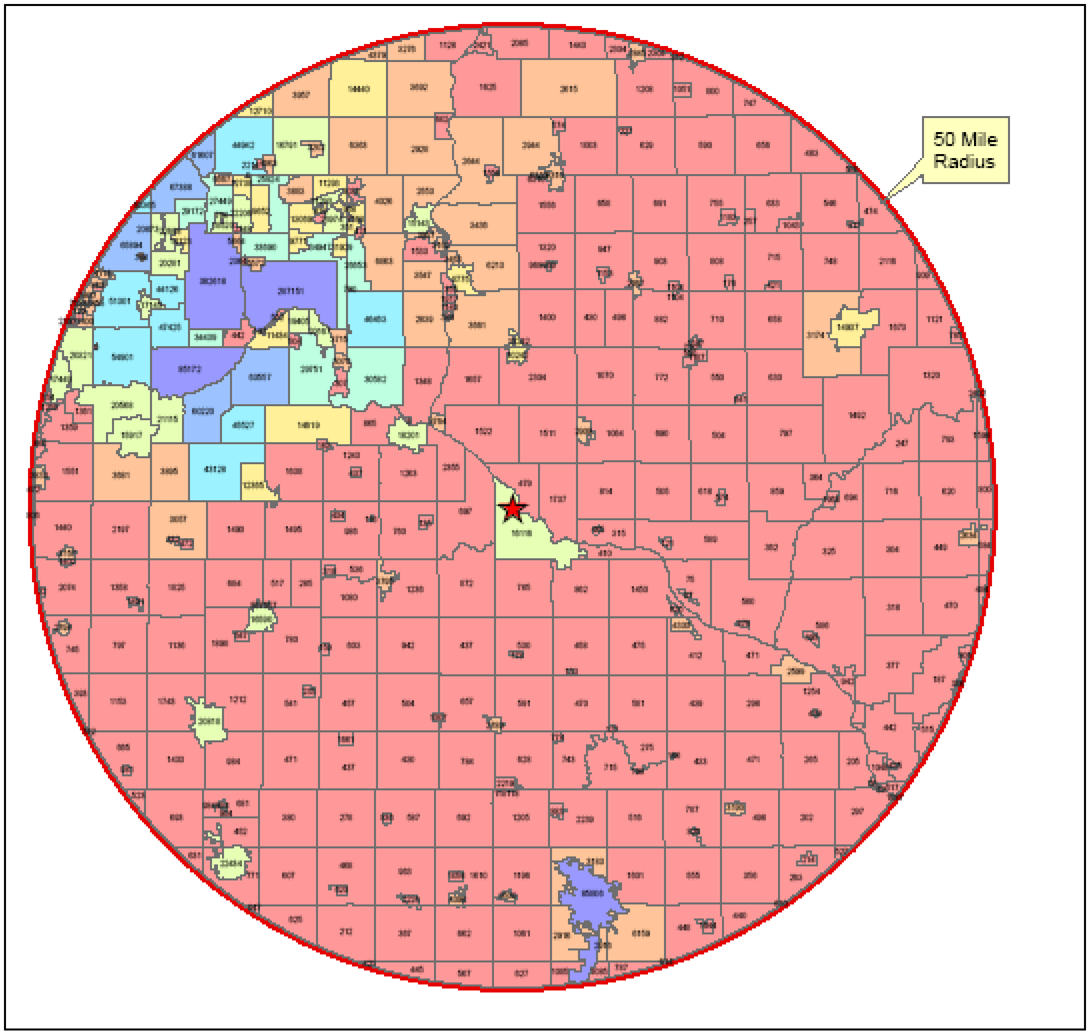
Prairie Island Spent Fuel Storage Certificate of Need

Figure 4-4

Population

PRAIRIE ISLAND NUCLEAR PLANT

Minor Civil Divisions 2000 Census Data



Legend

POPULATION

- 0 - 2500
- 2501 - 7500
- 7501 - 15000
- 15001 - 25000
- 25001 - 35000
- 35001 - 55000
- 55001 - 85000
- 85001 - 382618

Total Population
Within 50 Miles
2,949,234

N
W E
S

Shaw Shaw Environmental, Inc.

Prairie Island Spent Fuel Storage
Certificate of Need

\\SWBOSFS01\ENVIR\Prairie_Island\Prairie_Island_environmental.mxd - 01_10_07
Source:http://www.dot.state.mn.us/tda/basemap/county/statewide.html
http://deli.dnr.state.mn.us/ US Census Data
http://data.geocomm.com/

0 5 10 20 30 40 Miles

1 Inch equals 15.0 miles

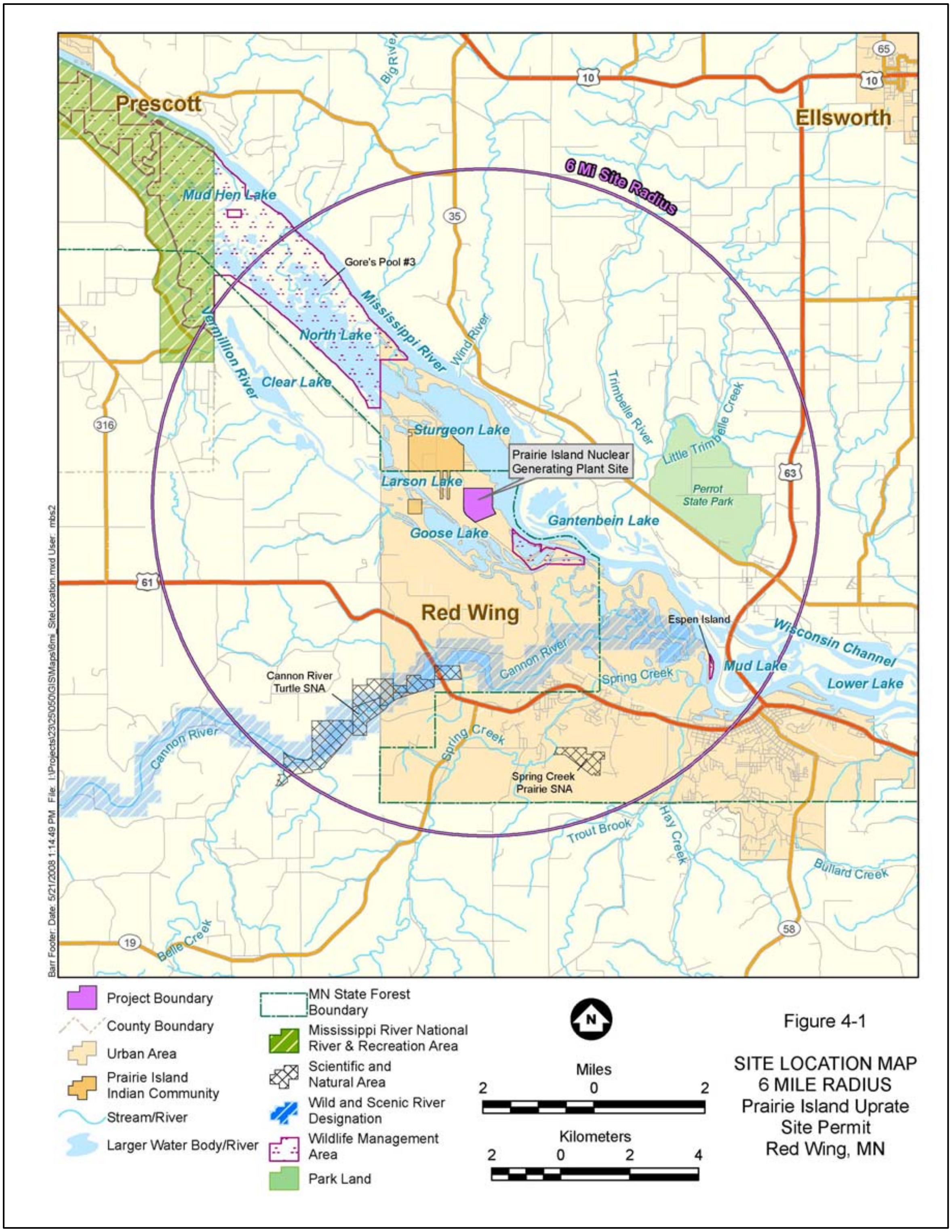
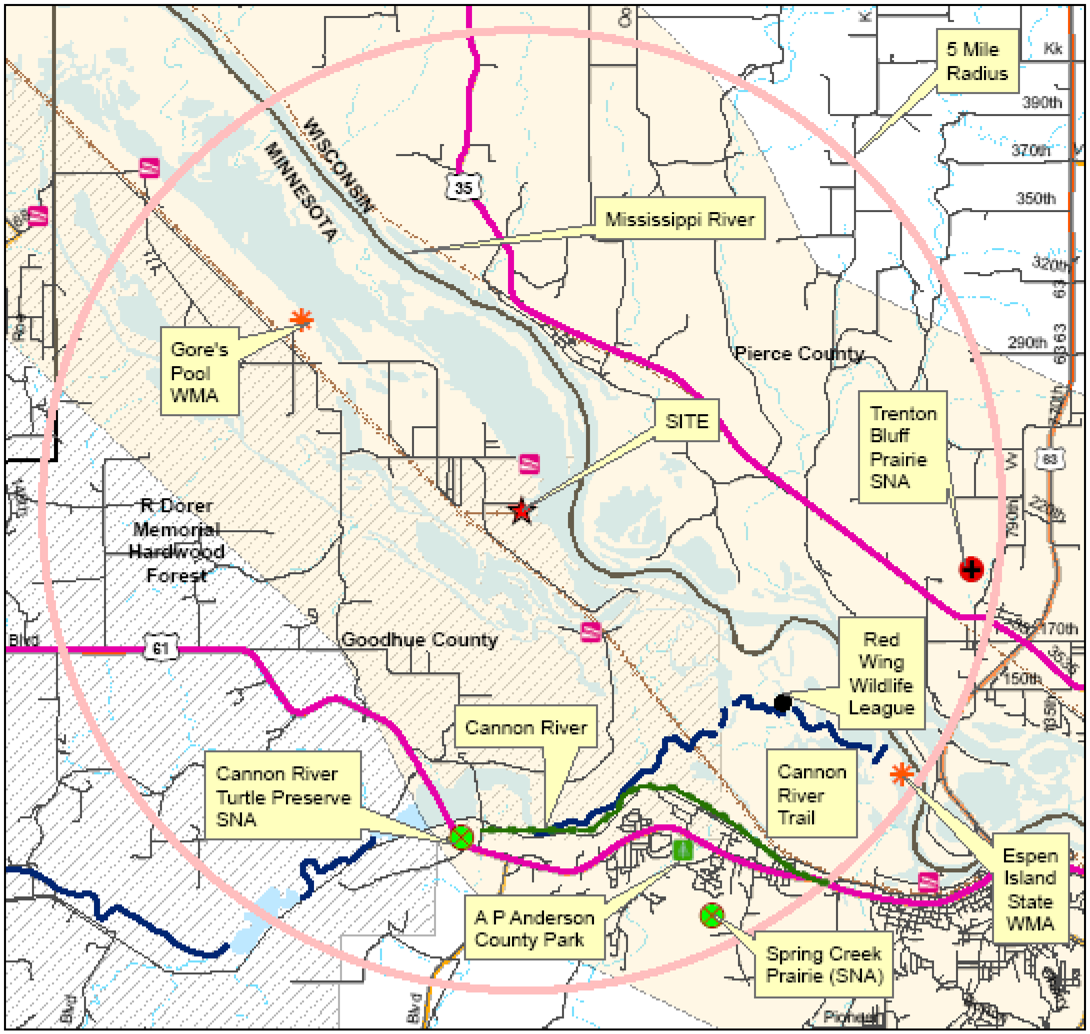


Figure 4-5 PINGP Site Location Map (W/ 6-Mile Radius)

Figure 4-6
Environmentally Sensitive Resources
PRAIRIE ISLAND NUCLEAR PLANT



Legend

- Mississippi Flyway
- Great River Road
- Minnesota State Wild & Scenic River
- Cannon River Trail
- Minnesota State Forests
- County Line
- Minnesota State Scientific and Natural Areas (SNA)
- Minnesota State Wildlife Management Areas (WMA)
- Wisconsin State Natural Areas
- County Parks
- Water Access MN
- Local Resources

0 0.75 1.5 3 Miles

1 inch equals 1.5 miles

\\SWBOSFS01\ENVIR\Prairie_Island\Prairie_Island_Envir_Sens_Resource2.mxd - 10_19_05
Source: http://www.dot.state.mn.us/tda/basemap/county/statewide.html
http://deli.dnr.state.mn.us/
http://data.geocomm.com/

Shaw Shaw Environmental, Inc.

Prairie Island Spent Fuel Storage Certificate of Need

Figure 4-7 PINGP Noise Measurement Locations

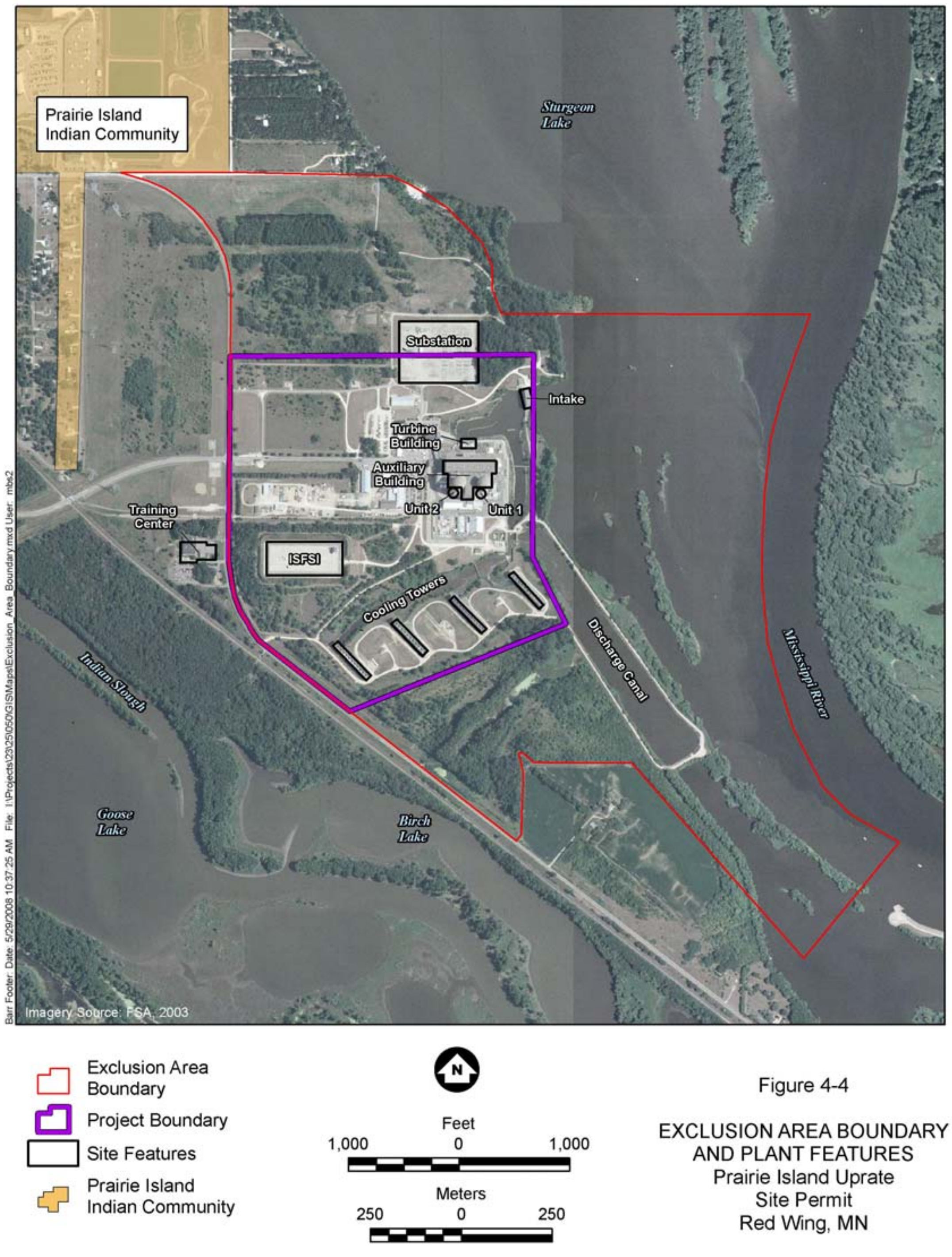


Figure 4-8 PINGP Exclusion Area Boundary and Plant Features

Figure 4-9a

Prairie Island Area TLD Locations
Minnesota Department of Health, July 2008

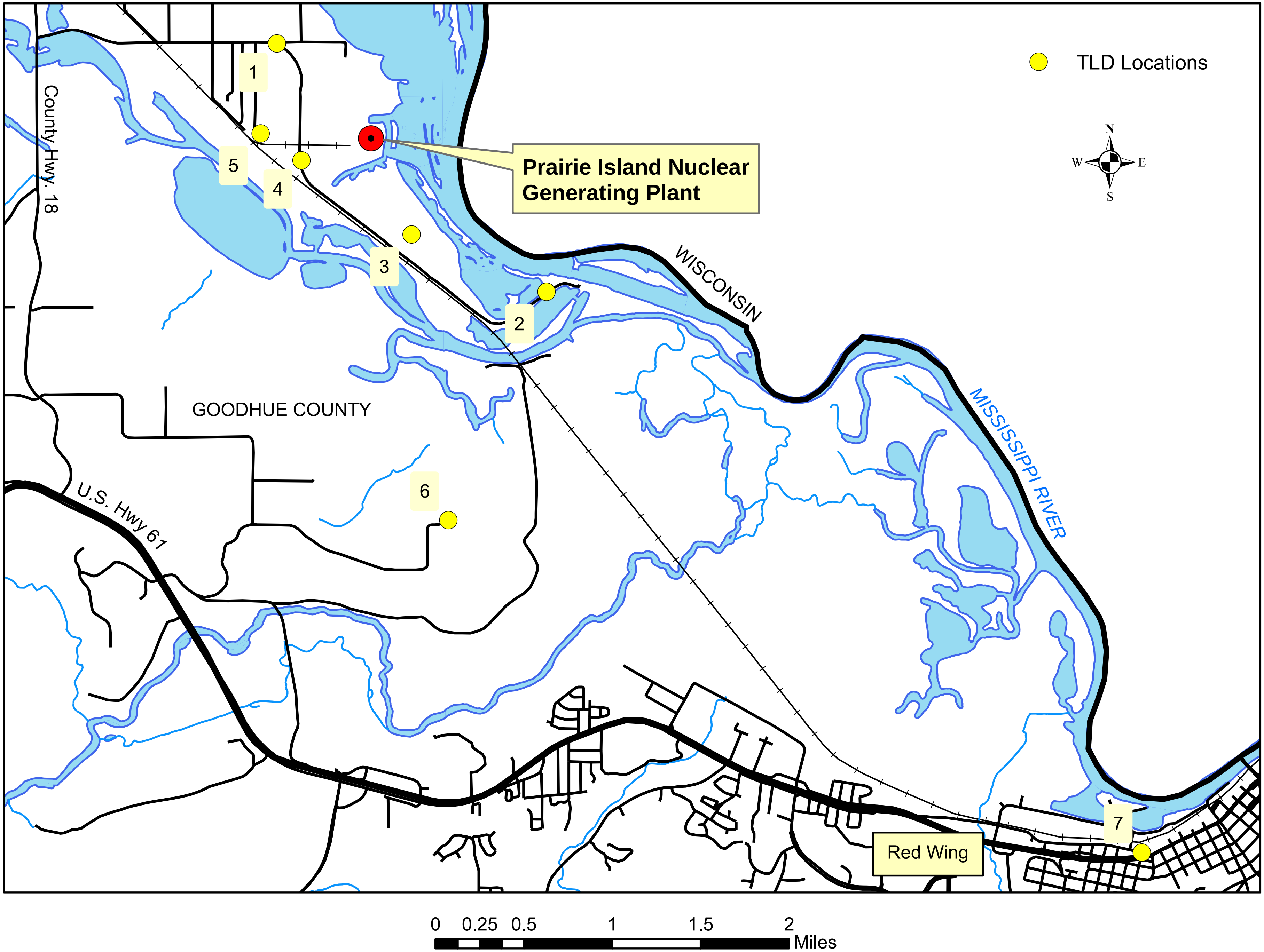
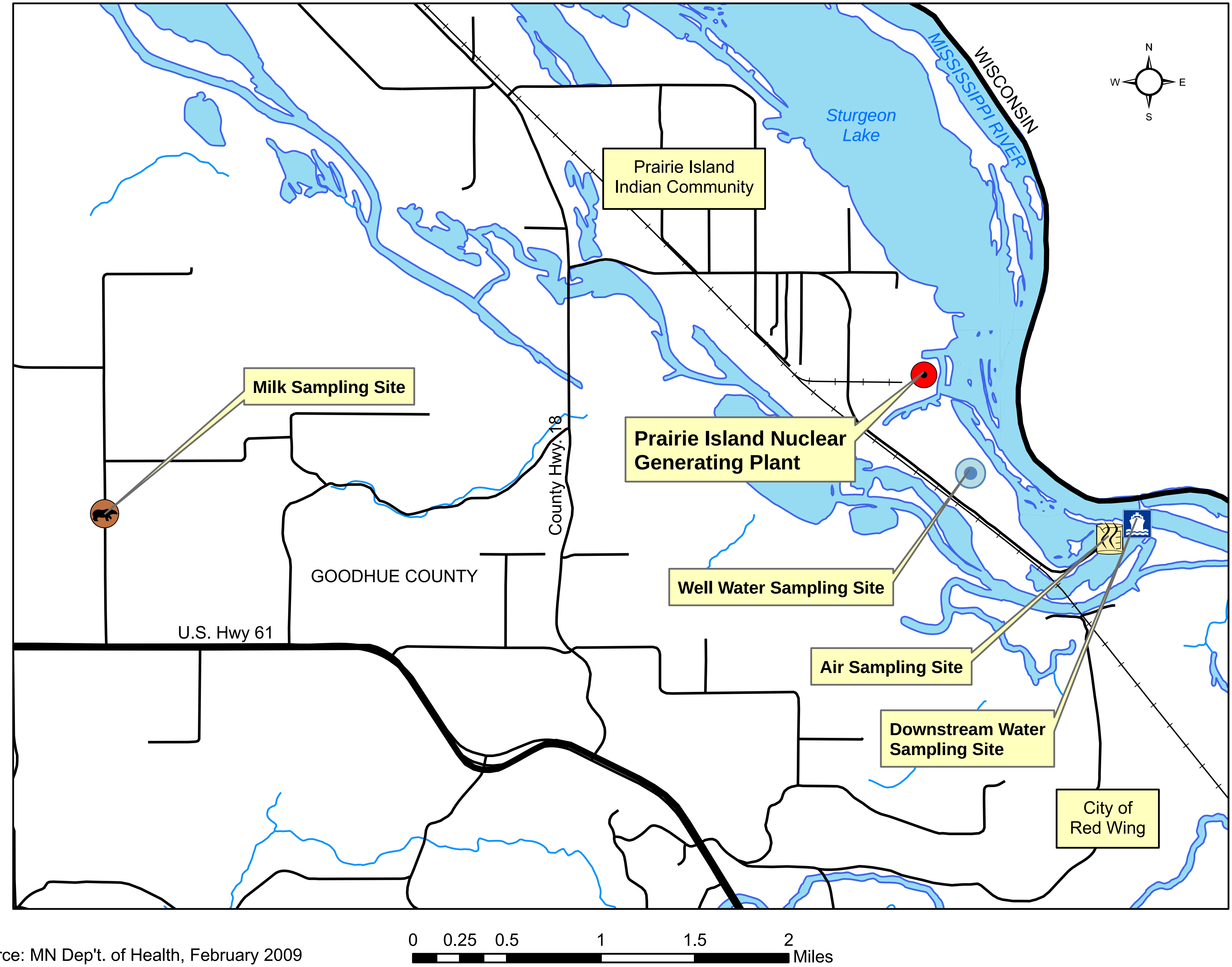


Figure 4-9b

PRAIRIE ISLAND NUCLEAR GENERATING PLANT AND SAMPLING SITE LOCATIONS



Source: MN Dep't. of Health, February 2009

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APPENDIX A

STATE OF MINNESOTA

OFFICE OF ENERGY SECURITY

In the Matter of Xcel Energy's Application for a Certificate of Need and Application for a LEPGP Site Permit for the proposed EPU & ISFSI Expansion projects at the Prairie Island Nuclear Generating Plant.	**ENVIRONMENTAL IMPACT STATMENT SCOPING DECISION** **PUC Docket No. E002/CN-08-510** **PUC Docket No. E002/GS-08-690** **PUC Docket No. E002/CN-08-509**

The above-entitled matter came before the Director of the Office of Energy Security (OES) for a decision on the scope of the Environmental Impact Statement (EIS) to be prepared on the proposed Extended Power Uprate and ISFSI Expansion Projects at the Prairie Island Nuclear Generating Plant.

On August 1, 2008, Xcel Energy submitted a large electric power generating plant (LEPGP) Site Permit application to the Minnesota Public Utilities Commission (Commission) for the proposed Prairie Island Nuclear Generating Plant (PINGP) Extended Power Uprate (EPU) project.

The proposed EPU of 164 MWe consists of an 82 MWe net capacity uprate at Unit 1 and an 82 MWe net uprate at Unit 2. Xcel Energy proposes to complete the uprate on Unit 1 during the 2012 refueling outage and on Unit 2 during the 2015 refueling outage.

On August 15, 2008, the Commission released an Order accepting the Site Permit Application as complete.

The proposed EPU project is also required to obtain a Certificate of Need (CON) from the Commission pursuant to sections 216C.05 to 216C.30. Xcel Energy filed an application for a CON with the Commission for the project on May 16, 2008, in accordance with Minnesota Rules Chapter 7829 and 7849.

Along with its May 16, 2008, filing, Xcel Energy also filed a CON for additional dry cask storage at the existing Independent Spent Fuel Storage Installation (ISFSI) at the PINGP. This filing was pursuant to Minn. Stat. § 116C.83, Minn. Stat. § 216B.243, and Minn. Rule 7855. The PINGP currently has State authorization for enough dry casks (29) to store the spent fuel generated until the end of the current operating licenses in 2013 and 2014; there are currently 24 dry casks at the PINGP ISFSI. In order for the reactors to continue operation through a license renewal period to 2033 and 2034, up to an additional 35 dry casks would need to be added to the existing ISFSI.

On July 15, 2008, the Commission accepted the two CON applications as complete (July 22, 2008 order). The docket numbers for the certificate of need for the Extended Uprate and the Additional Dry Cask Storage are E002/CN-08-509 and E002/CN-08-510, respectively.

Having reviewed the comments submitted and consulted with EFP staff, I hereby make the following Scoping Order.

I. SUMMARY

The EIS will address the environmental impacts of the proposed expansion of the existing ISFSI and continued operation of the PINGP until 2034, including the incremental impacts associated with the 164

MW increase in output due to the proposed EPU.

Federal regulations preempt state authority over radiological health and safety; however, the EIS will address radiological safety issues to help inform the public, help compare generation alternatives, and potentially inform the regulatory process. The EIS will review and summarize existing information in this area but will not include detailed new analysis.

The EIS will assess the potential impacts of temporary, long-term on-site storage (up to 200 years and 98 dry casks) of the additional spent fuel generated at the PINGP during the re-licensing period.

The EIS will assess potential groundwater, surface water and floodplain impacts.

The EIS will include an evaluation of alternatives to meet the stated need for the 164 MW of base-load power that comprises the proposed EPU and an evaluation of generation alternatives to the continued operation of the PINGP until 2034.

For most topics, such as the project description and general environmental impacts, there is a large amount of existing information in the Site Permit Application, the CON Applications, supplemental materials, and other sources. In addition, the NRC will be completing a detailed supplemental EIS as part of its license renewal decision. Therefore, most relevant technical and environmental issues—other than an analysis of generation alternatives—are either (1) addressed in detail in the Site Permit and CON Applications, (2) preempted by federal regulations, (3) subject to detailed review in the federal EIS, or (4) a combination of the above. The EIS will verify, summarize, supplement and incorporate by reference this body of existing information as outlined in the Scoping EAW and OES Treatment of Scoping Comments Worksheets.

II. MATTERS TO BE ADDRESSED IN THE EIS

The EIS on the PINGP EPU and ISFSI Expansion projects will address the following matters:

CHAPTER 1 EXTENDED POWER UPRATE

1.0 INTRODUCTION
- 1.1 Project Description
  - 1.1.1 Description of Power Generating Equipment and Processes
  - 1.1.2 Air Emission Control Equipment
  - 1.1.3 Water Use
  - 1.1.4 Wastewater
  - 1.1.5 Solid and Hazardous Waste Generation
    - Excavated materials disposal
  - 1.1.6 Fuel Supply
    - Mining, processing, transportation
  - 1.1.7 Electrical Interconnection
  - 1.1.8 Operation & Maintenance
    - Equipment Inspections/Replacement
    - Water Treatment Chemicals

Incident reporting
1.2 Purpose
1.3 Sources of Information
1991 EIS
2.0 REGULATORY FRAMEWORK
2.1 Certificate of Need
2.2 Site Permit Requirement
3.2.1 Environmental Review
3.2.2 Public Hearing
2.3 NRC
2.4 Other Permits
Coordination between agencies
2.5 Issues Outside DOC OES EFP Authority
3.0 ALTERNATIVE TO THE EPU
3.1 No-build Alternative
3.2 Demand Side Management
Combined w/ other alternatives
3.3 Purchase Power
3.3.1 Long term Purchase Power
3.3.2 Short term Purchase Power
3.4 Alternative Fuels
3.4.1 Fossil Fuel Technologies
3.4.2 Renewable Resource Technologies
Biomass
3.5 Up-grading Existing Facilities
Blackdog
3.6 New Transmission
3.7 PINGP Waste Heat
4.0 ENVIRONMENTAL SETTING
Topography, geology, hydrology, flood plain, meteorological, flora/fauna
5.0 HUMAN AND ENVIRONMENTAL IMPACTS
5.1 Air Quality
5.2 Biological Resources
Flora
Fauna
Rare and Unique Natural Resources
5.3 Culture, Archeological and Historic Resources
5.4 Geology and Soils
5.5 Health and Safety
Consumables (plants, animals)
EMF
Psychology
Plant & community emergency planning/preparedness
5.6 Land Use
Zoning

Displacement
Recreational Areas
5.7 Noise
5.8 Socioeconomics
5.9 Transportation
5.10 Visual Impacts and Aesthetics
5.11 Water Resources
Surface Water
Lake Pepin ice cover, TMDL
Potential effect of "steam flow reversal"
Sediment distribution
Thermal discharge effects on dissolved O_2, pathogens, synergies w/ other wastes
Higgins Eye Pearly Mussel
Potential flooding
Groundwater
Wetlands
5.12 Waste Management and Disposal
Wastewater
Solid Waste
Hazardous Waste
5.13 Radiological
Monitoring plant operations
Review generic health studies
Plant waste, handling disposal
6.0 SUMMARY OF MITIGATIVE MEASURES and UNAVOIDABLE IMPACTS

CHAPTER 2 ADDITIONAL DRY CASK STORAGE EXPANSION
1.0 INTRODUCTION
2.0 REGULATORY FRAMEWORK
2.1 Federal Regulatory Processes (NRC)
2.2 Minnesota Regulatory Processes
2.3 Permits and Approvals
3.0 PROJECT DESCRIPTION
3.1 Project Setting
3.2 Independent Spent Fuel Storage Installation (ISFSI)
Operation & Maintenance
Monitoring & Inspection
Cask specifications
Security procedures
3.3 Spent Fuel Inventory
3.4 Plant Closure and Decommissioning
Funding
4.0 HUMAN AND ENVIRONMENTAL IMPACTS (NON-RADIOLOGICAL)
4.1 Geology and Soils

- 4.2 Biological and Ecologically Sensitive Resources
- 4.3 Water Resources
- 4.4 Cultural and Historical Resources
- 4.5 Traffic
- 4.6 Noise
- 4.7 Socioeconomics
- 4.8 Visual Impacts and Aesthetics
- 4.9 Health and Safety
- 4.10 Cumulative Impacts
  - 4.10.1 ISFSI Operations
  - 4.10.2 PINGP Operations

5.0 RADIOLOGICAL IMPACTS
- 5.1 Natural Background Radiation near the Prairie Island Plant
- 5.2 Radiological Monitoring and Radiation Associated with the Independent Spent Fuel Storage Installation
- 5.3 Analysis of Potential Impacts of Storage Installation Incidents
- 5.4 Cumulative Impacts
  - 5.4.1 ISFSI Operations
  - 5.4.2 PINGP Operations

6.0 INDEPENDENT SPENT FUEL STORAGE INSTALLATION ALTERNATIVES
- 6.1 Reprocessing Spent Nuclear Fuel
- 6.2 Private and Off-Site Fuel Storage
- 6.3 Federal Geologic Depositories, Yucca Mountain
- 6.4 Alternatives to Increase Storage Pool Capacity
- 6.5 Alternative Dry Cask System Technologies
- 6.6 The "No Action" Alternative

7.0 PRAIRIE ISLAND NUCLEAR GENERATING PLANT ALTERNATIVES
- 7.1 PINGP Generation and Role in Minnesota Energy Supply
- 7.2 Alternatives to Continued Operation of the PINGP
- 7.3 Comparison of the Environmental Impacts of Alternatives

The above outline is not intended to serve as a "Table of Contents" for the EIS document, and as such, the organization (i.e., structure of the document) of the information and the data may not be similar to that appearing in the EIS.

III. MATTERS NOT WITHIN THE SCOPE OF THE EIS

The following issues will not be addressed in the Environmental Impact Statement.

Prairie Island Plant Radiation and Safety. The EIS will summarize the environmental impacts of continued operation of the PINGP, but will not include a detailed study of these issues because the NRC will complete a detailed evaluation of environmental impacts, and mitigation options, of continued plant operations during its license renewal review. Likewise, the EIS will summarize but not evaluate potential mitigation methods regarding radiation and safety issues of continued operation of the plant because the NRC has sole regulatory jurisdiction over those issues.

Storage Technology, Accidents, Terrorism. The EIS will summarize but not evaluate options for dry cask storage because the NRC has sole jurisdiction over whether and how spent fuel is stored on site at nuclear power plants, including ISFSI design and safety from threats such as accident and terrorism. Likewise, the EIS will not evaluate life-cycle safety of the ISFSI, ISFSI management, or the adequacy of security at the generating plant or the proposed ISFSI.

Nuclear Fuel Cycle. The EIS will not address the impacts of the nuclear fuel cycle because that issue will be addressed in the federal generic and supplemental EIS to be completed during the federal re-licensing review.

Off-Site Alternatives. The EIS will not evaluate ISFSI sites outside the PINGP boundaries because the NRC has jurisdiction over whether such a site can be considered. Additionally, the Commission's authority is "limited to the storage of spent nuclear fuel generated by a Minnesota nuclear generation facility and stored on the site of that facility" (Minnesota Statue 116C.83, subdivision 4, item b).

Economic Feasibility of Alternatives. The analysis of the economic feasibility will cover the same alternatives for which environmental impacts are evaluated, but will incorporate by reference the analysis of the Department of Commerce in the CON proceeding.

Transportation of Spent Fuel from PINGP. While certain matters regarding Yucca Mountain will be described in the EIS, the EIS will not include a discussion of any issues related to the transportation of spent nuclear fuel from Minnesota to Yucca Mountain.

Nuclear Regulatory Commission Standards. While the EIS will reference certain standards and rules promulgated by the NRC, the EIS will not address the adequacy of any federal standards that are applicable to the ISFSI or the generating plant. Nor will the EIS evaluate potential mitigation measures to reduce radiation exposure, accident risks or security requirements.

IV SCHEDULE

The OES staff intends to complete the draft EIS by March 17, 2008.

Signed this 14th day of November, 2008

STATE OF MINNESOTA
OFFICE OF ENERGY SECURITY

William L. Glahn

William Glahn, Director
Office of Energy Security

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APPENDIX B

STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

LARGE ELECTRIC POWER GENERATING PLANT

SITE PERMIT

FOR

MONTICELLO NUCLEAR GENERATING PLANT

IN

WRIGHT COUNTY, MINNESOTA

ISSUED TO

XCEL ENERGY

PUC DOCKET NO. E-002/GS-07-1567

In accordance with the requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7849.5010 - .6500, this Site Permit is hereby issued to:

XCEL ENERGY

Xcel Energy is authorized by this permit to construct and operate an Extended Power Uprate capable of producing an additional 71 megawatts (MW) on the site of the Monticello Nuclear Generating Plant in Wright County, Minnesota, identified in this Permit and in compliance with the conditions specified in this Permit.

Approved and adopted this 23rd day of December, 2008
BY ORDER OF THE COMMISSION

Mark E. Oberlander for

Burl W. Haar,
Executive Secretary

This document can be made available in alternative formats; i.e. large print or audio tape by calling (651) 201-2202 (Voice) or 1-800-627-3529 (TTY relay service).

I. SITE PERMIT

The Minnesota Public Utilities Commission ("Commission") hereby issues this Site Permit to Xcel Energy, pursuant to Minnesota Statute Chapter 216E and Minnesota Rules Chapter 7849, to construct the Extended Power Uprate (EPU), capable of producing an additional 71 megawatts (MW), at the Monticello Nuclear Generating Plant (MNGP) in Wright County, Minnesota.

II. PROJECT DESCRIPTION

The MNGP utilizes a boiling water reactor (BWR). 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. 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.

The plant is located on the western bank of the Mississippi River in Wright County, approximately 50 miles northwest of Minneapolis. The MNGP is owned and operated by Northern States Power Company, a Minnesota corporation ("Xcel Energy" or "Company"). The MNGP had been operated by Nuclear Management Company, LLC ("NMC"), under contract with Xcel Energy, but the functions of NMC have been reintegrated into Xcel Energy.

Xcel Energy proposes to uprate the electrical generating capacity of MNGP from 585 megawatts electric to 656 megawatts electric (MWe). The 71 MWe EPU will be achieved by increasing the steam output of the nuclear reactor and capturing this additional output with improved electrical generation equipment and systems. Steam output will be increased through an increase in the number of new fuel assemblies replaced in the reactor core at each refueling. Equipment and systems modifications include:

- Replacement of the high pressure turbine;
- Modification of the low pressure turbine;
- Replacement of condensate pumps, motors, and demineralizers;
- Upgrades of electrical power supplies and power cooling systems.

The modifications to the plant necessary for the EPU will occur in two phases during routine refueling outages at the plant in 2009 and 2011. All modifications, except for limited power supply upgrades, will occur within the current physical footprint of MNGP. No new structures are proposed. Operation at the increased power level following the 2009 refueling outage will occur following receipt of the operating license amendment approving reactor operations at the increased power level from the Nuclear Regulatory Commission ("NRC"). Approval from the NRC is expected in early 2010.

III. DESIGNATED SITE

The MNGP 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. 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. The remaining acres are undeveloped, with approximately 174 acres leased by local farmers for growing row crops and 144 acres under lease for recreational use.

The project location and site layout are shown in **Attachment 1**. The site is more specifically described in the Site Permit Application and in the Environmental Assessment.

IV. PERMIT CONDITIONS

The following conditions shall apply to the construction of the facility.

A. **Contact Information.** At least fourteen (14) days prior to the start of each of the 2009 and 2011 refueling outages, the Permittee shall advise the Commission in writing of the person or persons designated as the contact representative for the Permittee. This person's address, phone number, and emergency phone number shall be provided to the Commission, who may make the information available to local residents, public officials and other interested persons. The Permittee may change its field representative at any time upon written notice to the Commission.

B. **Increased Power Level.** Within 30 days of achieving operations at the increased EPU power levels (an increase is anticipated in late 2009 or early 2010 following NRC approval of the Monticello EPU, and another increase is anticipated following completion of the refueling outage in 2011), the Permittee shall notify the Commission in writing of the increased power level achieved and address any issues affecting the ability of the plant to achieve its anticipated power output as a result of the uprate.

C. **Work Completion.** Within 120 days of the plant's return to service following the 2009 and 2011 refueling outages, the Permittee shall notify the Commission in writing of the completion of the EPU work performed during the outage. The communication shall address the main modifications as outlined below and whether any significant issues were encountered with the implementation of each.

- Modification of the low pressure turbine sections (2009)
- Replacement of the high pressure turbine section (2009)
- Condensate demineralizer replacement (2011)
- Upgrades to isophase bus duct cooling system (2009)
- Replacement of condensate pumps and motors (2011)
- Upgrade of offsite power supplies to power larger plant loads (2011)
- Replacement, or modification, of the steam dryer (2011)
- Rewind of the main generator stator (2011)
- Replacement of feedwater pumps and motors (2011)
- Feedwater heater drain cooler capacity (2011)

D. Other Requirements. The Permittee shall comply with all applicable state rules and statutes. The Permittee shall obtain all required permits, or permit amendments required for the project and comply with the conditions of these permits.

E. Delay in Construction. If the Permittee has not commenced construction or improvement of the project within four (4) years from the date of issuance of this Permit, the Commission shall consider suspension of the Permit in accordance with Minn. Rule 7849.5970.

V. PERMIT AMENDMENT

This permit may be amended by the Commission. Any person may request an amendment of this permit pursuant to Minn. Rule 7849.5990 by submitting a request to the Commission in writing describing the amendment sought and the reasons for the amendment. The Commission will mail notice of receipt of the request to the Permittee. The Commission may amend the permit after affording the Permittee and interested persons such process as is required.

VI. TRANSFER OF PERMIT

The Permittee may request that the Commission transfer this permit to another person or entity pursuant to Minn. Rule 7849.6000. The Permittee shall provide the name and description of the person or entity to whom the permit is requested to be transferred, the reasons for the transfer, a description of the facilities affected, and the proposed effective date of the transfer. The person to whom the permit is to be transferred shall provide the Commission with such information as the Commission shall require in determining whether the new permittee can comply with the conditions of the permit. The Commission may authorize transfer of the permit after affording the Permittee, the new permittee, and interested persons such process as is required.

VII. REVOCATION OR SUSPENSION OF THE PERMIT

The Commission may initiate action to suspend or revoke this permit at any time. Grounds for suspension or revocation include:

1) A false statement was knowingly made in the application or in accompanying statements or studies required of the applicant, and a true statement would have warranted a change in the Commission's findings;

2) There has been a failure to comply with material conditions of this permit, or there has been a failure to maintain health and safety standards; or

3) There has been a material violation of a provision of an applicable statute or rule or an order of the Commission.

In the event the Commission shall determine that it is appropriate to consider suspension or revocation of this permit, it shall act in accordance with all applicable statutes and rules, including Minnesota Statutes Section 216E.14. The Commission may require the Permittee to undertake corrective measures in lieu of suspending or revoking this permit pursuant to Minn. Rule 7849.6010.

VIII. PERMIT COMPLIANCE

Failure to timely and properly make compliance filings required by this permit is a failure to comply with the conditions of this permit. Compliance filings must be eFiled through the Department of Commerce eDocket system in accordance with the Commission procedure for compliance filings attached to this permit (**Attachment 2**).

For ease of use, a compilation of compliance filings required under this permit is attached (**Attachment 3**).

IX. RIGHT OF ENTRY

The Permittee shall allow Commission designated representatives to perform the following, upon reasonable notice, upon presentation of credentials and at all times in compliance with the Permittee's site safety and security standards:

1) To enter upon the facilities easement of the property for the purpose of obtaining information, examining records, and conducting surveys or investigations;

2) To bring such equipment upon the facilities easement of the property as is necessary to conduct such surveys and investigations;

3) To sample and monitor upon the facilities easement of the property; and

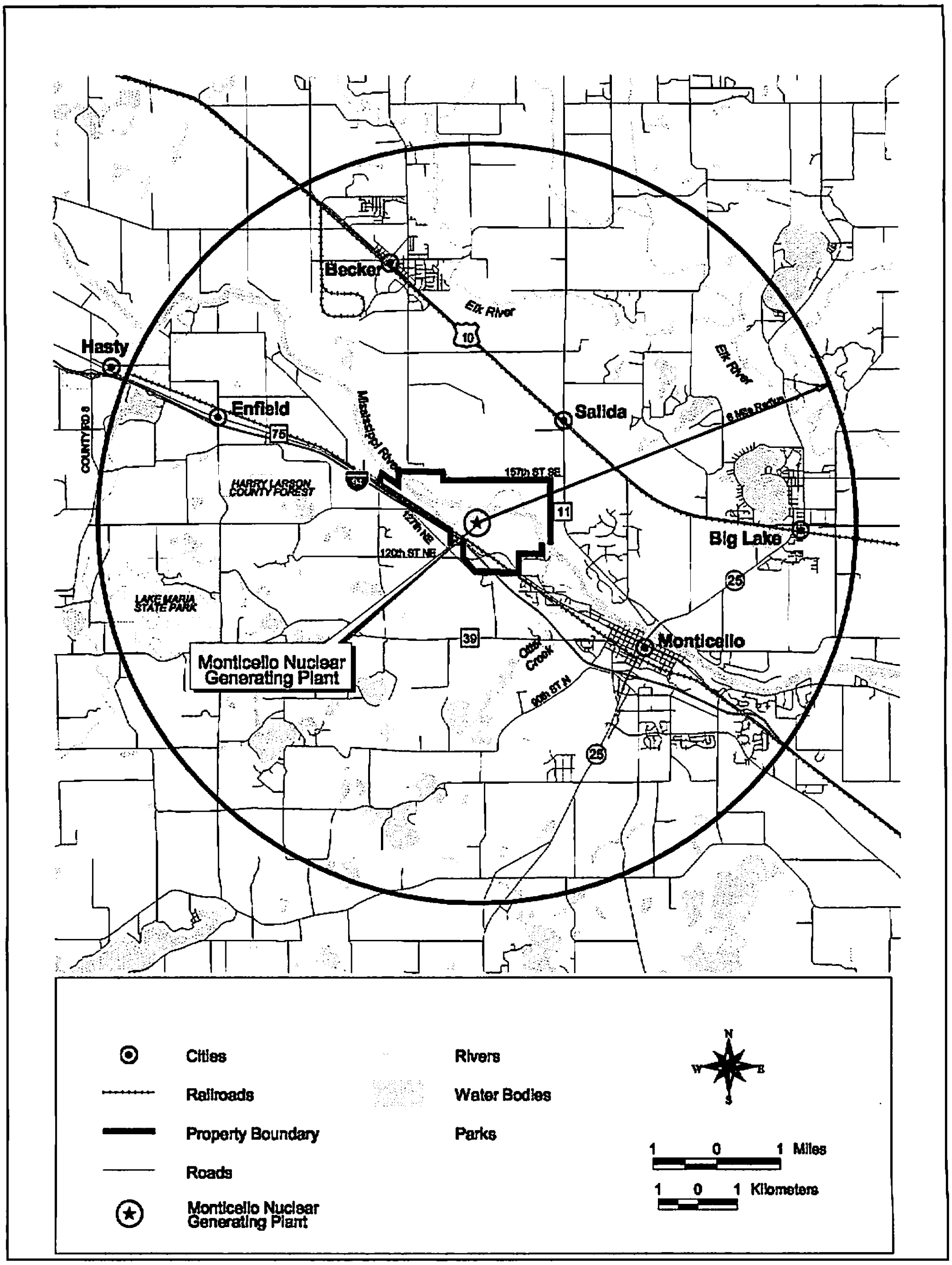
4) To examine and copy any documents pertaining to compliance with the conditions of this Permit.

X. COMPLAINT PROCEDURE

1) Within thirty (30) days of receiving this Site Permit, the Permittee shall submit to the Commission the Permittee's procedures to be used to receive and respond to substantial complaints received regarding the implementation of this project. The procedures shall be in accordance with the requirements set forth in the Commission complaint report procedure also attached to this permit.

2) The Permittee shall advise the Commission in writing (eFile) of any substantial complaints received by the Permittee during the course of construction that are not resolved within thirty (30) days of the complaint.

3) Upon request, the Permittee shall assist the Commission with the disposition of unresolved or longstanding complaints. This assistance shall include, but is not limited to, the submittal of complaint correspondence and complaint resolution efforts.


Becker
Elk River
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Hasty
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Big Lake
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LAKE MARIA STATE PARK
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Monticello
Monticello Nuclear Generating Plant
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MINNESOTA PUBLIC UTILITIES COMMISSION
COMPLIANCE FILING PROCEDURE
FOR PERMITTED ENERGY FACILITIES

1. Purpose

To establish a uniform and timely method of submitting information required by Minnesota Public Utilities Commission (PUC) energy facility permits.

2. Scope and Applicability

This procedure encompasses all compliance filings required by permit.

3. Definitions

Compliance Filing – A sending (filing) of information to the PUC, where the information is required by a PUC site or route permit.

4. Responsibilities

A) The permittee shall eFile all compliance filings with Dr. Burl Haar, Executive Secretary, PUC, through the Department of Commerce (DOC) eDocket system. The system is located on the DOC website:
https://www.edockets.state.mn.us/EFiling/home.jsp

General instructions are provided on the website. Permittees must register on the website to eFile documents.

B) All filings must have a cover sheet that includes:
1) Date
2) Name of submitter / permittee
3) Type of Permit (Site or Route)
4) Project Location
5) Project Docket Number
6) Permit Section Under Which the Filing is Made
7) Short Description of the Filing

C) Filings that are graphic intensive (e.g., maps, plan and profile) must, in addition to being eFiled, be submitted as paper copies and on CD. Copies and CDs should be sent to: 1) Dr. Burl W. Haar, Executive Secretary, Minnesota Public Utilities Commission, 121 7th Place East, Suite 350, St. Paul, MN, 55101-2147, and 2) Department of Commerce, Energy Facility Permitting, 85 7th Place East, Suite 500, St. Paul, MN, 55101-2198. Additionally, the PUC may request a paper copy of any eFiled document.

PERMITTEE: Xcel Energy
PERMIT TYPE: LEPGP Site Permit
PROJECT LOCATION: Wright County
PUC DOCKET NUMBER: E-002/GS-07-1567

Filing Number	Permit Section	Description	Due Date
1	Section IV.A.	Contact Information	At least fourteen (14) days prior to the start of each of the refueling outages in 2009 and 2011.
2	Section IV.B.	Increased Power Level Notification	Within 30 days of achieving increased EPU power levels.
3	Section IV.C.	Work Completion	Within 120 days of the plant's return to service following completion of each of the 2009 and 2011 refueling outages.
6	Section X	Complaint Procedure	Within 30 days of receiving this Site Permit.

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

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APPENDIX C

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

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 Prairie Island Nuclear Generating Plant Uprate Project, T113N R15W Sections 4 & 5, Goodhue County
NHNRP Contact #: ERDB 20080253

Dear Mr. Aiken,

Please note that the Township, Range, or Section information that was listed on the Data Request Form appeared incomplete based on 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 40 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 Goodhue 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, Wayne Barstad, at (651) 772-7940.

An invoice in the amount of $77.13 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

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CHAPTER 2

ENVIRONMENTAL IMPACT STATEMENT

Xcel Energy Prairie Island Nuclear Generating Plant Additional Dry Cask Storage

PUC Docket No. E002/CN-08-510

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TABLE OF CONTENTS

FIGURES

1.0 INTRODUCTION

On April 15, 2008, Xcel Energy applied to the United States Nuclear Regulatory Commission (NRC) for a license renewal for the Prairie Island Nuclear Generating Plant (PINGP). The renewal would allow the PINGP to operate through 2034. Operation through 2034 would require additional storage of spent nuclear fuel within the existing Prairie Island Independent Spent Fuel Storage Installation (ISFSI). Expansion of the ISFSI to accommodate additional spent fuel requires approval from the NRC and the Minnesota Public Utilities Commission (Commission).

On May 16, 2008, Xcel Energy applied to the Commission for a Certificate of Need (CON) to expand the existing Prairie Island ISFSI to accommodate an additional 35 casks of spent nuclear fuel. The docket number for the additional dry cask storage certificate of need is E002/CN-08-510. This chapter (Chapter 2) of this environmental impact statement (EIS) is required as part of the Commission CON process (Minn. Stat. § 116C.83, Subd 6).

The specific topics and extent of discussion in this chapter were outlined in the Prairie Island EIS Scoping Decision, approved by the Office of Energy Security (OES) director on November 14, 2008 (**Chapter 1, Appendix A**).

Section 2 of this chapter outlines the regulatory framework governing the Prairie Island ISFSI. Section 3 provides information on the proposed project. Section 4 discusses the non-radiological impacts that expansion of the Prairie Island ISFSI could have on humans and the environment. Section 5 discusses the radiological impacts that expansion of the ISFSI could have on humans and the environment. Section 6 discusses alternatives for storing spent nuclear fuel generated by the PINGP by operations through 2034. Section 7 discusses alternative methods of generating the electrical power currently produced by the PINGP and the human and environmental impacts of these alternatives. Section 8 summarizes the unavoidable impacts that would result from the proposed project.

1.1 SOURCES OF INFORMATION

Information in this chapter is drawn from multiple sources, which are footnoted throughout. Primary sources include Xcel Energy's Application for a Certificate of Need for additional dry cask storage, Xcel Energy's license amendment request to the Nuclear Regulatory Commission and associated safety analysis report (SAR), and correspondence with Xcel Energy. Select sources are noted here:

- Application to the Minnesota Public Utilities Commission for Certificates of Need for the Prairie Island Nuclear Generating Plant for Additional Dry Cask Storage and Extended Power Uprate, http://energyfacilities.puc.state.mn.us/Docket.html?Id=19602
- License Amendment Request (LAR) to Modify TN-40 Cask Design (Designated as TN-40HT) and enclosures, http://www.nrc.gov/reading-rm/adams/web-based.html >> "Begin

Adams Search" >> http://adamswebsearch.nrc.gov/scripts/securelogin.pl >> Search on the following accession numbers:
    - 081290197, Prairie Island ISFSI, LAR
    - 081290198, Enclosure 3
    - 081290199, Enclosure 5, Safety Analysis Report Addendum A
    - 081370151, Enclosure 5, Safety Analysis Report Addendum A
- Prairie Island Nuclear Generating Plant, Environmental Report for License Renewal Application, is Appendix J of the Xcel Energy's Application for Certificates of Need, http://energyfacilities.puc.state.mn.us/Docket.html?Id=19602
- Probabilistic Risk Assessment (PRA) of Bolted Storage Casks: Update Qualifications and Analysis Report, EPRI, 2004, www.epri.com

2.0 REGULATORY FRAMEWORK

The U.S. Nuclear Regulatory Commission (NRC) regulates nuclear generating plants and spent fuel storage facilities to ensure that they are safely operated. The State of Minnesota decides as an economic and policy matter whether it is in the public interest to allow additional storage of spent nuclear fuel at the Prairie Island ISFSI such that the PINGP can continue operations until 2034.

In 2003, the Minnesota Legislature made the Public Utilities Commission (Commission) responsible for deciding whether to issue a certificate of need (CON) for spent nuclear fuel storage facilities, including expansion of such facilities (Minn. Stat. § 116C.83, Subd. 2). The legislature retained the option of reviewing Commission decisions regarding independent spent fuel storage installations (ISFSIs). In addition, the legislature required an environmental impact statement (EIS) be prepared prior to any Commission ISFSI decision (Minn. Stat. § 116C.83, Subd 6).

2.1 FEDERAL REGULATION

The U.S. Nuclear Regulatory Commission (NRC) has responsibility for regulating the nuclear fuel cycle and the use of radioactive materials, including source material (uranium and thorium), special nuclear material (enriched uranium and plutonium), and byproduct material (material made radioactive in a reactor and residues from the milling of uranium and thorium). Nuclear generating plants like the PINGP are considered part of the nuclear fuel cycle.

The NRC regulates PINGP and Prairie Island ISFSI operations through an overlapping series of federal regulations (**Table 2-1**). Section 10 of the Code of Federal Regulations (CFR) Part 20 provides "Standards for Protection Against Radiation." Part 20 includes requirements for dose limits for radiation workers and members of the public, monitoring and labeling radioactive materials, posting radiation areas, and reporting the theft or loss of radioactive material. It also includes penalties for not complying with NRC regulations.

Radiation dose limits are imposed in 10 CFR 20, 50, and 72. The NRC also enforces U.S. Environmental Protection Agency (EPA) rules on nuclear power operations (40 CFR 190 and 191) through a Memorandum of Understanding. The Minnesota Department of Health has identical requirements to the NRC for radioactive materials use (Minn. Rules Chapter 4731) and very similar requirements for x-ray machine use (Minn. Rules Chapter 4730).

Nuclear Generating Plant License Renewal

The NRC licenses the operation of domestic nuclear power plants in accordance with the Atomic Energy Act of 1954, as amended, and NRC implementing regulations, including 10 CFR 51 and 10 CFR 54 (Requirements for Renewal of Operating Licenses for Nuclear Power Plants). NRC regulations provide for an operating license renewal period for up to 20 years beyond the initial 40-year license term.

The NRC license renewal process focuses on technical and engineering aspects of plant operations but also includes a federal environmental review component (both a generic EIS and a facility-specific supplemental EIS or ER). This federal process and these documents will cover, among other issues, the expected radiation safety and health impacts of continued operation of the plant and ISFSI, as well as a separate analysis of the impacts of generation alternatives to the continued operation of the Prairie Island plant itself. The NRC environmental review process includes a scoping process, public meetings, and opportunity for public comment.

Generic Environmental Impact Statement (GEIS) and Supplemental Environmental Impact Statement (SEIS). The NRC prepares a Generic Environmental Impact Statement (GEIS) to examine the possible environmental impacts of renewing any commercial nuclear power plant license, and, to the extent possible, establishes the significance of these potential impacts. For each type of environmental impact, the GEIS attempts to establish generic findings covering as many plants as possible.

While plant and site-specific information is used in developing generic findings, the NRC does not intend for the GEIS to be a compilation of individual plant environmental impact statements. Instead, this report may be incorporated by reference by an applicant into a license renewal application. The GEIS makes maximum use of environmental and safety documentation from original licensing proceedings and information available from state and federal regulatory agencies, the nuclear utility industry, scientific literature and plant operating experience. It allows the applicant to concentrate on those impacts that must be evaluated on a plant-specific basis. The *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, is available on the NRC website:

http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/

The NRC prepares a Supplement Environmental Impact Statement (SEIS) to look potential environmental impacts that must be evaluated on a plant-specific basis. The NRC initiated development of an SEIS for the PINGP with the submission of Xcel Energy's application for a license renewal. The draft SEIS for the PINGP is scheduled to be issued in 2009. The SEIS preparation process and PINGP license renewal process is viewable on the NRC website:

http://www.nrc.gov/reactors/operating/licensing/renewal/applications/prairie-island.html#public

Environmental Report. Every facility applying to the NRC for license renewal is required to complete a plant and site-specific supplemental environmental report to deal with unique facility and location issues. NRC regulation 10 CFR 51.53(c) requires that an applicant for license renewal submit with its application a separate document entitled, *Applicant's Environmental Report - Operating License Renewal Stage*. The report is to include an assessment of the environmental consequences and potential associated mitigating actions and is to supplement the

GEIS. Appendix E to the Prairie Island license renewal application contains the environmental report for the PINGP operating license renewal.[82]

Independent Spent Fuel Storage Installation (ISFSI) License Renewals and Amendments

The NRC licenses the storage of spent nuclear fuel separately and independently of the licensing of nuclear generating plants under 10 CFR 72 (Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor Related Greater than Class C Waste). The license for spent fuel storage is a Special Nuclear Materials (SNM) license. License renewals must include technical specifications than ensure safety through design, monitoring, and administrative controls. The NRC reviews spent fuel storage systems by evaluating each design for resistance to accident conditions, e.g., earthquakes, tornadoes, and temperature extremes.

License renewals require a site-specific environmental report, similar to that for a generating plant license renewal. All spent nuclear fuel storage facilities must use storage casks that have been approved by the NRC. A list of NRC-approved spent fuel storage casks is available on the NRC website:

http://www.nrc.gov/waste/spent-fuel-storage/designs.html

Information on the NRC's licensing of spent fuel storage is also available on the NRC website:

http://www.nrc.gov/waste/spent-fuel-storage/licensing.html#public.

Prairie Island ISFSI Expansion. Three NRC licenses or license amendments will be required for the expansion of spent fuel storage at the Prairie Island ISFSI: (1) approval of the enhanced Transnuclear spent fuel storage cask (TN-40HT cask), (2) renewal of the current ISFSI license that is set to expire in 2013, and (3) an amendment to the current ISFSI license to increase the number of casks beyond the 48 currently authorized by the NRC.

The Prairie Island ISFSI is currently licensed to store spent fuel in up to 48 TN-40 vertical metal casks (24 on each of the two storage pads) under the existing site-specific license issued in October 1993 (License No. SNM-2506). The NRC license amendments to expand spent fuel storage at the ISFSI are further detailed here:

1) **Approval of the TN-40HT Cask.** The first license amendment requirement is certification that an enhanced version of the TN-40 cask, referred to as the TN-40HT cask, complies with the requirements of 10 CFR 72. The TN-40HT is very similar to the TN-40 cask in dimensions, storage capacity, and operation. It is designed to use the same handling, transfer and operating equipment as used for the TN-40 casks. The enhancements involve features that improve heat transfer and neutron absorption. These

[82] Applicant's Environmental Report – Operating License Renewal Stage, Prairie Island Nuclear Generating Plant, Nuclear Management Company, LLC, Docket Nos. 50-282 and 50-306, License Nos. DPR-42 and DPR-60, April 2008.

features will enable the TN-40HT casks to store fuel assemblies that have a higher uranium-235 enrichment and higher burn-up, i.e., energy per fuel assembly. The license amendment request was submitted March 28, 2008. The expected NRC approval date is **September** 2009.

2) **Renewal of ISFSI License**. The second license amendment requirement is renewal of the Prairie Island ISFSI license (No. SNM-2506). The license was issued in October 1993 with a 20-year term. Therefore, to continue operation beyond October 2013, the license must be renewed. Per 10 CFR 72.42, the application for renewal of a license must be filed at least two years prior to the expiration of the existing license. Thus, a submittal will be made prior to October 2011 and it is anticipated that the NRC will renew the license prior to October 2013.

3) **Increase Cask Authorization.** The third license amendment requirement is to increase the allowed number of storage casks at the ISFSI beyond the current NRC approved 48-cask limit. To house up to 35 additional casks, two new concrete storage pads would be constructed adjacent to the existing pads. Since the cask loading plans do not call for the utilization of these new storage pads until 2022, it is projected that the installation of the pads would not occur until 2020**.** To support this timeline, it is projected that the license amendment request would be submitted to the NRC sometime in 2018 with an anticipated NRC approval in 2019.

In anticipation of transporting the spent nuclear fuel stored at the ISFSI to a federal repository, Transnuclear, the designer of the TN-40 and TN-40HT casks, is requesting transportation licenses from the NRC for these casks (10 CFR 71). Transnuclear has submitted a request for the TN-40 cask. After the NRC has approved the TN-40 casks for transportation, Transnuclear plans to submit a license amendment request to license the TN-40HT cask design for transportation. It is anticipated that the NRC would approve that amendment some time in **2010**.

2.2 STATE REGULATION

In addition to federal requirements, nuclear power generating plants and independent spent fuel storage installations (ISFSIs) in Minnesota are governed by state statutes, rules, and regulatory processes.

Certificate of Need (CON) Application

The storage of spent nuclear fuel storage in Minnesota, including the expansion of an existing ISFSI, requires a certificate of need from the Minnesota Public Utilities Commission (Minn. Stat. § 116C.83, Subd. 2). The Commission determines the need for the expanded storage pursuant to Minn. Stat. § 216B.243 and rules adopted under this statute. The Commission "may make a decision that could result in a shutdown of a nuclear generating facility" (Minn. Stat. § 116C.83, Subd. 2). Prior to the granting of a certificate of need by the Commission, an environmental impact statement (EIS) must be developed for the proposed storage expansion (Minn. Stat. § 116C.83, Subd. 6).

Xcel Energy applied for a certificate of need (CON) for expansion of the Prairie Island ISFSI on May 16, 2008.[83] The application provides information on the economics and potential impacts of expanding the current ISFSI – thus allowing the PINGP to remain operating – as compared to the economics and environmental impacts of alternative storage options and energy sources. The application discusses potential human and environmental impacts from the proposed ISFSI expansion, including estimated radiation exposures and doses.

Environmental Impact Statement

An environmental impact statement (EIS) must be prepared prior to the Commission decision on a certificate of need for expanded dry cask storage (Minn. Stat. § 116C.83, Subd. 6). The EIS must discuss the potential human and environmental impacts of the proposed project and compare the impacts of the proposed project with reasonable alternatives to the project (Minn. Rules Chapter 4410.2300). Its purpose is to inform the Commission of potential human and environmental impacts, and possible mitigative measures, as it considers the CON determination.

The Minnesota Department of Commerce is the responsible governmental unit for preparation of the EIS. The Commissioner of the Department of Commerce must determine the adequacy of the final EIS (Minn. Stat. § 116C.83, Subd. 6). With respect to this document, the Commissioner must find Chapter 2 adequate in addressing those issues and potential impacts described in the scoping decision for the EIS.

Environmental Review Process

As discussed in Chapter 1, Sections 1 and 2, the EIS for the proposed Prairie Island ISFSI expansion and the EIS development process (e.g., public meeting, scoping, comment period) have been consolidated with the EIS requirements for the proposed PINGP power uprate. Chapter 1 of this document covers the proposed power uprate; Chapter 2 covers the proposed expansion of dry cask storage at the ISFSI.

When the draft EIS (DEIS) is completed, it will be issued for public review and comment, including a public meeting. Timely, substantive comments on the DEIS will be responded to and included in a final EIS (FEIS) (Minn. Rules 4410.2700). The Commissioner of the Department of Commerce must determine the adequacy of Chapter 2 of the FEIS. Concurrent with development of the FEIS, the DEIS will be entered in the record of the contested case hearing for the ISFSI expansion CON. The Commission has consolidated the hearing for the ISFSI expansion with that of the proposed PINGP power uprate.[84] Upon issuance of the report of the Administrative Law Judge from the contested case, the docket will come before the Commission for a decision on the issuance of a CON for the proposed ISFSI expansion.

[83] Certificates of Need Application, Prairie Island Nuclear Generating Plant, May 16, 2008, http://energyfacilities.puc.state.mn.us/Docket.html?Id=19602
[84] Minnesota Public Utilities Commission, Notice and Order for Hearing, https://www.edockets.state.mn.us/EFiling/ShowFile.do?DocNumber=5373456

3.0 PROJECT DESCRIPTION

Xcel Energy is proposing to extend the concrete storage pads within the current Prairie Island ISFSI to accommodate additional dry storage casks of spent nuclear fuel. The ISFSI currently has state authorization for 29 casks. In order to operate the Prairie Island nuclear generating plant (PINGP) an additional 20 years, Xcel Energy is seeking state authorization for storage of an additional 35 casks. Thus, the total number of casks required for operations through 2034 would be 64.

The current ISFSI is constructed with concrete storage pads sufficient to place 48 casks. To place 64 casks, the concrete storage pads need to be expanded to accommodate 16 additional casks. This expansion would allow the PINGP to operate through 2034. The ISFSI is designed to accommodate storage casks necessary for decommissioning the Prairie Island plant. Additional concrete storage pads would be needed to place these casks in the ISFSI at decommissioning.

In addition, Xcel Energy is proposing to use an enhanced version (TN-40HT) of the current Transnuclear dry storage cask used at the PINGP for the expansion. The proposed project can be summarized as: (1) extending the concrete storage pads within the current ISFSI, (2) placing spent nuclear fuel from PINGP operations into the TN-40HT casks, (3) transporting and placing the casks on the storage pads within the ISFSI, and (4) monitoring the casks until removed to a federal repository.

3.1 PROJECT SETTING

The Prairie Island Nuclear Generating Plant (PINGP), including its associated Independent Spent Fuel Storage Installation (ISFSI), is located on the west bank of the Mississippi River in Goodhue County within the city limits of Red Wing, MN. The PINGP is situated on the southeastern portion of Prairie Island, an outwash terrace above the Mississippi River. The plant site is located at an elevation of 690 feet above mean sea level (MSL), about 15 feet above the normal pool elevation of the river. The general area is nearly level, with a local relief ranging from about 675 feet above MSL (along the river frontage) to about 700 feet above MSL.

At the plant location, the Mississippi River serves as the state boundary between Minnesota and Wisconsin. The Mississippi River at this location is known as Sturgeon Lake, a backwater area located approximately one mile upstream from the U.S. Army Corps of Engineers (USACE) Lock and Dam 3. The Vermillion River lies just west of the PINGP and flows into the Mississippi River approximately two miles downstream of Lock and Dam 3.

The PINGP site comprises approximately 578 acres of land, owned in fee by Northern States Power, a subsidiary of Xcel Energy. Access to the site is controlled and there is an enforced exclusion zone. On Prairie Island, access to the exclusion zone is restricted by a perimeter fence with “No Trespassing” signs. East of the plant the exclusion zone boundary extends to the main channel of the Mississippi River. Islands within this boundary as well as a small strip of land northeast of the plant are owned by USACE. An agreement exists with USACE such that no residences will be built on that strip of land or islands within the exclusion zone for the life of the plant.

The Prairie Island Indian Reservation is located directly north of the Prairie Island site. The Prairie Island Indian Community (PIIC) is a Federally Recognized Indian Tribe organized under the Indian Reorganization Act (25 USC 476). The reservation population is approximately 250 persons; the total enrollment of the tribal community is approximately 760 persons. The Prairie Island Indian Community owns and operates the Treasure Island Resort and Casino, which includes a hotel and convention center.

ISFSI Setting

The Prairie Island ISFSI is located approximately 300 yards west of the main generating plant at an elevation of 694 feet above MSL (**Figure 3-1**).

The ISFSI consists of a lighted area, approximately 720 feet long and 340 feet wide, roughly 5.5 acres in size. The tallest structures are the light poles that are approximately 40 feet tall. Two fences surround the facility with a monitored, clear zone between the two fences. Within the storage area, the casks are currently stored on two reinforced concrete pads, 36 ft. x 216 ft. x 3 ft. The additional casks necessary to support PINGP operations through 2034 would reside on new 18 ft. concrete pads to be located immediately south of each of the existing concrete pads (**Figure 3-2**, proposed new concrete pads shaded).

The approach to the pads consists of 14 inches of compacted Class 5 aggregate with a 2% slope. A 30 ft. x 50 ft. steel frame equipment storage building approximately 30 feet high is located on the ISFSI site. The primary purpose of this building is to store the cask transport vehicle. A smaller block building within the ISFSI houses the security equipment while one outside the ISFSI houses the pressure monitoring equipment. A 17 ft high earthen berm surrounds the ISFSI. The site is monitored with cameras and other security devices. An access road connects the ISFSI to the rest of Prairie Island.

The current NRC licensed capacity of the ISFSI is 48 TN-40 storage casks. The proposed extension of the storage pads will be sufficient to accommodate an additional 16 casks. The storage facility is laid out so that the storage pads could be extended to the north and south to accommodate a total of 100 casks without having to change the security perimeter. The extra space could be used for casks to decommission the Prairie Island plant.

3.2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION EXPANSION

The proposed Prairie Island ISFSI expansion project consists of: (1) extending the concrete storage pads within the current ISFSI, (2) placing spent nuclear fuel from PINGP operations into Transnuclear TN-40HT casks, (3) transporting and placing the casks on the storage pads within the ISFSI, and (4) monitoring the casks until removed to a federal repository.

Extending the Concrete Storage Pads within the ISFSI

The Prairie Island ISFSI was granted a federal operating license in October 1993. In 1994, the Minnesota Legislature granted Xcel Energy permission to store a limited amount of spent nuclear fuel in dry storage casks at an on-site ISFSI. ISFSI construction was completed in 1995; the first cask was loaded and placed on the ISFSI pad in May 1995. There are currently (2008) 24 casks on the ISFSI pad.

In order to store an additional 16 casks, two new pads will need to be constructed. Construction of each new pad will consist of pouring an 18 ft. wide x 216 ft. long x 3 ft. thick slab. In addition, underground concrete duct banks and associated electrical conduit will need to be installed from the cask monitoring building to the new pads. The work will include excavation of the pad area, trenching of the duct bank path, pouring the concrete pad and duct bank, and replacing the structural fill. Site preparation will involve using earth moving equipment such as bull dozers, scrapers, backhoes, and graders to excavate and level the pad and duct bank areas. Following the leveling of the area, reinforced steel, conduit, and forms will be put in place and concrete will be poured forming the storage pads and duct banks. Concrete trucks will deliver concrete to the site and pumping trucks will place it. The area around the pad and trench over the duct bank will be back-filled and returned to the 2% grade when complete.

During construction it is anticipated that storm water will drain into the existing structural fill within the ISFSI and into drainage ditches. Construction measures will be taken to ensure that there are no point discharges from the site into flow routes that discharge into the Mississippi River. Sediment controls such as geo-textiles will be used to minimize soil sediment runoff into drainage ditches.

Prior to any construction activities, a radiation survey of the work area near the existing dry storage casks will be performed. A plan to limit radiological doses to construction workers will be developed based dose rates in these areas. The plan will utilize standard radiation practices, e.g., time, distance and shielding. It is not anticipated that excavated fill (aggregate) will become activated or contaminated by radioactive materials. If monitoring of the ISFSI reveals ground water or soil contamination at the site, the fill would be tested prior to its removal from the site and disposed of properly.

The primary function of the concrete storage pads is to provide a uniform level surface for storing the casks. The pads are designed to prevent unacceptable levels of cracking or settlement under normal and off-normal loads. Since the cask loading plans do not call for the utilization of these new storage pads until 2022, it is projected that the installation of the pads would not occur until 2020.

Loading and Transporting Dry Storage Casks to the ISFSI

The loading of spent nuclear fuel into dry storage casks and the transportation of these casks to the ISFSI will utilize processes and safeguards very similar, if not identical, to those currently used at the PINGP. The process will use the same fuel source (the spent nuclear fuel pool at the PINGP), the same lifting and handling devices, the same transport vehicle, and the same ancillary equipment. The primary difference will be the use of the enhanced Transnuclear cask (TN-40HT) and the loading of spent fuel with a higher fuel loading and burnup.

Operations. When it is time to load spent fuel assemblies, a TN-40HT cask is placed in the PINGP auxiliary building and lowered into the spent fuel pool. Fuel assemblies (40 assemblies per cask) are loaded into the cask and the lid for the cask is installed underwater. The cask is lifted from the pool, drained, and moved to a cask decontamination area. In the decontamination area, the outer surface of the cask is decontaminated. The cask is vacuum dried, backfilled with helium, and a helium leak test of the cask seals is performed.

The decontaminated cask is placed into a specialized cask transport vehicle (CTV). A neutron shield is placed on the cask top. The cask's overpressure system is pressurized and tested. A final protective weather cover is attached, and the cask is moved via the CTV to the ISFSI and placed on the pad.

Dry Storage Cask, TN-40HT. All spent nuclear fuel storage casks must be licensed by the NRC and meet design criteria established by 10 CFR 72. Storage casks are designed to ensure that: (1) fuel critically is prevented, (2) cask integrity is maintained, and (3) fuel is not damaged so as to preclude its removal from the cask. These design criteria must be met for normal operations and for off-normal events including natural phenomena (e.g., tornadoes, floods) and man-made accidents (e.g., missiles).[85]

The Prairie Island ISFSI currently uses the Transnuclear TN-40 cask. Xcel Energy proposes using this cask for storage of spent fuel in casks number 1 through 29 at the ISFSI. Starting with cask number 30, Xcel Energy proposes using an enhanced version of the Transnuclear cask, the TN-40HT. Use of the TN-40HT cask is dependent upon approval by the NRC of the cask for use at the Prairie Island ISFSI. A license amendment application was submitted to the NRC on March 28, 2008, requesting that the enhancements to the TN-40HT cask be found to comply with the requirements of 10 CFR 72. It is anticipated the NRC will issue the amendment to the license in 2009.

The TN-40HT cask is an enhanced version of the TN-40 dry fuel storage cask (**Figure 3-3**). The TN-40HT cask is designed to hold 40 fuel assemblies and will allow for storage of relatively more highly enriched fuel and greater burnups. A cask consists of an internal basket, containment vessel, lid, outer shell, neutron radiation shields, and a weather cover.

The cask is designed to be an independent, passive storage system which does not rely on other systems or components for operation. Individual casks are approximately 8 ft. in diameter, 16 ft. tall, and weigh approximately 240,000 lbs. when loaded.

[85] Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Section 3.2

The TN-40HT cask consists of two concentric shells. The containment vessel is the inner most cask shell and is a 1.5-inch thick carbon steel cylinder with a welded carbon steel plate at the bottom. The vessel includes stainless steel boxes (fuel basket) separated by heat conduction and neutron absorption plates. The stainless steel box geometry provides structural rigidity to support the fuel assemblies. At the top of the containment vessel is a flange, which provides the positioning and sealing surface for the bolted carbon steel lid. The lid is 10 inches thick and is attached to the upper vessel flange by 48 bolts. Two metallic O-rings are installed on the lid to provide a redundant seal, capable of being monitored, between the flange and the lid.

The outer cask shell is a 7.25-inch thick steel cylinder. It is welded to a 7.25-inch bottom shield plate and to the containment vessel closure flange, thereby enclosing the containment vessel inner shell and bottom plate. Attached to the shell are resin filled containers arrayed vertically and surrounding the shell. The resin contains neutron-absorbing material to reduce neutron radiation levels. A circular neutron shield disk provides neutron shielding on the lid during storage. In order to keep the cask lid clean and to avoid the accumulation of water in recesses of the cask lid, a weather cover is provided above the cask lid. The resultant overall dimensions of a cask are an outer diameter of 101 inches and a height of approximately 200 inches.

The TN-40 cask is currently licensed to store spent fuel assemblies with a maximum burnup of 45 giga-watt days/metric ton of uranium (GWD/MTU), maximum enrichment of 3.85 wt. % U235, and a minimum cooling time of 10 years after reactor discharge. The TN-40HT cask is expected to be licensed to accommodate a maximum burnup of 60 GWD/MTU, maximum enrichment of 5.0 wt. % U235, a minimum cooling time of 12 years after reactor discharge, and a thermal capacity of 32 kW (0.8 kW per fuel assembly).

Though the TN-40HT cask is nearly identical to the TN-40 cask, the TN-40HT cask includes enhancements to safely accommodate higher enrichment and burnup fuel. These enhancements include: (1) making the fuel basket structurally stronger by increasing the thickness of fuel cell compartment walls, (2) improving heat transfer capability by utilizing aluminum plates between fuel compartments that improve heat conduction from the center of the cask to the cask body, and (3) increasing the concentration of neutron absorbing material in the fuel basket itself.

Monitoring, Inspection, and Maintenance

The Prairie Island ISFSI is designed to be a passive storage system. However, there is monitoring and maintenance that is required to ensure the casks are operating properly and that they can maintain proper functioning throughout the life of the ISFSI.

The double seal (O-ring) system on the TN-40HT cask is pressurized with helium to approximately 5.5 atmospheres (80 pounds per square inch, psi). This pressure is monitored by a transducer which, via a pressure transmitter mounted on the side of cask, sends an electronic signal to the ISFSI monitoring system. The monitoring system is checked daily. Should the pressure in the seal drop, it would indicate that either: (1) the inner seal may have failed and helium is leaking into the cask, or (2) the outer seal may have failed and helium is leaking into the space between the lid and protective cover. Additionally, it could be that there is a malfunction in the monitoring system. PINGP personnel would immediately investigate the cask and indicated pressure drop. If necessary, the cask would be returned to the auxiliary building and the cask seals repaired or replaced.

The first dry storage cask was placed in the Prairie Island ISFSI in 1995. Since that time, there have been eight low-pressure alarms at the ISFSI. All eight alarms were due to a leak in the monitoring system tubing or pressure transmitter. None of the alarms were caused by a cask seal leak. Accordingly, no casks, to date, have been removed to the auxiliary for cask seal repair.
Casks are visually inspected periodically for signs of weathering. The casks are painted with a corrosion-inhibiting coating. This coating is inspected and touched up as necessary.

The minimum design life for the TN-40 series of Transnuclear casks is 25 years.[86] However, due to the passive nature of the dry storage casks and the robustness of their components, it is anticipated that the ISFSI could physically be operated for several hundred years. The extent and possible impacts of temporary, long-term storage of spent nuclear fuel at the Prairie Island ISFSI are discussed further in Sections 4 and 5 of this chapter.

Security for the Prairie Island ISFSI is provided by the PINGP security force. Access to the ISFSI is controlled. The ISFSI is surrounded by two security fences with an intrusion detection system and a monitored clear zone. The intrusion detection system would alert the PINGP security force in the event of an unauthorized attempt to enter the ISFSI. Lighting and video cameras will provide video monitoring to assist the security force. The ISFSI perimeter is patrolled by plant personnel at least once per shift. The ISFSI (including casks and berm) are inspected quarterly to ensure proper functioning of the ISFSI. Any maintenance indicated by these inspections is then performed.

Project Costs
The estimated installed cost of the ISFSI in 2008 dollars is $155.7 million. The estimate includes the following component costs:

Component	Cost (millions)
State Regulatory Processes	$2.0
Cask Licensing	$4.6
ISFSI Construction	$3.0
ISFSI Re-licensing	$2.8
35 TN-40HT casks	$143.3
TOTAL	**$155.7**

[86] Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Table 3.4-1, Design Criteria for the TN-40 Casks.

3.3 SPENT FUEL INVENTORY

Spent nuclear fuel from PINGP operation is temporarily stored in the spent nuclear fuel pool in the PINGP auxiliary building. The pool provides the means to safely handle and manage the spent fuel assemblies. Additionally, storage in the pool allows the fuel assemblies to cool with respect to thermal and radioactive emissions so that they can be safely stored in dry casks.

The spent nuclear fuel pool is filled with storage racks that hold the spent fuel assemblies and other irradiated reactor components. The depth of water in the pool is approximately 37 feet The spent fuel pool is equipped with redundant cooling systems to remove heat that continues to be generated by the assemblies. The filtering portion of the system maintains pool water chemistry and removes suspended particles. The water above the spent fuel also provides radiation shielding. The spent fuel pool also provides an area for cask loading operations (**Figure 3-4**). Space is set aside so that a cask may be lowered into the pool and assemblies transferred to it for dry storage or transport ("cask lay down area"). Spent fuel assemblies are placed in the pool for between 10 and 12 years to cool before they can be placed in dry casks for storage.

Xcel Energy's NRC operating licenses allow for long-term storage of up to 1,386 spent fuel assemblies in the spent fuel pool. As of April 2008, there were 1,149 spent fuel assemblies in the spent fuel pool. Four storage racks, with a combined capacity of 196 assemblies, may be installed in the cask lay down area to provide additional temporary storage. The PINGP maintains the ability to temporarily remove all of the fuel from both reactors (referred to as full core offload capability) with the use of these temporary storage racks.

Refueling of the PINGP reactor cores takes place every 18 to 20 months. Approximately one third of the fuel assemblies in the core are replaced with new assemblies at each refueling. As of April 2008, 2,109 spent fuel assemblies had been discharged from the PINGP, of which 1,149 reside in the spent fuel pool and 960 in 24 dry casks. Xcel Energy estimates that 1,786 spent fuel assemblies will be discharged from Prairie Island's reactors during operation between April 15, 2008 and 2034 (**Table 3-1**).

3.4 PLANT CLOSURE and DECOMMISSIONING

When the operating license for the PINGP expires, the plant will be removed from service, decontaminated, and dismantled. Non-radioactive deconstruction would be handled in a conventional fashion, with extra precautions for workers handling low-level radioactive waste and contaminated debris. Spent nuclear fuel will be managed and stored based on storage alternatives available at the time the plant is removed from service.[87] It is anticipated and most likely that spent fuel would be stored in the spent nuclear fuel pool until such time as it could be transferred to dry casks and transported to the Prairie Island ISFSI.

[87] See Section 6.0 for a discussion of spent fuel storage alternatives.

The Prairie Island ISFSI will be decommissioned once all spent fuel stored in dry casks has been transported to an off-site facility. It is anticipated that the TN-40 and TN-40HT casks will be licensed for transportation by the NRC[88]. The federal government will take title to the casks when they are transported to a federal repository. This leaves only the concrete storage pads and supporting infrastructure to be disposed of by Xcel Energy. Since the casks are sealed, no radioactive materials will be present once the casks and spent fuel have been shipped. No activation of the concrete in the storage pads is expected. A survey will be conducted to ensure that no activation has occurred. Once it is confirmed that no activation has occurred, the concrete storage pads and infrastructure will be dismantled, and the site will be returned to a green field state. If limited activation has occurred, deconstruction of the storage site would be handled appropriately, with precautions and mitigation measures for dealing with any low-level radioactive components (e.g., reinforcing steel).

Funding for Decommissioning

A nuclear decommissioning trust fund (NDT) has been established per NRC regulations to cover the costs of decommissioning the PINGP and Prairie Island ISFSI. The NDT for Prairie Island includes funds for radiological removal of the plant, site restoration, and ISFSI operations. ISFSI operations included in the fund are for operating the ISFSI after plant shutdown until all fuel is removed from the site and then the removal of the ISFSI structures.

The monies placed in the NDT are recovered through rates from Xcel Energy customers. The Minnesota Public Utility Commission reviews the funds collected from ratepayers and placed into the NDT triennially. A triennial review is currently underway for 2009 accruals (Commission docket number: E002/M-08-1201).

In 2008 dollars, the current cost estimates for decommissioning are: $1.026 billion for radiological removal, $83.7 million for site restoration, and $404 million for ISFSI operations. Recognition of these ISFSI operating costs in the NDT is not intended to acknowledge that these costs will ultimately be borne by Xcel Energy or its ratepayers, as some costs (or all) are expected to be the responsibility of the U.S. Department of Energy as a result of the breach to the Standard Contract of Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste.[89] The NRC reviews the level of funding every 2 years and by the Minnesota Public Utility Commission every 3 years to ensure that the NDT has sufficient funds.

[88] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 2.5.1.2. On August 7, 2006, Transnuclear Inc. requested from the NRC a transportation license for the TN-40 casks pursuant to 10 CFR 71.

[89] Under federal court decisions, the U.S. Department of Energy (DOE) has been found liable for damages attributable to delays in accepting spent nuclear fuel for placement in a federal repository; *Maine Yankee Atomic Power Company v. United States*, 225 F.3d 1336 (Fed. Cir. 2000), *Northern States Power Company v. United States*, 224 F.3d 1361 (Fed. Cir. 2000).

4.0 HUMAN AND ENVIRONMENTAL IMPACTS (NON-RADIOLOGICAL)

This section addresses the non-radiological impacts on human economies and the environment resulting from the proposed 35-cask expansion of the Prairie Island ISFSI. In addition, it discusses non-radiological impacts from two related actions – the continuing operation of the Prairie Island Nuclear Generating Plant (PINGP), and the continuing operation of the ISFSI. Radiological impacts are discussed in Section 5 of this chapter.

4.1 GEOLOGY and SOILS

The expansion of the ISFSI will not have a significant impact on the geology or soils of the area. The ISFSI expansion will occur entirely within the confines of the existing ISFSI. No geologic or soil resources within the PINGP site are anticipated to be disturbed.

The Prairie Island ISFSI is constructed on alluvial soils (loamy sands) which are supported by sedimentary rock of the St. Lawrence and Franconian formations. The existing concrete storage pads within the ISFSI are three feet thick. The area within the ISFSI that is not currently used for storage pads is covered with compacted aggregate. Thus, within the ISFSI there are no undisturbed soils which could be impacted by the expansion of the concrete storage pads. Movement of equipment used for construction of the new concrete pads within the ISFSI may cause some erosion to unpaved roads within and near the PINGP site. This erosion is anticipated to be minimal.

4.2 BIOLOGICAL and ECOLOGICALLY SENSITIVE RESOURCES

Expansion of the Prairie Island ISFSI will not have a significant impact on biological and ecologically sensitive resources. The ISFSI expansion will occur entirely within the confines of the existing ISFSI. Neither the construction of the new concrete storage pads, nor the pads and dry storage casks themselves will impact high quality habitat for flora or fauna.

Fauna

The PINGP and Prairie Island ISFSI are located near the Mississippi River and its associated riparian and wetland habitats. There are numerous wetlands within five miles of the Prairie Island ISFSI, all associated with the floodplains of the Mississippi, Cannon, and Vermillion rivers. These wetland habitats and nearby upland habitats support a diversity of fauna, including fish, mollusks, turtles, frogs, birds, waterfowl, muskrats, and raccoons.[90] The habitats are also part of the larger Mississippi River flyway ecosystem that supports migration of birds and waterfowl between the Americas. The construction of new concrete storage pads and the operation of the casks and ISFSI will not impact these habitats. Construction will occur within the current ISFSI, which provides little or no habitat for fauna.

[90] Prairie Island Nuclear Generating Plant, License Renewal Application, Appendix E – Environmental Report, Section 2.3 Biological Resources.

The new concrete pads will add approximately one acre of impervious surface to the ISFSI. This surface will not impact the quality of water runoff from the ISFSI, but will slightly increase the quantity of runoff from the ISFSI. This additional runoff is anticipated to be minor such that it will not impact habitat for regional or migratory fauna. The energy in the additional runoff water will be mitigated by physical barriers that are part of the existing ISFSI, e.g. berm, rip-rap.

Noise due to construction activities at the ISFSI may be intrusive to some fauna. However, noise levels during construction will be only slightly higher than ambient levels (local traffic, trains) and will remain below the Minnesota daytime code limit of 60 dBA.[91] Noise impacts are discussed further in section 4.6.

Flora

Of the 578 acres that comprise the PINGP site, approximately 338 acres have been undisturbed by the construction of the PINGP and Prairie Island ISFSI. This acreage is covered with non-native herbaceous species (e.g. brome grass), shrubs, and trees. Common trees include elms, cottonwoods, ashes, box elders, and burr oaks. The PINGP site itself is surrounded by the Richard J. Dorer Memorial Hardwood State Forest. Wetland plant communities are found around, adjacent to, and, in some places, within the PINGP site. For example, the area roughly between the ISFSI and PINGP cooling towers includes portions of floodplain forest.

The construction of new concrete storage pads and the operation of the casks and ISFSI will not impact the region's flora. Construction will occur within the current ISFSI, with little or no disturbance of acreage within the PINGP site.

Threatened and Endangered Species

Within counties near the PINGP site there are approximately 60 animal species and 30 plant species that are of special concern. These are species that are federally-listed or state-listed as threatened or endangered, species proposed for federal listing, candidates for federal listing, and species state-listed as species of special concern.[92] Of these, seven species are found within one mile of the PINGP site: Higgins Eye pearlymussel, peregrine falcon, Blanding's turtle, paddlefish, and mucket, washboard, and butterfly mussels. The Higgins Eye pearlymussel is federally listed; the other six species are state-listed.

The construction of new concrete storage pads and the operation of the casks and ISFSI will not significantly impact these species. Construction and operation of the expanded ISFSI will not significantly impact water and wetland habitats upon which most of these species rely. Peregrine falcons have nested in a nest box on the PINGP Unit 1 containment dome since 1997. They are apparently habituated to activities at the PINGP and will likely not be impacted by construction or operations at the Prairie Island ISFSI.

[91] Minn. Rules 7030.0040. The daytime limit is expressed as an L_{50} level of 60 dBA. L_{50} means the sound level is exceeded 50 percent of the time.
[92] Prairie Island Nuclear Generating Plant, License Renewal Application, Appendix E – Environmental Report, Section 2.3.3 Threatened or Endangered Species, Table 2.3-1.

4.3 WATER RESOURCES

Expansion of the Prairie Island ISFSI is not expected to have a significant impact on water resources. The expansion will not impact nearby riverine or wetland resources. It will withdraw a small amount of water from the Mississippi River for construction purposes. It will not impact groundwater resources.

Water Resources
There are bountiful water resources within five miles of the PINGP site, including the Mississippi River, local tributaries (Cannon, Vermillion, Trimbelle rivers), and associated wetlands. The PINGP site is located on Sturgeon Lake, a backwater area of the Mississippi River created by Lock and Dam Number 3. The Cannon, Vermillion, and Trimbelle rivers enter the Mississippi River near and just south of this dam.

The Mississippi National River and Recreation Area extends from north of Minneapolis, MN to just south of Hastings, MN. This recreation area is approximately 6 miles north of the PINGP site. The Cannon River is a designated State Wild and Scenic River. A large wetland complex, the Rice Lake Bottoms, is located at the confluence of the Cannon and Mississippi rivers, approximately 3 miles south of the PINGP site. There are numerous wetlands associated with Sturgeon Lake and Pool Number 3, the Mississippi River pool created by Lock and Dam Number 3.

The construction of new concrete storage pads and the operation of the casks and ISFSI will not significantly impact these water resources. Construction will occur within the current ISFSI, with little or no disturbance of acreage within the PINGP site. Construction of the new storage pads will require the excavation of approximately 864 cubic yards (CY) of existing aggregate and subsoil within the ISFSI. Movement of these materials will occur within a facility with existing runoff controls, thus the possibility of impacting water resources is minimal. Practices to minimize run-off and erosion will be employed during construction – e.g., strategic placement of hay bales, silt fencing, geo-textiles, and in-situ vegetation. Xcel Energy will **coordinate** with the Minnesota Pollution Control Agency as to the permit(s) required, **e.g., construction stormwater permit,** for expansion of the ISFSI.

The new concrete pads will add approximately one acre of impervious surface to the ISFSI. This surface will not impact the quality of water runoff from the ISFSI, but will slightly increase the quantity of runoff from the ISFSI. The energy in the additional runoff water will be mitigated by physical barriers that are part of the existing ISFSI, e.g. berm, rip-rap.

Water Use
Water use due to the construction of new concrete storage pads and the operation of the casks and ISFSI will be minimal. Xcel Energy proposes drawing water from the Mississippi River for dust control purposes. This amount is estimated at approximately 53,000 gallons total over the course of construction. The ISFSI itself uses no water for operations. Expansion of the ISFSI will not change water use at the PINGP.

Groundwater Quality

Groundwater at the PINGP site moves generally toward the Mississippi River and its tributaries. On outwash terraces such as the one upon which the PINGP and Prairie Island ISFSI are situated, groundwater levels coincide closely with river elevation. Additionally, because the terraces are formed from permeable alluvial soils, the groundwater table responds quickly to changes in river elevation.

The approximate river elevation at the PINGP site is 675 ft. above mean sea level (MSL). The ISFSI is constructed at an elevation of 694 ft. MSL, with the top of the storage pad at **694.5** ft. MSL. Thus, it is approximately **19.5** feet to groundwater from the ISFSI surface; however, this distance varies readily with river elevation.

The construction of new concrete storage pads and the operation of the casks and ISFSI will not impact groundwater resources. There are no effluents from the ISFSI. There are no borings, holes, or other channels within the ISFSI that could reach groundwater and commute surface pollutants. The requirements of Minn. Stat. § 116C.83, Subd. 6(b) regarding radiological groundwater standards are discussed in Section 5.

4.4 CULTURAL and HISTORICAL RESOURCES

Expansion of the Prairie Island ISFSI will not have a significant impact on cultural and historical resources. There are 60 properties on the National Register of Historic Places in Goodhue County. There are seven properties listed in Pierce County, WI, across the Mississippi River from the PINGP site. The Final Environmental Statement (FES, 1973) for the PINGP identified three sites with historical significance within six miles of the Prairie Island plant.[93] One of these, the Barton Site, was added to the National Register of Historic Places in 1970. The site appears to have been inhabited by people of the Oneota culture sometime between 1050 and 1300 A.D.

The Prairie Island Indian Community (PIIC) is located directly north of the PINGP site. The PIIC is home to the Mdewankanton Band of Eastern Dakota. The lands and waters of the PIIC are a cultural and historic resource. These lands and waters encompass over 3000 acres.

The Mississippi River and its associated parks, trails, and roads are cultural resources for the area. The Mississippi National River and Recreation Area is located upriver from the PINGP site. The Mississippi River corridor in the region is a scenic byway designated as the “Great River Road.” The Road is comprised of U.S. Highway 61 in Minnesota and Wisconsin Route 35 in Wisconsin. Additional cultural resources include state wildlife management areas, state forest areas, and boating areas. The A. P. Anderson County Park is approximately 5 miles south of the PINGP. The Cannon Valley Trail, which follows the Cannon River, offers biking, hiking, skating, and skiing opportunities.

[93] Prairie Island Nuclear Generating Plant, License Renewal Application, Appendix E – Environmental Report, Section 2.10 Historic and Archaeological Resources.

The construction of new concrete storage pads and the operation of the casks and ISFSI will not impact these cultural and historical resources. Construction will occur within the current ISFSI and will utilize existing facilities on the PINGP site (e.g., roads). No historic or cultural resources will be disturbed by the expansion of the ISFSI or ongoing ISFSI operations. Noise due to construction activities at the ISFSI may temporarily impinge on the enjoyment of some cultural resources. However, noise levels during construction will be only slightly higher than ambient levels (local traffic, trains).

4.5 TRAFFIC

Expansion of the Prairie Island ISFSI will not have a significant impact on local transportation resources and no traffic mitigation measures are warranted for construction of the project. No additional staff persons are required for operation of the expanded ISFSI. Operation of the ISFSI creates no new traffic impacts.

Construction of the new concrete storage pads within the ISFSI will create traffic impacts. These impacts are anticipated to be minimal. Construction of the new pads is expected to be completed in a 4 week period. Xcel Energy projects that during this time period 6 additional construction labor workers will be commuting to the ISFSI work site. Trucks will be used to deliver construction supplies to the work site, including structural fill, rebar, and concrete. During the weeks when supplies are delivered, Xcel Energy projects approximately 24 additional truck trips per day on roads leading to the ISFSI work site. These roads include U.S. Highway 61, Prairie Island Blvd., and Sturgeon Lake Rd. These are major roads in good condition such that they can easily handle the additional construction traffic or minor roads with very limited use such that they can accommodate a temporary increase in traffic.

4.6 NOISE

Expansion of the Prairie Island ISFSI will not create significant noise impacts. Impacts from operations of the ISFSI are minimal and primarily reflect ambient noise levels from operations at the PINGP. There will be additional noise impacts related to construction of the concrete storage pads within the ISFSI. These impacts are expected to be minimal.

Construction at the ISFSI site will generate noise. Noise will be generated primarily by the operation of heavy equipment, e.g., bulldozers, dump truck, backhoes, and concrete trucks. Xcel Energy has compared projected construction noises with ambient noise levels at six locations around the PINGP site.[94] Ambient noise levels are highly dependent on location. For example, daytime ambient noise levels at the Prairie Island Casino are in the range of 45 dBA, due primarily to casino related traffic. Daytime ambient noise levels at rural residences are in the range of 35 dBA.

[94] Prairie Island Nuclear Generating Plant, Certificates of Need Application, May 16, 2008. Section 7.3.9, Table 7-8.

Xcel Energy projects construction noises in the range of 40-55 dBA. Thus, some citizens will experience noise impacts of 10-20 additional dBA; other citizens will experience no increase in noise. For those citizens who are impacted, the additional noise impact is limited in extent and duration. The impact will be below the Minnesota daytime code limit (60 dBA). It will occur only during daytime hours, and only during the 4-6 weeks of construction.

The noise impacts from operation of the Prairie Island ISFSI will be the occasional placement of spent fuel casks on the ISFSI pad. Noise levels related to the transport of a cask are approximately equal to that of construction (use of heavy machinery) but of less duration (one or two days per year).

4.7 SOCIOECONOMICS

Expansion of the Prairie Island ISFSI will not have a significant impact on the socioeconomics of the region. The expanded ISFSI will require no additional workers for operations. There will be a small positive impact due to the need for laborers during construction of the concrete pads within the ISFSI. Xcel Energy projects employing 13 additional workers at the ISFSI site over the one-month construction period. Additionally, local companies that supply and transport materials for the construction project will experience a small positive economic impact. Construction of the ISFSI expansion is schedule for 2020. Thus, economic impacts related to construction activities will not occur until that year.

4.8 VISUAL IMPACTS and AESTHETICS

Expansion of the Prairie Island ISFSI will not create significant visual or aesthetic impacts. The ISFSI is situated within a wooded area on the PINGP site and surrounded by a 17 foot high earthen berm. It is not visible from the Mississippi River or adjacent properties. The ISFSI is illuminated for security purposes. However, the light fixtures are approximately 40 ft. high, which is lower than many of the trees surrounding the site.

The illumination of the ISFSI and that of the Prairie Island plant create a small visual impact for persons attempting to enjoy a dark night sky in the area (e.g., stargazing). It is difficult to mitigate this impact. However, this is an existing impact and independent of the ISFSI expansion. The expansion of the ISFSI will not create new or additional visual impacts.

4.9 HEALTH and SAFETY

The health of citizens is dependent upon the health of the ecosystems in which they live and work. The discussions in this section related to ecosystem health, e.g., biological resources and water resources, indicate that the expansion of the Prairie Island ISFSI will not have a significant non-radiological health impact on citizens.

There are very few aspects of health that can be extracted and considered outside of the natural environment. Two health concerns related to the built environment are considered here: (1) the possible impacts to the psychological health of citizens, and (2) the possible radiological health impacts to citizens. Psychological health impacts are discussed in Chapter 1, Section 4.5 of this EIS. Possible radiological impacts are discussed are discussed in Chapter 2, Section 5 of this EIS.

Expansion of the Prairie Island ISFSI will not pose significant non-radiological safety risks and all related possible impacts to citizens (e.g., fall, burn) are minimal. Pursuant to NRC regulations, Xcel Energy maintains an emergency plan for all activities at the PINGP site. As access to the PINGP site is controlled, non-radiological safety incidents involving the general populace are extremely rare. The far greater exposure to safety incidents is to plant personnel. The Prairie Island ISFSI is part of a large industrial facility. As such, there are risks to plant personnel typical of an industrial facility. Xcel Energy implements safety programs to reduce the impact of such risks, e.g., spill prevention plan. It is not anticipated that expansion of the Prairie Island ISFSI will increase risks or introduce new risks to plant personnel that are not well managed by these safety programs. The PINGP had no lost workdays to worker injuries in 2007 or 2008. In 2008, it received a Governor's Safety Award for its safety performance record. **If, however, elements of the emergency response plan for the PINGP are not effective, e.g, governmental entities with emergency responsibilities cannot adequately respond, risks may not be well managed.**

4.10 CUMULATIVE IMPACTS

Cumulative impacts are impacts on the environment that result from the incremental effects of a project in addition to past, present, and reasonably foreseeable future projects regardless of who undertakes these projects.[95] Two reasonably foreseeable future projects are considered here: (1) continued operation of the PINGP until 2034, and (2) use of the ISFSI to facilitate decommissioning of the PINGP after cessation of operations.

Operation of the PINGP Through 2034
If Xcel Energy is granted a certificate of need to expand the storage capacity of the Prairie Island ISFSI by 35 dry storage casks, it is foreseeable that the PINGP will continue operating an additional 20 years past its original license term. Xcel Energy has submitted an operating license renewal application to the NRC to allow continued operation of Prairie Island Units 1 and 2 until 2033 and 2034 respectively.

The potential impacts of the continued operation of the PINGP are discussed in Chapter 1 of this EIS. It's anticipated that no new or additional impacts, beyond those discussed in Chapter 1, would occur if the PINGP continued operations through 2034. **Xcel Energy acquires and maintains permits from state agencies for operations at the Prairie Island plant. These agencies, e.g., Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, are charged with protecting the natural resources of the State of Minnesota and associated public health. Xcel Energy will be required to maintain these permits through**

[95] Minn. Rules 4410.0200, Subp. 11.

2034 should the proposed ISFSI expansion be approved by the state. Accordingly, there will be no new, additional, or otherwise unmanaged impacts beyond those discussed in Chapter 1 if the PINGP continued operations through 2034.

Use of the ISFSI to Facilitate Decommissioning

If the PINGP operates through 2034, it is foreseeable that the plant would cease operations at that time and undergo decommissioning. In the decommissioning process, spent nuclear fuel would need to be temporarily stored (e.g., in the spent nuclear fuel pool) until it could be placed in temporary, long-term storage (Prairie Island ISFSI) or in a federal geologic repository. Although there is uncertainty as to the storage alternatives that will be available in 2034, a likely scenario is temporary long-term storage of spent nuclear fuel at the Prairie Island ISFSI until the dry storage casks can be transported to a federal repository. In this scenario, approximately 34 additional casks would be needed for decommissioning, creating a total of 98 casks on the ISFSI pad upon removal of all spent nuclear fuel from the plant.

Given the uncertainty as to when a federal repository will be available to accept casks from the Prairie Island ISFSI, this document assumes, for analysis purposes only, that the casks (a total of 98) will be at the ISFSI for up to 200 years. Potential radiological impacts from the long-term storage of the casks are discussed in Chapter 2, Section 5. Potential non-radiological impacts are discussed here.

As discussed in this section, the non-radiological impacts related to the expansion of the Prairie Island IFSI are not significant. Additionally, operation of the ISFSI, an essentially passive, monitored structure, poses no significant non-radiological impacts. If an additional 34 casks will be need for decommissioning, an expansion of the pad at the Prairie Island ISFSI very similar to the currently proposed expansion (35 casks) would be required. The ISFSI site is designed such that it can be expanded to accommodate 98 casks. Thus, sometime around 2030, a second expansion of the concrete pads within the ISFSI would be likely. Once this expansion is constructed, the ISFSI would require no further structural changes to store 98 casks.

Construction of new storage pads and operation of the ISFSI most likely presents no significant non-radiological impacts for storage of 98 dry storage casks for up to 200 years. Man-made and natural phenomena could occur during this 200-year period that would introduce substantial non-radiological impacts to the region, e.g., flood, earthquake. However, the marginal impact due to the continued operation of the ISFSI within such phenomena would be insignificant.

5.0 RADIOLOGICAL IMPACTS

This section discusses the radiological impacts expected due to normal operations and to incidents and off-normal operations at the Prairie Island ISFSI. Additionally, it assesses potential radiological impacts from two related actions – the continued operation of the Prairie Island Nuclear Generating Plant (PINGP) through 2034 and the operation of the ISFSI through decommissioning.

5.1 RADIATION MONITORING – ISFSI

Radiation monitoring at the Prairie Island plant, including the ISFSI, is discussed in Chapter 1, Section 4.13.

5.2 RADIOLOGICAL IMPACTS – NORMAL ISFSI OPERATIONS

Radiological impacts from expansion of the Prairie Island ISFSI are anticipated to be within NRC regulatory limits and will not be significant during normal operations. The dry storage casks are passive systems that emit no radioactive effluents. There are no projected impacts or discharges to groundwater from ISFSI operations. Accordingly, there is a "reasonable expectation that the operation of the facility will not result in groundwater contamination."[96] Any radioactive wastes generated during loading of the storage casks in the Auxiliary Building will be treated and handled using existing waste control systems at the PINGP.

Sources of Information

Information and analysis in this section related to operation of the Prairie Island ISFSI is drawn from the Safety Analysis Report (SAR) for the ISFSI and Xcel Energy's Certificate of Need application for additional dry cask storage. The SAR is required by the NRC in order for Xcel Energy to obtain a Special Nuclear Materials (SNM) license to operate the ISFSI (SNM-2506). The Prairie Island ISFSI SAR contains essentially two analyses: (1) an initial safety analysis reflecting the placement of 48 TN-40 casks on the ISFSI pad, and (2) a subsequent safety analysis reflecting the placement of 48 TN-40HT casks on the ISFSI pad. This subsequent analysis is included as Addendum A to the SAR and reflects Xcel Energy's intent to use the TN-40HT casks at the Prairie Island ISFSI. Analysis for the TN-40HT casks was submitted as a license amendment request to the NRC on March 28, 2008.

The Prairie Island ISFSI is licensed federally for storage of up to 48 casks. The ISFSI currently has approval from the State of Minnesota for storage of up to 29 casks. Discussion and analysis in this section is focused on state benchmarks: (1) the pending request for an additional 35 casks (for a total of 64), and (2) the possible placement of a total of 98 casks on the ISFSI pad prior to transport to a federal repository.

[96] Minn. Stat. § 116C.83, Subd. 6.

The safety analysis for a Prairie Island ISFSI composed of TN-40 casks is very similar to an analysis for an ISFSI composed of TN-40HT casks or a mix of TN-40 and TN-40HT casks. However, where there is a significant difference in the characteristics of the casks or in the analyses reported in the SAR regarding the operation of the casks, it is noted and discussed.

Estimation of Doses. The dose estimates in the Prairie Island ISFSI SAR and in Xcel Energy's Certificate of Need application are obtained by computer simulation of neutron and gamma radiation transport in a three dimensional model. This modeling is computing power intensive, requiring CPU days of computation for each simulation. However, this modeling is the only way to obtain meaningful dose estimates. In the discussion that follows there are instances where dose estimates for a specific scenario are not available. These are noted and estimates or projections based on the best available data are made.

Impacts to the General Public

Radiation doses to the general public from ISFSI operations result from skyshine radiation. Skyshine radiation is gamma and neutron radiation that travels upward from the storage casks and is reflected off the atmosphere back to the ground. Shielding on the storage casks themselves reduces radiation doses, as does the earthen berm surrounding the ISFSI. The casks and berm greatly minimize direct radiation to the public, leaving skyshine radiation as the primary means of exposure.

The estimated annual dose to the nearest permanent residence (0.45 miles; 724 meters NW of the ISFSI) with 64 casks on the ISFSI pad is 0.4 mrem/yr.[97] This dose is within NRC regulatory limits for radiation exposure to the general public – 100 mrem/yr from all man-made sources (10 CFR 20) and 25 mrem/yr from ISFSI operations (10 CFR 72). The dose from skyshine radiation decreases with distance from the ISFSI. Members of the public at a distance greater than 0.45 miles would receive less than 0.4 mrem/yr. For example, the estimated annual dose at the Prairie Island Community Center and Treasure Island Casino (0.8 miles; 1285 meters NW of the ISFSI) is approximately one-tenth of the estimated dose to the nearest residence (0.04 mrem/yr).[98]

The radiation exposure contribution from ISFSI operations to a member of the general public (≤ 0.4 mrem/yr.) is indistinguishable from background radiation. Monitoring programs corroborate ISFSI exposure and dose estimates and their near-background levels. Data from themoluminescent dosimeters (TLDs) monitored by the Minnesota Department of Health (MDH) indicates exposure rates near the Prairie Island plant are at background radiation levels.[99] Monitoring by the Wisconsin Department of Health Services (WDHS) shows radiation exposure rates within background levels and comparable to other areas within Wisconsin.[100] Monitoring

[97] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 7.2.3. This estimate assumes the placement of 64 TN-40HT casks loaded with spent fuel at anticipated PINGP fuel enrichments and burnups.
[98] The change in estimated dose with distance from the ISFSI is illustrated by dose rate tables in the SAR, Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Section A7.5.
[99] 2006 Environmental Radiation Data Report, Minnesota Department of Health, http://www.health.state.mn.us/divs/eh/radiation/monitor/envriondatareport.html
[100] State of Wisconsin, 2007 Prairie Island Environmental Radioactivity Survey, http://dhs.wisconsin.gov/dph_beh/EnvMonitoring/PrairieIsland/piwww07.pdf

by Xcel Energy at thirty-four locations near the PINGP indicates exposure rates at background levels.[101]

Health risks to the general public result from potential long-term exposure to low-level skyshine radiation from the Prairie Island ISFSI. These risks are not anticipated to be significant. The primary health concern is cancer. If we assume that members of the local public live at the nearest residence and that they are at home, outdoors, continuously for 70 years, it is estimated that an additional 1 person in 35,700 (2.8 in 100,000) would be diagnosed with cancer and an additional 1 person in 71,000 would die from cancer.

As there are approximately 450 full-time residents within the immediate vicinity of the Prairie Island plant (2 mile radius), this translates into a hypothetical 0.013 additional cancer diagnoses and 0.006 additional cancer deaths among these residents during a 70-yr. time period. Approximately 40 percent of these residents (180 persons) would be diagnosed with cancer and 20 percent of these residents (90 persons) would be expected to die from cancer from all cancer causes during this same period.

Impacts to Plant Personnel

Radiological exposures and doses to personnel at the PINGP and Prairie Island ISFSI are monitored and controlled according to the Prairie Island radiation protection program. Per NRC regulations (10 CFR 72), exposures are kept as low as reasonably achievable (ALARA) through design and operational procedures. Radiation exposures to plant personnel from all operations at Prairie Island have decreased over time and now average approximately 111 person-rem annually.[102]

Radiation exposures to plant personnel due to operation of the Prairie Island ISFSI can be divided into three categories: (1) exposure due to handling and placing casks, (2) exposure due to surveillance and maintenance activities, and (3) exposure due to skyshine radiation. Exposures for all three categories will increase with the use of the TN-40HT casks due to higher fuel loadings and burnups. Because cask handling and maintenance are specialized, high exposure rate tasks, it is difficult to estimate individual dose rates and impacts. The SAR estimates these doses as collective doses, i.e., in person-rem (**Table 5-1**).

The SAR dose estimates are based on NRC-required assumptions and are conservative.[103] Personnel involved in these tasks will have their doses managed by the Prairie Island radiation protection program to keep them below NRC regulatory limit of 5,000 mrem/yr. for occupational exposure (10 CFR 20). Plant personnel doses are individually monitored and tracked to ensure compliance with NRC regulations. Health risks to "cask personnel" will be higher than those to

[101] 2007 Annual Radiological Environmental Monitoring Program (REMP) Report, Xcel Energy, Prairie Island Nuclear Generating Plant, May 2008, http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/prai1-2.html

[102] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 8.2.5.2.

[103] For example, the NRC requires the assumptions that all TN-40HT casks are loaded with spent fuel at maximum fuel loading (410 kg U per fuel assembly) and burnup (60,000 MWD/MTU). PINGP fuel has a lower fuel loading (360-400 kg U per fuel assembly) and burnup (53,000 MWD/MTU).

the general public. If we assume that cask surveillance staff performs the same job for 70 years, it is estimated that there would be 0.32 additional cancer diagnoses and 0.16 additional cancer deaths among the staff during this time period.

In contrast to direct radiation received from cask operations, skyshine radiation from the ISFSI impacts all plant personnel regardless of their duties. There is not a direct estimate (an estimate based on 64 casks on the ISFSI pad) for skyshine radiation dose to plant personnel in the SAR or in Xcel Energy's Certificate of Need application.[104] The best estimate, based on available data, for the annual average dose to plant personnel from skyshine radiation is 14 mrem/yr.[105] Individual employees will receive more or less than this average depending on their employment status and their work location. This dose is within the NRC regulatory limit of 5,000 mrem/yr. for occupational exposure (10 CFR 20).

Health risks to plant personnel result from potential long-term exposure to low-level doses from ISFSI operations. As before, the primary health concern is cancer. Assuming that all workers receive a dose of 14 mrem/yr and that they are full-time employees for 70 years, it is estimated that an additional 1 person in 1020 (98 in 100,000) would be diagnosed with cancer and an additional 1 person in 2040 would die from cancer. As there are 923 employees at the Prairie Island plant, this translates into a hypothetical 0.9 additional cancer diagnoses and 0.45 additional cancer deaths among plant personnel during a 70-yr. time period. Approximately 40 percent of plant personnel (369) would be diagnosed with cancer and 20 percent of plant personnel (185 persons) would be expected to die from cancer from all cancer causes during this same period.

Impacts to Flora and Fauna

Direct radiation doses to flora and fauna from normal ISFSI operations are typically not estimated or monitored. It is assumed that the exposure to flora and fauna is similar to that of the general public, i.e., indistinguishable from background radiation, and thus there is no significant radiological impact. However, this assumption would not hold for two cases: (1) flora that is very near the ISFSI, and (2) fauna that lives in, moves through, or otherwise utilizes the ISFSI site or nearby habitat.

The earthen berm that surrounds the ISFSI greatly minimizes radiation exposure in these cases; however, it cannot eliminate skyshine radiation, nor radiation within the ISFSI. Radiation impacts to tall nearby flora, e.g., trees, are anticipated to be minimal but unavoidable (or likely not to be mitigated as trees around the ISFSI, though receiving radiation exposure, are healthy and provide desirable ecosystem services). Radiation impacts to nearby fauna are mitigated by the fact that there is no potential habitat for fauna within the ISFSI. Birds, for example, may

[104] SAR dose estimates are based on 48 casks (TN-40 or TN-40HT) placed on the ISFSI pad.
[105] This is the estimated dose for 48 TN-40HT casks. Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Section A7.4 (12.9 person-rem / 923 persons = 14 mrem). The dose estimate is conservative in that it is based on maximum fuel loading, fuel burnups, and cask loading rates. Additionally, it assumes that plant personnel are outdoors, unprotected by buildings from skyshine radiation. The estimate is not conservative in that it is based on 48 casks on the ISFSI pad.

light on top of the earthen berm, but likely would not make a nest on the concrete pads. ISFSI operating procedures preclude use of the ISFSI site by nesting animals. Accordingly, radiation impacts to fauna are anticipated to be minimal.

5.3 RADIOLOGICAL IMPACTS – POTENTIAL INCIDENTS and OFF-NORMAL ISFSI OPERATIONS

Radiological impacts from potential incidents and off-normal operations at an expanded Prairie Island ISFSI are not anticipated to be significant. The potential impacts from natural and man-made phenomena have been analyzed in the Safety Analysis Report for the ISFSI. In these scenarios, the probability of damaging the dry storage casks such that they release radioactive materials is very low. Additionally, assuming such damage might occur, the estimated radiological doses are within NRC regulatory limits (10 CFR 72).

Natural Phenomena
Incident and off-normal operation scenarios caused by natural phenomena discussed in this section include earthquakes, tornadoes, and floods. These phenomena are considered design basis accidents and are covered by cask design requirements in 10 CFR 72. All casks licensed for use by the NRC must meet these design requirements.

Earthquakes. The design basis earthquake for the Prairie Island ISFSI is the equivalent of the safe shutdown earthquake (SSE) for the PINGP. The SSE is projected to cause accelerations of 12 percent of gravity (g) horizontally and 8 percent g horizontally. This is roughly equivalent to an intensity of VI on the Mercalli scale and a magnitude of 5.4 on the Richter scale. Such an earthquake is slightly larger than the largest recorded earthquake in Minnesota.[106] Analysis of the storage casks in a safe shutdown earthquake predicts that the casks will not tip or slide. Accordingly, there is no anticipated radiological impact.

Tornadoes. The design basis tornado is a tornado with winds of 360 miles per hour (mph). Analysis of the storage casks in such a tornado predicts that the casks will not tip or slide. An additional hazard considered in this scenario is the impacting of the casks by an object which is picked up in the tornado. Such an object, impelled by the wind, would act as a missile against the casks. Analysis of two potential missiles (an automobile, a plank of wood) predicts that the missiles will not tip the casks. A cask is predicted to slide about 1 inch when hit by an automobile in a tornado. Neither missile would penetrate a cask. Thus, there is no anticipated radiological impact.

Floods. The design basis flood is the probable maximum flood that could occur at Prairie Island. This flood is a hypothetical flood that would result if all of the factors that contribute to the flood (e.g., rainfall, timing, runoff) were to reach their most critical values concurrently. The probable maximum flood at Prairie Island is calculated to be 706.7 ft. above mean sea level (MSL), with a water velocity of 6.2 ft/sec. The surface of the ISFSI concrete pads is **694.5** ft. above MSL.

[106] Minnesota Earthquake Information, http://earthquake.usgs.gov/regional/states/?region=Minnesota

Waters from a probable maximum flood would cover the ISFSI pad and extend approximately **12** ft. up the sides of the casks. The casks are approximately 16 ft. tall and flood waters would remain below cask seals. The velocity of the water in a probable maximum flood would not cause the casks to tip or slide. Accordingly, there is no anticipated radiological impact.

Burial. Thermal analysis of the dry storage casks in the Safety Analysis Report includes a scenario in which the casks cannot dissipate heat to the environment and are effectively insulated. Such a scenario might occur if the casks were buried in dry soil. Analysis of this scenario predicts that cask temperatures would reach 570º F approximately 60 hours after burial. This temperature would likely cause cask seal failure (radiological impacts from failure of a cask seal are discussed in this section). It's unclear what natural or man-made phenomena might lead to complete burial of a cask. Accordingly, there are substantial uncertainties in estimating the risk of burial and possible radiological impacts. The Prairie Island emergency response plan provides for accident conditions that could impact cask confinement. Cask burial is included as a possible accident condition and there is a plant abnormal operations procedure in the event a cask becomes buried.

Other Phenomena. Other natural phenomena, e.g., lightning, snow loading, have been modeled in the ISFSI Safety Analysis Report and are predicted to have no impact on the dry storage casks.

Man-made Phenomena

Incident and off-normal operation scenarios caused by man-made phenomena discussed in this section include fire, explosion, mishandling of the casks, terrorism, and impact by airplane. **Discussion of these phenomena assumes that emergency planning measures remain effective into the future. If emergency planning measures are not effective into the future, e.g., governmental entities with emergency responsibilities cannot adequately respond, the risk of radiological impacts increases and could be significant.**

Fire. The only source of fuel which could cause a fire at or near a cask is the fuel for the cask transporter. Analysis of this fuel combusting and engulfing a cask indicates that the cask would maintain its integrity. The cask's neutron shield would suffer damage in the fire and could lose effectiveness. Thus, the radiological impact would be limited to an increase in neutron radiation near the cask, until such time as the cask / shield could be repaired.

Accident analysis in the SAR for the TN-40HT cask assumes that all neutron shielding is lost due to the fire and that a hypothetical person remains at the site boundary 24 hours a day for 30 days. The dose to this hypothetical person is estimated to be 322 mrem, which is within NRC regulatory limits (10 CFR 72). As a fire at the ISFSI which damaged a cask would trigger emergency response measures that would preclude a local resident standing at the site boundary for 30 days, this dose estimate is very conservative. It better reflects dose levels that would be considered by plant and emergency response personnel.

Explosion. A cargo explosion on a barge in the Mississippi River would create a pressure wave that might damage the PINGP and ISFSI. Analysis of a hypothetical cargo explosion indicates that the resulting pressure wave would not damage ISFSI casks. No radiological impacts would occur.

Mishandling of Casks. The handling of dry storage casks is discussed in Chapter 2, Section 3. The primary steps include loading spent fuel assemblies into casks, preparing the casks for storage, and transporting casks to the ISFSI. Each of these steps contains sub-steps which, if performed incorrectly, could create a potential radiological impact. Consequently, there are substantial control and design measures in place at the Prairie Island plant to ensure proper cask handling.

The ISFSI Safety Analysis Report (SAR) examines possible mishandling scenarios. The casks at the PINGP are lifted in the Prairie Island Auxiliary Building by a single failure proof crane. Single failure proof means that the failure of any single component will not result in a load being dropped. The trunnions by which the casks are lifted are designed to ANSI standards for critical loads. All cask lifts are performed in accordance with the PINGP heavy load program, which requires operator and riggers that have specific training and qualifications. The casks are transported by the specialized cask transport vehicle (CTV), and are never lifted higher than 18 inches during transport.

For purposes of the SAR, these design and handling standards preclude several possible mishandling scenarios, e.g., dropping a cask in the Auxiliary Building. However, even if a cask can be handled securely in the Auxiliary Building, it is still possible that: (1) the cask was loaded with an incorrect fuel assembly, or (2) that the cask is dropped by the CTV. The SAR analysis of the administrative and record controls required by the NRC license for the ISFSI indicates that an erroneously loaded fuel assembly would be detected prior to sealing the cask. Thus, the storage casks would perform as designed and there would be no radiological impact. Analysis of an 18 inch drop of a cask onto a concrete surface (ISFSI pad, Auxiliary Building floor) indicates that the cask and its contents would remain intact. Cask confinement would not be breached; no radiological impacts would occur.

The Electric Power Research Institute (EPRI) has conducted a risk assessment of the use of the Transnuclear TN series casks at a generic nuclear generating plant.[107] The assessment evaluates possible incident-initiating events and follows these events to estimate the radiological risk to a person at the plant site boundary. The risk assessment indicates a low level of radiological risk, with no early fatality risk to the general public. The risks are expressed in latent cancer deaths per cask per year (**Table 5-2**).

The EPRI risk assessment results include the possibilities of incorrect fuel assembly loading and of crane failure (dropping a cask in the Auxiliary Building). The cask loading phase contains the least risk of the three cask handling phases, followed by cask storage and cask transportation. The relatively higher cask transportation risk is due to the possibility of a generic transporter fire which is of sufficient duration to cause cask seal failure.

[107] Probabilistic Risk Assessment (PRA) of Bolted Storage Casks: Updated Qualification and Analysis Report, EPRI, Palo Alto, CA; 2004, www.epri.com.

Considering the SAR and EPRI risk assessments together, the SAR indicates that specific cask storage risks (e.g., flood, tornado) and specific cask transportation risks (fire) present little or no radiological risk. Specific cask loading risks (incorrect fuel loading, crane failure) are not considered credible. The EPRI risk assessment supports the SAR in concluding that loading risks represent the smallest share of cask handling risks. The EPRI risk assessment highlights that a transporter fire represents a relatively higher radiological risk, one that should be evaluated for a specific site-transporter-cask combination. The SAR performs this evaluation (discussed above). Thus, the SAR and EPRI risk assessments suggest that radiological impacts due to mishandling of casks are not likely.

Terrorism. The radiological risks resulting from a terrorist attack on the Prairie Island ISFSI are covered to a great degree by the risk analyses for natural and man-made phenomena referenced in this section. That is, there are few forces that could be brought to bear on the storage casks by terrorists greater than those already examined, e.g., tornado, flood, fire, explosion. It is possible that armaments could be used to attack the casks, creating damage or a fire that causes a cask seal failure. An airplane could be commandeered to attack the casks (discussed below). These risks are difficult to assess and include substantial uncertainties. However, the risks and potential radiological impacts are likely no greater than risks from natural and man-made phenomena discussed in this section.

Following the events of September 11, 2001, the NRC developed and required security enhancements for all spent fuel storage installations. The NRC also initiated a classified review of the capability of nuclear facilities to survive a terrorist attack, including commercial aircraft attacks, vehicle bomb assaults, and ground assaults. This review indicated that the likelihood of a radioactive release with significant radiological impacts was very low. Nonetheless, the NRC is providing revised guidance to all licensees regarding security requirements against terrorism.[108] Xcel Energy has implemented security enhancements at the Prairie Island in accordance with NRC guidance and regulations.

Impact by Airplane. The radiological risks associated with the impact of an airplane on a dry storage cask were discussed in the 1991 final environmental impact statement (FEIS) for the Prairie Island ISFSI and are discussed in the 2004 EPRI risk assessment. The FEIS notes that an airplane crash is an unlikely event, and is not analyzed in the ISFSI SAR.[109] The impact of a small propeller aircraft or jet would be similar to a tornado impelled missile, and would likely not create a radiological risk. Impact from a commercial airplane would likely cause a cask to tip over but would not breach the cask confinement. The FEIS suggests that the worst case scenario for a commercial airplane would be the direct impact of jet turbine rotor with a cask, which would damage the outer shell and shielding, but likely leave the cask confinement intact.

[108] Backgrounder – Nuclear Security, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/security-enhancements.html

[109] Final Environmental Impact Statement, Prairie Island Independent Spent Fuel Storage Installation, Minnesota Environmental Quality Board, 1991.

The EPRI risk assessment analyzes the impact of an airplane as a "loss of integrity due to high temperature and heavy missiles."[110] The EPRI risk assessment indicates that impact from a small airplane could cause a fire, but would not tip a cask or penetrate the cask. Depending on the fire characteristics, cask shielding would be damaged and cask confinement may or may not be maintained. The assessment indicates that impact from a commercial airliner could cause a cask to tip, depending on which part of the airplane hits the cask. The impact would likely cause a fire which would damage cask shielding and could compromise cask confinement.

Taken together, the FEIS and EPRI risk assessment indicate that radiological risks due to airplane impact are low, but that there are substantial uncertainties, particularly concerning impact by a commercial airliner, in estimating the risks. Significant radiological impacts to the general public are not anticipated.

Hypothetical Cask Confinement Failure

The scenarios and analyses discussed in this section indicate that loss of cask confinement is a very low risk event. None of the specific risks evaluated in the SAR compromise cask confinement. Nonetheless, recognizing the fallibility of all human endeavors, the SAR evaluates the possibility of breach of the cask seal by some hypothetical unspecified means and the resulting radiological impacts. The confinement failure analyses in the SAR for the TN-40 and TN-40HT casks are slightly different and are discussed separately here.

In the confinement failure analysis for the TN-40 cask, it is assumed that the cask seal is breached and that the fuel pellets and cladding for all fuel assemblies in the cask fail.[111] This failure releases radioactive Krypton gas (Kr-85), the only nuclide in the fuel assemblies in a gaseous state. It is assumed that all of the Kr-85 gas is release instantaneously, is not mitigated in any way, and exposes a person at the Prairie Island site boundary to a dose of radiation. The distance from the ISFSI to the nearest site boundary is approximately 0.07 miles (110 meters). The estimated dose to this person is 338 mrem. This dose is within the NRC limit of 5 rem (5,000 mrem) for a design basis accident at an ISFSI (10 CFR 72). The estimated dose to the nearest permanent residence (0.45 miles away; 720 meters) is approximately 12 mrem. If we assume all local residents (450 persons) receive this dose, this translates into a hypothetical 0.005 additional cancer diagnoses and 0.003 additional cancer deaths among these residents during their lifetimes.

In the confinement failure analysis for the TN-40HT cask, it is assumed that all fuel rods fail and fire conditions exist.[112] However, unlike the TN-40 analysis, the release rate of radionuclides is limited to the seal leak rate (1 E-05 cm^3/sec) and occurs over a 30 day period. As before, Krypton gas is projected to provide the greatest amount of activity and exposure. The estimated dose to a person at the nearest site boundary (110 meters) is 24 mrem. This dose is within the NRC regulatory limits for a design basis accident at an ISFSI (10 CFR 72). The estimated dose

[110] Probabilistic Risk Assessment (PRA) of Bolted Storage Casks: Updated Qualification and Analysis Report, Section B.4.3.7, EPRI, Palo Alto, CA; 2004, www.epri.com.
[111] Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Section 8.2.9.
[112] Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Section A8.2.9.

to the nearest permanent residence (0.45 miles away; 720 meters) is approximately 1 mrem. If we assume all local residents (450 persons) receive this dose, this translates into a hypothetical 0.0005 additional cancer diagnoses and 0.0002 additional cancer deaths among these residents during their lifetimes.

The SAR analyses indicate that doses to local residents under cask confinement failure conditions will be limited and will not cause significant impacts. Persons at the plant, either working at the plant or for some reason within the plant boundary, would likely receive higher doses and would experience relatively greater health impacts. These persons could receive approximately one year's worth of background radiation in one accident event. Emergency responders could receive even higher doses. **If emergency response measures are not effective, doses to local residents and plant personnel would increase and could cause significant health impacts.**

It is conceivable that an incident at the ISFSI (e.g., impact by commercial airliner) could cause more than one cask to suffer a confinement failure. If in constructing a worst-case scenario we assume: (1) the ISFSI pad is loaded with 98 casks (the projected decommissioning total), half of which experience confinement failure due to airliner impact, (2) the failure is one of immediate release (such as the TN-40 cask analysis), and (3) the estimated dose per cask to local residents is that of the TN-40 analysis (12 mrem), then the estimated dose to residents is approximately 588 mrem/person (49 x 12 mrem). If we assume all local residents (450 persons) receive this dose, this translates into a hypothetical 0.26 additional cancer diagnoses and 0.13 additional cancer deaths among these residents during their lifetimes.

There are substantial uncertainties in estimating such a worst-case dose, e.g., damage to casks, release conditions, release rates. There are also uncertainties related to the risk of such a dose, e.g., probability of airliner impact causing 49 casks to fail, release conditions caused by such an impact, and the effectiveness of emergency response measures. Nonetheless, projecting from confinement failure analyses in the SAR, it appears that multiple cask confinement failures would not cause a significant human health impact to local residents. Plant personnel and emergency responders would experience relatively greater health impacts. **If emergency response measures are not effective, doses to local residents and plant personnel would increase and could cause significant health impacts.** Because of the substantial uncertainties involved in making a worst-case scenario projection there are likely differences of opinion regarding potential health impacts.

5.4 CUMULATIVE IMPACTS

Cumulative impacts are impacts on the environment that result from the incremental effects of a project in addition to past, present, and reasonably foreseeable future projects regardless of who undertakes these projects.[113] Two reasonably foreseeable future projects are considered here: (1) continued operation of the PINGP until 2034, and (2) use of the ISFSI to facilitate

[113] Minn. Rules 4410.0200, Subp. 11.

decommissioning of the PINGP after cessation of operations. **Additionally, this section discusses possible scenarios for storage of spent nuclear fuel should the currently proposed federal repository, Yucca Mountain, be unavailable.**

Operation of the PINGP Through 2034

If Xcel Energy is granted a certificate of need to expand the storage capacity of the Prairie Island ISFSI by 35 dry storage casks, it is foreseeable that the PINGP will continue operating an additional 20 years past its original license term. Xcel Energy has submitted an operating license renewal application to the NRC to allow continued operation of Prairie Island Units 1 and 2 until 2033 and 2034 respectively.

Normal Operations. The potential radiological impacts of continued normal operation of the PINGP are discussed in Chapter 1 of this EIS (Section 4.13). It's anticipated that no new or additional impacts, beyond those discussed in Chapter 1, would occur if the PINGP continued operations through 2034. Potential radiological impacts are projected to be within NRC regulatory limits and would not be significant during normal operations.

Incidents and Off-normal Operations. Assuming that regular maintenance continues as currently performed at the PINGP, radiological impacts from incidents and off-normal operations at the PINGP which might occur during an additional 20 years of operation (through 2034) are projected to be within NRC regulatory limits and are not anticipated to be significant. Potential incidents at the PINGP and their consequences are discussed and analyzed in the environmental report which Xcel Energy submitted to the NRC for license renewal of the PINGP.[114] Applicable sections of the report are discussed here.

Potential incidents at the PINGP are analyzed using probabilistic risk assessment (PRA). PRA develops and examines fault trees for incidents that could lead to the release of radionuclides. Because the components of Unit 1 and Unit 2 at the PINGP have different fault characteristics, e.g., the steam generator for Unit 1 was replaced 2004, while the Unit 2 replacement is scheduled for 2013, the risk of incidents is expressed for each unit. The risk of an incident that results in reactor core damage is estimated at 9.79 E-06/yr for Unit 1 and 1.21 E-05/yr for Unit 2.[115] This frequency is approximately once every 82,644 reactor-years. Thus, an incident resulting in core damage is highly unlikely.

If an incident resulting in core damage does occur, the potential release of radionuclides could follow any of several pathways depending on the type of incident and the potential responses. Modeling in the environmental report, which assumes effective emergency response measures, estimates the collective dose to the general public from a core damage

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[114] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Environmental Report, Section 4.17, Attachment F, May 16, 2008.

[115] Id. Attachment F, Table F.3-7. The risk for Unit 2 is higher than for Unit 1 due to the age of the steam generator, i.e., an older steam generator is more vulnerable to a steam generator tube rupture which could be an initiating event for a core damage incident.

incident to be 2.94 person-rem for Unit 1 and 8.43 person-rem for Unit 2.[116] Using the higher estimate from Unit 2, this dose corresponds to an estimated 0.008 additional cancer diagnoses and 0.004 additional cancer deaths among the general public due to an incident.

The NRC has evaluated potential incidents (accidents) at commercial reactor sites in its Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS).[117] The GEIS uses regression analysis to estimate the environmental impacts of incidents at 72 commercial reactor sites throughout the Unites States. Analysis in the GEIS estimates the collective dose to the general public from a severe accident at the Prairie Island plant to be 237 person-rem.[118] This dose corresponds to an estimated 0.24 additional cancer diagnoses and 0.12 additional cancer deaths among the general public due to an incident. The GEIS dose estimate is a conservative estimate, and due to the methodology and assumptions used, is higher than the estimate in the environmental report.

The most serious accident to occur at a U.S. commercial nuclear plant is the accident at the Three Mile Island plant near Middletown, Pennsylvania, in 1979.[119] Due to a loss of coolant, the reactor core at the plant suffered a meltdown, a most severe core incident. The estimated collective dose to the general public from the incident was approximately 2000 person-rem.[120] This dose corresponds to an estimated 2.0 additional cancer diagnoses and 1.0 additional cancer deaths among the general public due to the incident.

Considering the environmental report, the GEIS, and the health impacts of the Three Mile Island (TMI) accident, potential radiological impacts to the general public from continued operation of the PINGP are not anticipated to be significant. Projected dose levels are within NRC regulations (100 mrem/yr., 10 CFR 20). To be sure, the potential health impacts of the TMI accident are not to be taken lightly. Substantial improvements, both in the regulation and operation of commercial nuclear plants in the United States, have occurred as a result of the TMI accident. The risk of a core damage incident is very low, and the consequences of such an incident, calculated (environmental report, GEIS) and experienced (TMI), are not significant.

The above discussion of potential radiological impacts assumes that emergency response measures are effective. Such measures are necessary to reduce potential exposures and health impacts to the general public. If emergency response measures are not effective into the future, e.g., governmental entities with emergency responsibilities cannot adequately respond, the risk of radiological impacts from potential PINGP incidents increases and could be significant.

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[116] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Environmental Report, Attachment F, Table F.3-7, May 16, 2008.
[117] Generic Environmental Impact Statement for License Renewal of Nuclear Plant, NUREG-1437, Section 5, http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/v1/part05.html#_1_129.
[118] Id. Table 5.6.
[119] NRC Fact Sheet on the Three Mile Island Accident, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html.
[120] Id. Approximately 2 million persons in the area received an average dose of 1 mrem.

Use of the ISFSI to Facilitate Decommissioning

If the PINGP operates through 2034, it is foreseeable that the plant would cease operations at that time and undergo decommissioning. In the decommissioning process, spent nuclear fuel would need to be temporarily stored (e.g., in the spent nuclear fuel pool) until it could be placed in temporary, long-term storage (Prairie Island ISFSI) or in a federal geologic repository. Although there is uncertainty as to the storage alternatives that will be available in 2034, **the most** likely scenario, **the only scenario in accordance with current Minnesota and federal law governing storage of spent nuclear fuel,** is temporary long-term storage of spent nuclear fuel at the Prairie Island ISFSI until the dry storage casks can be transported to a federal repository. In this scenario, approximately 34 additional casks would be needed for decommissioning, creating a total of 98 casks on the ISFSI pad upon removal of all spent nuclear fuel from the plant.

Given the uncertainty as to when a federal repository will be available to accept casks from the Prairie Island ISFSI, this document assumes, for analysis purposes only, that the casks (a total of 98) will be at the ISFSI for up to 200 years. Potential non-radiological impacts from the long-term storage of the casks are discussed in Chapter 2, Section 4. Potential radiological impacts are discussed here.

Normal Operations. Assuming that regular monitoring and maintenance continue as currently performed at the ISFSI, radiological impacts from continued operation of the Prairie Island ISFSI for up to 200 years would be within NRC regulatory limits and would not be significant during normal operations. The dry storage casks are passive systems that emit no radioactive effluents. Radiation exposure would occur solely through cask monitoring and skyshine radiation (discussed above, Section 5.2).

It is assumed that the 34 additional casks needed for decommissioning would be TN-40HT casks. Thus, the composition of casks on the ISFSI pad at decommissioning would be: 29 TN-40 casks and 69 TN-40HT casks, for a total of 98 casks. The additional 34 casks would increase radiation exposure to the general public by increasing skyshine radiation. The maximum exposure and dose rate would occur when the 98th cask is placed on the pad. Once it is placed, exposure rates would decrease due to radioactive decay of the contents of the casks.

There is not a direct estimate (an estimate based on 98 casks on the ISFSI pad) for skyshine radiation dose to the general public in the SAR or in Xcel Energy's Certificate of Need (CON) application (**Table 5-3**).

However, dose estimates in the SAR and the CON application can be used to project, with some confidence, a bounding dose rate for the general public. The annual dose to the nearest residence (0.45 miles; 724 meters NW of the ISFSI) with 98 casks on the ISFSI pad is projected to be no greater that 5 mrem/yr.[121] This dose would be within NRC regulatory limits for radiation

[121] Doubling the estimated dose in SAR Addendum A (2.2 x 2 =4.4 mrem/yr.) would be a conservative estimate of 96 casks on the ISFSI pad.

exposure to the general public (25 mrem/yr., 10 CFR 72). Members of the public at a distance greater than 0.45 miles would receive less than 5 mrem/yr.

Health risks from this exposure and dose are not expected to be significant. The primary health concern is cancer. If we assume that members of the local public live at the nearest residence and that they are at home, outdoors, continuously for 70 years, it is estimated that an additional 1 person in 2,850 (35 in 100,000) would be diagnosed with cancer and an additional 1 person in 5,700 would die from cancer. As there are approximately 450 full-time residents within the immediate vicinity of the Prairie Island plant (2 mile radius), this translates into a hypothetical 0.16 additional cancer diagnoses and 0.08 additional cancer deaths among these residents during a 70-yr. time period. **Over a 200-year timeframe (approximately 3 lifetimes), this translates into a hypothetical 0.48 additional cancer diagnoses and 0.24 additional cancer deaths among residents near the Prairie Island plant.**[122]

If the population of full-time residents within a 2-mile radius (particularly within a 1-mile radius from the ISFSI) increases over a 200-year timeframe, the potential health risks would also increase. Though population growth can be expected in the general area, particularly in and around the city of Red Wing, it is not expected that there would be a large population increase near the PINGP and Prairie Island ISFSI. The projected population within a 2-mile radius of the PINGP in 2034 is 2,210 persons.[123] **Assuming these are all full-time residents, this translates into a hypothetical 0.78 additional cancer diagnoses and 0.39 additional cancer deaths among these residents during a 70-year time period. Over a 200-year timeframe (approximately 3 lifetimes), this translates into a hypothetical 2.3 additional cancer diagnoses and 1.2 additional cancer deaths among residents near the Prairie Island plant.**

The collective dose (person-mrem/yr) and associated health risks will vary over a 200-year timeframe based on the number of full-time residents and the exposure they receive, which will decrease with distance from the ISFSI and time, i.e. radioactive decay of the spent fuel in the storage casks. Estimates presented here are conservative in that (1) they rely on a projected exposure rate from the SAR, not a direct estimate, (2) the exposure rate does not take into account radioactive decay over a 200-year timeframe, (3) the exposure rate is for persons assumed at home, outdoors, continuously for 70 years, and (4) the exposure rate for all persons within 2 miles is assumed to be equal to the nearest resident (0.45 miles). It is not possible to provide more accurate estimates without a direct estimate of skyshine radiation that takes into account radioactive decay (see Section 5.2 of this chapter discussing estimation of doses).

[122] This estimate assumes that exposure levels from ISFSI skyshine radiation will remain constant over 200 years. This is a conservative assumption. Exposure levels would drop over the 200-year timeframe due to radioactive decay of the spent nuclear fuel.

[123] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Environmental Report, Attachment F, Table F.9, May 16, 2008.

Radiological impacts to plant personnel during decommissioning are expected to be minimal. Casks would no longer need to be loaded and placed on the ISFSI pad. Thus, this component of plant personnel exposure would be eliminated. Casks would still need to be monitored and maintained until moved to a federal repository, thus this exposure component would remain.

It is assumed that plant staffing levels would drop with decommissioning. Thus, impacts due to skyshine radiation would be greatly reduced. There would still be radiation due to the storage casks, but few persons to receive the exposure.

Assumptions. The analysis of dry cask storage for up to 200 years at the Prairie Island ISFSI assumes that regular monitoring and maintenance continue as currently performed at the ISFSI. This monitoring and maintenance would ensure that the ISFSI and its components function as designed to protect public health. In order for this to occur, the social and political infrastructure that supports the Prairie Island plant and ISFSI must continue to function. This continuation of social, political, and economic functioning is commonly known as institutional control. Whether or not, in a country just over 230 years old, institutional control can be maintained for 200 years such that the dry cask storage at Prairie Island performs as designed is a relevant question and one that is challenging to answer. Such a question has been examined in the environmental impact statement for the proposed federal repository at Yucca Mountain.[124] Analysis from the Yucca Mountain EIS that addresses this question is discussed here.

The Yucca Mountain EIS, in its evaluation of a "no-action alternative" assumes that Yucca Mountain does not enter operation, and that commercial spent nuclear fuel is stored in ISFSIs at existing plant locations for 10,000 years.[125] The EIS examines two scenarios – one in which institutional control exists for all 10,000 years (Scenario 1), and one in which institutional control ends after 100 years (Scenario 2). Because the EIS attempts to consider all ISFSI types over a very long time period, it necessarily makes some basic assumptions. Among these are that the ISFSIs use horizontal canister systems (discussed in Section 6 of this chapter), that they undergo a major repair or revision when they are 50 years old, and that they are replaced every 100 years.

In Scenario 1, because institutional control exists for 10,000 years, ISFSIs function as designed and estimated doses to the general public are relatively low (≤ 1 mrem/yr) and within NRC regulations (25 mrem/yr., 10 CFR 72).[126] As is the case with estimated doses at

[124] Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada; http://www.ocrwm.doe.gov/eis/index.shtml [hereafter "Yucca Mountain EIS"].

[125] Id. The 10,000 year timeframe is for comparison purposes only, i.e., to compare the proposed action (operation of Yucca Mountain) with the no-action alternative (storage at existing commercial reactor sites). It is not intended to reflect the time that spent nuclear fuel needs to be isolated from the environment to ensure public health. This time period is measured in millions of years. In September 2008, the Environmental Protection Agency issued radiation protection standards for Yucca Mountain for up to 1 million years; http://www.epa.gov/rpdweb00/yucca/index.html.

[126] Id. See Chapter 7, Environmental Impacts of the No-Action Alternative, Table 7-6, Table 7-11.

the Prairie Island ISFSI, estimated doses to workers at the associated facilities are higher than those to the general public (e.g., 23 mrem/yr for general employees).

In Scenario 2, institutional control ends after 100 years and this cessation leads to degradation of the ISFSI storage systems, their failure, and the eventual release of radionuclides into the environment. For facilities located in the Upper Midwest, the EIS estimates that precipitation will infiltrate the ISFSIs' concrete storage structures 70 years after the end of institutional control, leading to degradation of the metal storage canisters (by corrosion) and an initial release of radionuclides 1000 years after the end of institutional control.[127] Radionuclides would be released to the air, soil, and surface waters causing chronic exposures and adverse health impacts. The EIS projects approximately 3,700 additional cancer fatalities over the 10,000 year period, and projects that fatalities would peak about 3,400 years after the end of institutional control due to releases to the Mississippi River and its tributaries.[128] Individuals living near degraded ISFSIs are projected to suffer severe health impacts due to direct radiation and/or internal doses due to ingestion.

As is clear from this brief discussion of the Yucca Mountain EIS, assumptions about institutional control directly influence how well ISFSIs will perform their designed functions and how well public health will be protected. The Yucca Mountain EIS illustrates that lack of institutional control leads to a degradation of ISFSI function and chronic health impacts.

<u>Costs.</u> Institutional control that ensures ISFSIs perform as designed requires resources, i.e., energies and monies to monitor, maintain, service, and repair ISFSIs. The Yucca Mountain EIS estimates life-cycle costs for the no-action alternative scenarios discussed above. The EIS estimates costs of $436 – 492 million dollars/year for the first 100 years of storage at 72 commercial ISFSI sites.[129] It estimates costs of $407 – 460 million dollars/year for the next 9,900 years. Thus, using the more conservative 100-year estimates, a rough average annual cost for on-going operation of an ISFSI would be $6.4 million dollars.[130]

With respect to the assumptions in the Yucca Mountain EIS, costs for operation of the Prairie Island ISFSI would likely be at the low end of the estimated range(s). First, it's unclear that the Prairie Island ISFSI would require major repair after 50 years. Due to the passive operational nature of the concrete pad and the casks, it's unclear what major repair would be required (or is anticipated by the Yucca Mountain EIS). Second, the dry storage casks at Prairie Island use a non-canister system, i.e., they do not rely on a concrete storage module to house (and protect) the casks. Thus, discussion in the Yucca Mountain

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[127] Id. See Chapter 7, Environmental Impacts of the No-Action Alternative, Figure 7-8; Appendix K, Long-Term Radiological Impact Analysis for the No-Action Alternative.
[128] Id.
[129] Id. See Chapter 2, Proposed Action and No-Action Alternative, Table 2-6. The range of costs is based on the assumption that the spent fuel would be placed in dry storage casks that (1) would not need to be replaced over the 10,000 year period (low cost) or (2) would have to be replaced every 100 years (high cost).
[130] Average 100-year costs ((436+492)/2) divided over 72 commercial sites.

EIS about concrete cracking and fatigue such that concrete housing needs to be replaced every 100 years is not directly applicable. There is a concrete pad at the Prairie Island ISFSI, and its integrity is necessary to proper operation of the ISFSI. However, it is an embedded flat concrete surface, not a three-dimensional, surface-mounted structure. Accordingly, it is likely to suffer cracking at a slower rate, with greater opportunity to inspect and repair incipient cracks to prevent further damage.[131] The Prairie Island ISFSI concrete pad, should storage exist there for hundreds of years, would need to be replaced, but the timeline for this replacement is likely more than the 100-year assumption in the Yucca Mountain EIS.

Estimates of annual ISFSI operation costs by the Minnesota Department of Commerce, Office of Energy Security are consistent with estimates from the Yucca Mountain EIS. In a proceeding for an ISFSI at the Monticello Nuclear Plant, a plant operated by Xcel Energy and located near Monticello, Minnesota, the estimated annual operation costs for an ISFSI of 30 casks (horizontal canisters) was $4.4 million dollars.[132]

The payment of costs associated with on-going operation of the Prairie Island ISFSI is discussed in Section 3.4 of this chapter. ISFSI operation costs are included in the nuclear decommissioning trust fund established for the PINGP and Prairie Island ISFSI. Additionally, eventual storage of spent nuclear fuel in a federal repository is a federal obligation. Federal courts have held that the Department of Energy is liable for damages attributable to delays in accepting spent nuclear fuel for placement in a federal repository. Thus, the Department of Energy will pay costs attributable to the on-going operation of the Prairie Island ISFSI.[133]

What is not reflected in these discussions of cost and payment are those costs of institutional control that are indirectly tied to on-going operations of the Prairie Island ISFSI. That is, institutional control assumes not only a solvent and effective entity (e.g., Xcel Energy) responsible for maintaining proper functioning of the ISFSI, but also solvent and effective socio-political institutions that provide a stable societal framework for the ISFSI. For there to be institutional control of the Prairie Island ISFSI, the city of Red Wing, Goodhue County, the State of Minnesota, and the United States of America all have to exist as functioning political entities. There are myriad demands on these entities. In

[131] Yucca Mountain EIS. See Appendix K Long-Term Radiological Impact Analysis for the No-Action Alternative, Section K.2.1.1.

[132] Rebuttal Testimony and Attachments of Dr. Steve Rakow, May 12, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={2DD285A6-F035-47A3-92E9-B1E86ABB0C7A}&documentTitle=20095-37422-01

[133] See http://www.leg.state.mn.us/LRL/Issues/prairieIsland.asp. In 1998, after the U.S. Department of Energy failed to meet its deadline to accept waste from the country's nuclear power plants, Xcel Energy/NSP filed a lawsuit in the U.S. Court of Federal Claims against the department seeking reimbursement for the costs of storing the waste at its Minnesota facilities. The suit was settled in September 2007, with Xcel Energy/NSP being awarded $116 million for costs accrued through 2004. In August 2007, Xcel Energy filed another lawsuit against the U.S. Department of Energy seeking money to cover waste storage costs from 2005 through June 2007.

this respect, the Prairie Island ISFSI is just one more demand on the list. However, the ISFSI is unique in that its demands will last much longer than typical socio-political demands and the consequences for failing to meet these demands are predictable and severe.

Incidents and Off-normal Operations. Assuming that regular monitoring and maintenance continue as currently performed at the ISFSI, radiological impacts from incidents and off-normal operations at the Prairie Island ISFSI which might occur within 200 years, would be within NRC regulatory limits and would likely not be significant. The addition of 34 casks for decommissioning and the storage of the casks for up to 200 years does not introduce any new phenomena, natural or man-made, that could compromise cask confinement.

The risk that is introduced by storing the casks for 200 years is time itself. For many of the risks discussed in this section, the passage of time does not increase the probability that a radiological impact will occur. The casks are designed to withstand design basis accidents that are essentially independent of a 200 year timeframe, e.g., earthquake, maximum probable flood, tornado. For example, if the casks can withstand a tornado in 2010, they can withstand a tornado in 2040. There may be many tornadoes over time, but the passage of time does not change the risk of a radiological impact.

Time is a consideration for risks related to the mishandling of casks. The more times you operate a particular mechanical system, the more opportunities there are for the system to fail in some regard. For the Prairie Island ISFSI, once the casks are loaded, transported, and placed on the ISFSI pad, they are no longer handled. Barring the need to repair a cask seal or other possible damage, the casks are not handled or transported within the PINGP site. Thus, handling of the casks effectively ends within the first 50 years of the 200 year time frame. The 2004 EPRI risk assessment estimates the risks associated with loading and transporting casks is on the order of 3 E-13 latent cancer deaths per cask per year. Multiplying this risk by an additional 34 casks and 50 years does not make this risk significant.

The only additional handling that would occur is the loading of the casks for transport to a federal geologic repository. The federal Department of Transportation (DOT) and NRC share responsibility for establishing standards for the safe transport of the casks. Casks must be licensed for transport by the NRC (10 CFR 71). It is anticipated that the risks associated with cask handling for removal to a geologic repository, under DOT and NRC regulation, are of a similar magnitude as the risks associated with cask handling operations at the ISFSI. As discussed above, these risks are not expected to be significant.

Time is also a consideration for risks posed by man-made phenomena that, unlike cask handling, will exist for the full 200 years and may change over time, e.g., risk of explosion, terrorism, airplane impact. Current analyses indicate that the risk of radiological impacts from these events is small. If emergency planning measures remain effective into the future and if we assume that these man-made risks remain relatively constant over time, then multiplying these risks over an additional 200 years will likely not make them significant. Compared with natural phenomena and well-regulated cask handling systems, risks posed by these man-made phenomena are likely the more uncertain. **If emergency planning measures are not effective into the future, e.g., governmental entities with emergency responsibilities cannot adequately respond, the risk of radiological impacts from man-made phenomena increases and is likely significant.**

Assumptions. **The analysis of radiological impacts from potential incidents at the Prairie Island ISFSI assumes that regular monitoring and maintenance continue and that emergency planning measures remain effective into the future. In the language of the Yucca Mountain EIS, the analysis assumes institutional control. The Yucca Mountain EIS concludes that, with institutional control, spent nuclear fuel can be safely stored in dry casks at commercial ISFSI sites (Scenario 1) for up to 10,000 years.[134] The EIS examined possible incidents at the ISFSI sites and found no events which could lead to the release of radionuclides to the environment.[135] In the analysis, the two events which provided the greatest challenge to the integrity of the storage modules were impact by an aircraft and a severe seismic event. These events are discussed for the Prairie Island ISFSI in section 5.3 of this chapter.**

If institutional control is not maintained, incident risks become greater. If the dry casks are not monitored and maintained they will likely deteriorate with time and their barriers to release will degrade. Under such circumstances, natural and man-made phenomena, previously resisted by the storage casks, could cause release of radionuclides. Of the possible initiating phenomena examined in the Yucca Mountain EIS, impact by aircraft on degraded storage modules created the greatest radiological consequences, with an estimated 13 additional cancer fatalities in the general public due to radioactive release after aircraft impact.[136] Risks due to sabotage or terrorism would also increase if institutional control is not maintained. The increase would be due to increased ease of access to the casks such that armaments might be successfully employed and the increased vulnerability of degraded casks.

Possible Scenarios – Yucca Mountain Unavailable

The cumulative impacts scenario analyzed in this section – the temporary long-term storage of spent nuclear fuel at the Prairie Island ISFSI until the dry storage casks can be transported to a federal repository – is the only scenario in accordance with current Minnesota and federal law. Minnesota law requires that dry cask storage be temporary and managed such that spent nuclear fuel can be shipped to a repository as soon as feasible.[137] The Nuclear Waste Policy Act (NWPA), as amended, makes the placement of

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[134] Yucca Mountain EIS. See Chapter 7, Environmental Impacts of the No-Action Alternative, Section 7.2.1.
[135] Id. See Section 7.2.1.8.
[136] Yucca Mountain EIS. See Appendix K, Long-Term Radiological Impact Analysis for the No-Action Alternative, Section K.3.2.1.
[137] See Minn. Stat. 116C.71, Subd. 7, distinguishing ISFSIs from radioactive waste management facilities where radioactive waste is disposed of or permanently stored; Minn. Stat. 116C.83, Subd. 4, requiring that waste be managed for shipment to a repository as soon as feasible.

commercial spent nuclear fuel in a federal repository a federal obligation. Additionally, it identifies Yucca Mountain as the only site for development of an initial repository.[138]

There is uncertainty as to when the Yucca Mountain repository will open, its capacity, and the consequences of its opening being delayed (see Section 6.1 of this chapter). In 1984, U.S. Department of Energy (DOE) anticipated that a first repository would begin operation in 1998, and a second in 2004.[139] In 1990, DOE anticipated that a repository would begin operation in 2010, and there would be no "back-up" repository site. On June 3, 2008, DOE submitted a license application for the Yucca Mountain repository to the NRC, with a best achievable date for opening the repository of 2020.[140] Prospects for opening Yucca Mountain on this timetable have likely weakened with the new federal administration.[141]

Xcel Energy anticipates that Yucca Mountain will not be available before 2017.[142] DOE has stated that the best achievable date is 2020. The Nuclear Regulatory Commission (NRC) has expressed confidence that radioactive wastes produced by nuclear power plants can be safely stored at ISFSIs until such time as a federal repository is available. The NRC has recently proposed that the length of time such storage can be safely affected is 60 years beyond the licensed life of the reactor which produces the spent fuel.[143] Thus, the NRC is proposing that the dry casks at the Prairie Island ISFSI could be safely stored until at least 2094. The Yucca Mountain EIS suggests that, with institutional control, dry casks at the Prairie Island ISFSI could be stored for 10,000 years with minimal radiological impacts.

The analysis in this section of temporary long-term storage of spent nuclear fuel at the Prairie Island ISFSI adopts a timeframe of 200 years in an attempt to bound the uncertainty related to the opening of the Yucca Mountain repository. Given that the timeline for opening a federal repository has already slipped from 1998 to 2020, a total of 22 years, it appears prudent to factor in additional delay in evaluating the temporary long-term storage scenario. The 200-year timeframe is roughly 10 times the length of the delay to date and is anticipated to bound the uncertainty related to the opening of a federal repository.

It is possible that the Yucca Mountain repository will not be available in the long term, i.e., that it will not be constructed or operate. The Yucca Mountain EIS briefly discusses scenarios should activities at Yucca Mountain be terminated.[144] They include: (1) continued storage of spent nuclear fuel at one or more centralized locations, (2) selection of

[138] The Report to the President and the Congress by the Secretary of Energy on the Need for a Second Repository, December 2008, DOE/RW-0595, http://www.ocrwm.doe.gov/uploads/1/Second_Repository_Rpt_120908.pdf
[139] Nuclear Regulatory Commission, Waste Confidence Decision Update, 73 FR 197, October 9, 2008.
[140] Id.
[141] See, "Future Dim for Nuclear Waste Repository," New York Times, 3/5/09, http://www.nytimes.com/2009/03/06/science/earth/06yucca.html; Q & A: Steven Chu, Technology Review, 5/14/09, http://www.technologyreview.com/business/22651/.
[142] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 5.2.4.4.
[143] Nuclear Regulatory Commission, Waste Confidence Decision Update, 73 FR 197, October 9, 2008.
[144] Yucca Mountain EIS, Chapter 2, Proposed Action and No-Action Alternatives, Section 2.2

another location for a geologic repository, (3) the development of new technologies, and (4) reconsideration of alternatives to geologic disposal. All of these scenarios would require new federal legislative authority. The granting of such authority, the alternatives to Yucca Mountain that would be developed, and the timeline for their development are uncertain.

Environmental Justice

Environmental justice is a principle which informs state and federal agency processes such that all persons, regardless of race, color, national origin, or income, are provided fair treatment and meaningful involvement in the development and implementation of environmental policies.[145] The goal of this principle is to ensure that no persons bear a disproportionate share of the negative environmental consequences of a proposed project.[146]

For the cumulative impacts discussed in this section, the Prairie Island Indian Community (PIIC) is a community of persons for whom there are environmental justice concerns. These concerns can be roughly divided into two parts: (1) concerns with radiological impacts from normal operations at Prairie Island, and (2) concerns of uncertainty and risk should there be an incident at the PINGP or Prairie Island ISFSI.[147] Of these two, the latter is likely the greater concern.

Radiological impacts to the general public related to normal operations of the PINGP and Prairie Island ISFSI are projected to be within federal regulatory guidelines and are not anticipated to be significant. Thus, radiological impacts will be within federal guidelines and not significant for the PIIC. This said, the PIIC is the closest community to the Prairie Island site. Additionally, this EIS assumes a linear no-threshold model for radiological impacts due to low-level radiation exposures. Thus, PIIC members will receive slightly higher exposure levels and doses than communities at a greater distance. These doses will create a small incremental risk that the PIIC will bear differentially from other communities.

The likely larger uncertainty and incremental risk borne by the PIIC is the uncertainty related to an incident at the PINGP or Prairie Island ISFSI. As discussed in this section, the probabilities associated with such incidents are projected to be very low; consequently their impacts are not anticipated to be significant. Nonetheless, there is uncertainty. This uncertainty is borne by all communities surrounding Prairie Island, but likely most directly felt by those communities which could be impacted should an incident occur, e.g., PIIC, City of Red Wing. As discussed in Chapter 1, Section 4.5, this uncertainty may be associated with socio-psychological impacts.

[145] Minnesota Pollution Control Agency (MPCA) and Environmental Justice, http://www.pca.state.mn.us/assistance/ej.html

[146] Id.

[147] Concerns discussed here reflect analysis of this EIS with respect to cumulative impacts of this section. They are not intended as a limit on concerns that the PIIC may have, or as an expression of the community's concerns.

The cumulative impacts described in this section are proposed to occur at an existing power plant facility, Prairie Island. As there are limitations in current Minnesota law as to alternative locations for nuclear power plants and ISFSIs, the only apparent means to mitigate environmental justice concerns related to the PIIC would be to discontinue operations at the PINGP and replace its energy generation with an alternative source (see Chapter 2, Section 7). This course of action would not eliminate risks related to continuing operation of the ISFSI until such time as the storage casks are removed to a federal repository.

6.0 SPENT FUEL STORAGE ALTERNATIVES

This section analyzes the feasibility of alternatives for storing the spent nuclear fuel generated by PINGP operations for the term of its proposed license renewal (2014 – 2034). The alternatives to storing spent fuel at the Prairie Island ISFSI discussed in this section include: (1) Storing the spent fuel off site, (2) Storing the spent fuel on site, but not in the ISFSI, (3) Storing the fuel at the ISFSI but with different cask technology, and (4) Reducing the need for spent fuel storage by ceasing PINGP operations in 2014.

None of the off-site storage options offers a feasible alternative to expansion of the Prairie Island ISFSI. None of the on-site options appear to be a more reasonable alternative than the proposed ISFSI expansion. The potential human and environmental impacts of ceasing PINGP operations in 2014 and decommissioning the plant are discussed in Section 7 of this chapter.

6.1 OFF-SITE STORAGE ALTERNATIVES

Minnesota law requires that spent nuclear fuel stored in Minnesota be stored on the site at which the fuel is used.[148] Thus, off-site storage of spent nuclear from the Prairie Island plant must also be out-of-state. The four alternatives discussed here are all out-of-state.

Reprocessing

Reprocessing is a method of recovering unused uranium and plutonium from used nuclear fuel and recycling it for use in new reactor fuel. Reprocessing does not result in elimination of all nuclear wastes and radioactivity. However, the volume of high-level waste to be stored is reduced. When electric power companies first considered using nuclear energy to generate electricity, it was assumed that when the nuclear fuel was used up or "spent," it would be recycled so that useful fuel could be extracted and used again. Approximately 96 percent of the spent fuel is uranium that could be reprocessed into usable fuel to generate electricity. It is this assumption that led to sizing spent fuel pools to provide the limited space necessary to cool spent fuel for a few years before transporting for reprocessing.

In 1977, President Carter, concerned about the possibility of nuclear proliferation, banned commercial reprocessing for private companies. As a result, the two private reprocessing facilities, then under construction, were never made operational. In 1981, President Reagan lifted the ban, but because of the economics of reprocessing compared to fabrication of new fuel and the political uncertainty surrounding reprocessing, no private companies invested in the construction or operation of reprocessing facilities in United States. In 1993, the Clinton administration reinstated policy opposing reprocessing in the United States.

In 2006, as part of President Bush's Advanced Energy Initiative, the Department of Energy (DOE) launched a new initiative, the Global Nuclear Energy Partnership (GNEP).[149] One of the

[148] Minn. Stat. § 116C.83, Subd. 4b.
[149] 71 FR 55, March 22, 2006.

goals of this partnership is to "recycle nuclear fuel using new proliferation-resistant technologies to recover more energy and reduce the volume of waste."[150] In October, 2008, the GNEP released a draft programmatic environmental impact statement for its proposed programs.[151] The DOE states that it "envisions changing the U.S. nuclear energy fuel cycle from an open (or once through) fuel cycle …to a closed fuel cycle in which SFN [spent nuclear fuel] would be recycled to recover energy-bearing components for use in new nuclear fuel." Given the political and institutional history of reprocessing in the U.S., there are substantial uncertainties that preclude reprocessing as a feasible off-site storage alternative.

Existing Off-Site Storage Facilities

The only facility currently storing spent fuel on a contract basis from commercial nuclear power reactors is the General Electric Morris facility in Morris, Illinois. However, it is no longer accepting spent fuel from commercial nuclear power plants. Thus, this facility is not a feasible off-site storage alternative.

Private Fuel Storage Initiative

Xcel Energy is pursuing temporary, off-site storage of spent nuclear fuel in Utah as a member of Private Fuel Storage, LLC ("PFS").[152] PFS is a consortium of eight utilities, including Xcel Energy, which is working to build a spent fuel storage facility on the west central Utah reservation of the Skull Valley Band of Goshute Indians. PFS and the Skull Valley Band of Goshute Indians entered into an agreement in December 1996 that allows for temporary storage of spent fuel from commercial nuclear power plants.

The license application for PFS was submitted to the NRC in June 1997. The NRC staff issued their final Safety Evaluation Report in December 2001. The NRC issued their Final Environmental Impact Statement in January 2002. Both reports declared that the project design and supporting analyses met the federal regulatory requirements for Independent Spent Fuel Storage Installations. The Nuclear Regulatory Commission approved the license for PFS on September 9, 2005.

In September 2006 the U.S. Department of the Interior ("DOI") disapproved the PFS-Goshute lease and the use of public lands for an Intermodal Transfer Facility, which was to be used for a rail spur from the mainline to the storage facility. On July 17, 2007, PFS and the Skull Valley Band of Goshute Indians filed a complaint in U.S. District Court challenging the September 2006 decision.

Even if PFS and the Skull Valley Band are successful in their judicial challenge to reverse the DOI decision, the project faces further obstacles. The State of Utah remains opposed to the project. Ultimately the feasibility of PFS will depend not only on the outcome of the licensing process, legislative activity, and litigation, but also on the interest and commitment to use the

[150] 71 FR 55, March 22, 2006.
[151] GNEP, Programmatic Environmental Impact Statement, http://www.gnep.energy.gov/peis.html
[152] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 5.2.3, May 16, 2008.

facility by utilities with spent fuel. Due to the considerable uncertainty surrounding the project, PFS is not a feasible alternative to additional spent fuel storage at Prairie Island.

If PFS were to become available, it may represent an opportunity to reduce the overall number of storage casks used to keep Prairie Island operating beyond 2014 or the length of time that a dry cask storage facility will be needed on-site.

Federal Geologic Repository

In 1982, Congress, through the Nuclear Waste Policy Act (NWPA), directed the Department of Energy (DOE) to characterize and recommend two geologic repository sites for the disposal of the nation's spent nuclear fuel (SNF) and high-level radioactive waste. In 1987, Congress amended the NWPA to: (1) select Yucca Mountain in Nye County, Nevada as the only site for further study, and (2) terminate the program for a second repository. In 2002, after numerous technical studies, legal challenges, and an environmental impact statement, the U.S. Senate passed and the president signed into law legislation designating Yucca Mountain as the site for the nation's first repository.[153]

Responsibility for operations at Yucca Mountain is divided among three federal agencies. The DOE is responsible for design, construction, and operation of the repository. The DOE must obtain a license for the repository from the NRC. The NRC is responsible for reviewing the license application and ensuring compliance with safety and radiological standards. The Environmental Protection Agency (EPA) is charged with setting radiological standards that will protect public health and the environment from the risks of radioactive material in the repository for up to 1 million years after the facility closes.

The DOE submitted a license application to construct the Yucca Mountain repository in June 2008. The EPA promulgated amended standards for the protection of public health and the environment in September 2008. If, after review, the NRC approves the license application, the DOE will construct the repository, and the DOE will then apply to the NRC for a license to receive SNF and HLW. The DOE's best-achievable repository schedule projects that receipt of SNF will being in March 2017.[154]

There are several significant uncertainties with respect to the ability of Yucca Mountain to serve as an off-site storage alterative for SNF from the Prairie Island plant. These uncertainties preclude Yucca Mountain as a feasible off-site storage alternative.

Timing. The PINGP currently has authorization from the State of Minnesota for enough dry casks (29) to store spent fuel generated until the end of the plant's current NRC license in 2013 and 2014. The DOE's best-achievable availability for storage at Yucca Mountain is 2017. Thus, storage at Yucca Mountain will be available at least three years too late. Given the history of the

[153] Yucca Mountain Repository: History of the Nuclear Waste Program, http://www.ocrwm.doe.gov/ym_repository/about_project/history.shtml
[154] Yucca Mountain Repository: About the Project, http://www.ocrwm.doe.gov/ym_repository/about_project/index.shtml

Yucca Mountain repository, it is uncertain that the repository will open in 2017. In 1984, DOE anticipated that the first repository would begin operation in 1998 and the second in 2004. Xcel Energy estimates that the Yucca Mountain repository will not begin receiving SNF until 2020.[155] In 2008, the U.S. House Appropriations Committee requested DOE to plan for taking custody of SNF stored at decommissioned reactor sites and placing it an interim storage facility to demonstrate that "DOE can move forward in the near-term with at least some element of nuclear waste policy."[156] In response, DOE noted that it does not have authority under the NWPA to construct or operate an interim storage facility prior to the opening of the Yucca Mountain repository. Thus, there is no possibility, absent new federal legislation, of interim storage for SNF prior to final disposal at Yucca Mountain.

Capacity. The SNF storage capacity of Yucca Mountain is a statutory limit.[157] The limit, set by the NWPA, is 70,000 metric tons heavy metal (MTHM). Under NWPA this limit will remain in place until a second repository is in operation. Of the 70,000 MTHM limit, 63,000 MTHM is reserved for SNF from commercial reactors. The current inventory of commercial SNF in the U.S. is approximately 58,000 MHTM and is increasing by about 2,000 MTHM annually. At this rate, that portion of Yucca Mountain capacity reserved for commercial SNF will be exceeded by 2010.

The queue for accepting SNF at Yucca Mountain is managed according to the principle of "old fuel first" (OFF). The oldest SNF, as measure by date of discharge from the reactor, is given the highest priority in the acceptance queue. The additional SNF generated by continued operation of the PINGP for an additional 20-yr. license term (2014-2034) would not enter the Yucca Mountain queue until several years after 2014. Thus, there is currently no room at Yucca Mountain for the SNF proposed to be generated by the PINGP during its license renewal term. To place the additional Prairie Island SNF in a federal geologic repository will require raising the statutory limit on Yucca Mountain's capacity or developing a second geologic repository.

In December 2008, U.S. Secretary of Energy, Samuel Bodman, recommended to the President and Congress that the statutory limit of 70,000 MTHM for Yucca Mountain be removed.[158] DOE studies indicate that the Yucca Mountain repository could be expanded to safely hold at least three times its current statutory limit. DOE suggests that lifting the statutory limit on Yucca Mountain is preferable to the alternative of beginning work on a second repository given the uncertainty about the future growth of nuclear power and the possibility of fuel reprocessing. If the Yucca Mountain limit is removed, then Yucca Mountain could have capacity for additional SNF from the PINGP. It's uncertain when the additional capacity at Yucca Mountain would be available.

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[155] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 3A.1, May 16, 2008.
[156] Report to Congress on the Demonstration of the Interim Storage of Spent Nuclear Fuel from Decommissioned Nuclear Power Reactor Sites, December 2008, DOE/RW-0596.
[157] The Report to the President and Congress by the Secretary of Energy on the Need for a Second Repository, December 2008, DOE/RW-0595.
[158] *Id.*

Funding. The development of Yucca Mountain is paid for by customers of utilities who own and generate electricity from nuclear power plants. A fee of 1 mil (0.1 cents) for each kilowatt-hour generated by a nuclear power plant is collected and paid to the federal government. These fees are placed into the federal government's general fund and Congress must act each year to appropriate the collected funds to the Yucca Mountain project. Through December 2006, Xcel Energy's customers have paid approximately $620 million into the federal Nuclear Waste Fund to finance nuclear waste management. Nationally, customers have contributed $25.9 billion into the federal Nuclear Waste Fund. Through December 2006, the DOE has received $6.1 billion in disbursements from the Nuclear Waste Fund. For fiscal year 2008, the DOE requested $495 million and was appropriated $387 million.[159] Under-funding of the Yucca Mountain repository adds uncertainty to the timeline for completion of the repository and the possibility of expanding its capacity.

6.2 ON-SITE STORAGE ALTERNATIVES

There are three on-site alternatives to increase the present capacity at the PINGP to store spent fuel assemblies without expanding the Prairie Island ISFSI: consolidation, re-racking, and a new spent fuel storage pool.[160] Two of the three are not feasible alternatives to expansion of the ISFSI. The third alternative, a new spent fuel storage pool, is feasible, but not a more reasonable alternative than expansion of the ISFSI.

Consolidation

Fuel rod consolidation is a process that reduces the volume of spent fuel assemblies by disassembling and repackaging the fuel rods and assembly hardware. Fuel rod consolidation and hardware processing can be performed in the existing spent fuel pool. During this process, fuel rods are removed from the fuel assembly. The rods are then grouped in a closer-packed array and placed in a container with similar dimensions as a fuel assembly. The assembly hardware is compacted and then packed into separate containers in the pool or in a dry storage configuration.

Fuel rod consolidation has not been widely used and U.S. nuclear industry experience with consolidation is not extensive beyond demonstration projects. Consequently, the technology is not optimized or as commercially mature as other alternatives. Rod consolidation would require a complex and site-specific solution, if implemented.

Northern States Power (NSP, Xcel Energy) conducted a fuel rod consolidation demonstration project at the PINGP in 1986. Although some volume reductions for spent fuel were realized, the predicted compaction ratios for assembly hardware were not achievable. Additionally, the occupational dose was significantly higher than predicted because workers were subject to increased exposure from the time consuming and labor intensive fuel-handling activities.

[159] Civilian Radioactive Waste Management, Budget and Funding, http://www.ocrwm.doe.gov/about/budget/index.shtml
[160] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 5.3, May 16, 2008.

Since 1986, there have been no industry initiatives or design advances that would render rod consolidation to be a more feasible alternative. No U.S. nuclear plant owner that is considering rod consolidation as a long-term solution to spent fuel storage. Therefore, consolidation is not a feasible alternative to expanded storage at the Prairie Island ISFSI.

Re-Racking to Increase Pool Storage

Re-racking is a process by which current storage racks are replaced with storage racks designed to provide a more compact array for storing the spent fuel assemblies. Re-racking has already been performed twice at Prairie Island, once in 1977 and again in 1981. The current licensed storage capacity of the spent fuel pool is 1,386 fuel assemblies. In 1995, a feasibility study was performed to assess the potential increase in wet storage capacity via the use of state-of-the-art storage racks. The study concluded that it might be possible to gain up to 790 storage cells within Prairie Island's spent fuel storage pools. An increase in wet storage of 790 spent fuel assemblies is not sufficient additional storage to support 20 additional years of PINGP operations. Thus, re-racking to increase pool storage is not a feasible alternative to expanded storage at the Prairie Island ISFSI.

Constructing a New Spent Fuel Storage Pool

Storage of additional spent nuclear fuel in a new storage pool would require constructing a new building on the PINGP site containing a new spent fuel storage pool and associated components. The new building and pool structure would be designed and constructed to the same or higher standards as the existing spent fuel storage pool and would be licensed and regulated by the NRC. A transfer cask would be required to transfer spent fuel assemblies from the existing pool to the new pool. Under this alternative, the number of times the spent fuel assemblies are handled would most likely increase. This handling would in turn increase radiation doses received by plant personnel.

A new storage pool would require the same components as the existing pool and would rely on active cooling rather than passive cooling systems. These components would include storage racks, pool cooling and filtration systems, pool bridge crane and fuel assembly handling tools, building ventilation systems, radiation monitoring equipment, and a cask decontamination area. It would take approximately three years to design a new pool building and to complete state and federal reviews and approvals. Construction would last approximately two years; the total design and construction period would be approximately five years. The new storage pool would likely be located at close as possible to the existing spent fuel storage area.

This alternative was evaluated in the 1991 Prairie Island Certificate of Need Application. The estimates of the project costs in 1991 were on the order of $31 million to build, $0.5 million per year to operate, and $50 million to decommission the pool. This estimate did not include costs associated with purchasing hardware or plant personnel to load and transport the spent fuel to Yucca Mountain when it becomes available. In 2008 dollars, costs for a new spent fuel storage pool would be approximately $140 million. This cost, coupled with an increase in radiation exposure to plant personnel due to extra handling of fuel assemblies, makes this alternative less attractive than expansion of the ISFSI. The financial risk and safety risks associated with a new spent fuel storage pool make the ISFSI expansion a more reasonable approach.

6.3 ALTERNATIVE STORAGE SYSTEMS

The NRC approves spent fuel dry storage systems by evaluating each design for resistance to accident conditions such as floods, earthquakes, tornado missiles, and temperature extremes, and authorizes a nuclear power plant licensee to store spent fuel in NRC-approved systems at a site that is licensed to operate a power reactor. All spent fuel storage systems must meet NRC licensing requirements established in 10 CFR 72. As a result, all alternative storage technologies provide the same level of safety and resistance to accident conditions.

Currently there are four types of NRC-approved storage systems available for dry storage of spent nuclear fuel. Xcel Energy evaluated and compared these technologies before deciding on the Transnuclear TN-40HT casks.[161] All four systems rely on passive cooling to remove decay heat from the spent fuel. They vary in the manner in which they store the spent fuel, how they accommodate the transfer of spent fuel from the power plant, and how they are transported. All of the alternative storage systems are feasible alternatives. Based on costs, projected radiological doses to personnel, ease of use, and past experience, none of the alternative storage systems appears more reasonable than the TN-40HT casks.

Non-Canister Storage Systems

The non-canister storage system is the proposed system for the Prairie Island ISFSI expansion. It is the system currently used at the Prairie Island ISFSI (see Project Description, Chapter 2, Section 3). The storage system is a metal cask with a bolted lid, O-rings, and a pressure monitoring system. The casks are designed to store up to 40 spent fuel assemblies in an internal basket or in storage cells dispersed throughout the cask. The Transnuclear TN-40 cask currently in use at Prairie Island is licensed for storage under 10 CFR 72. The Transnuclear TN-40HT cask will be licensed prior to use in the Prairie Island ISFSI.

The proposed Transnuclear non-canister system is the system that has been used at the Prairie Island ISFSI for the past 10 years. Thus, the PINGP has in place the equipment, procedures, and infrastructure needed to load and transport a cask to the ISFSI. The system is simpler than available alternatives, e.g., no welding or transfers of loaded canisters. **This simplicity facilitates the eventual removal of the casks to a federal repository. Of the storage systems discussed in this section, the non-canister system is the easiest to handle and transport.** Additionally, the relatively higher number of fuel assemblies that may be stored within a cask, i.e., 40 vs. 24, reduces the number of casks/containers that must be loaded, transferred, and stored in the ISFSI. This reduced handling results in reduced radiological doses to plant personnel.

[161] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 5.4, May 16, 2008.

Horizontal Canister Systems

The horizontal canister storage system consists of: (1) a welded sealed metal canister to contain spent fuel assemblies and provide the primary confinement boundary, (2) concrete storage modules that house the canisters, (3) a transfer cask to handle the canisters, (4) and a transportation cask to ship the canisters offsite. The storage module, transfer cask and transportation cask provide radiation shielding and physical protection during canister transportation, transfer, or storage. A typical canister will hold 24 or 32 spent fuel assemblies.
Currently, the only horizontal system available is the TN NUHOMS (Nuclear Horizontal Modular System), which is designed, licensed and manufactured by Transnuclear, Inc. The system is used at several nuclear power plants throughout the United States including Xcel Energy's Monticello nuclear generating plant.

Transitioning from the current non-canister system to a canister system would require construction at the ISFSI site to occur approximately 10 years earlier. It would also require the purchase of new major equipment (e.g., a transfer cask, trailer, automatic welding machines, and a building to store new equipment). The loading process is more complicated for the canister storage system, e.g., welding and transfer of a canister, which would require new and specialized training for personnel. Currently, NRC licensed horizontal canister systems can store 24 fuel assemblies of the high burnup fuel utilized at Prairie Island. Thus, this system would require 66 percent more canisters be purchased, loaded, transferred, and stored than casks in the proposed system. Handling more canisters would increase the radiological dose received by plant personnel and would increase the cost per fuel assembly stored.

Vertical Canister Systems

Vertical canister storage systems are similar to horizontal systems except that the canisters and concrete modules are stored vertically on a pad as opposed to horizontally. For the reasons discussed above, these systems are not preferable to the proposed Transnuclear non-canister system.

Modular Vault Dry Storage Systems

The modular vault dry storage (MVDS) system is a large concrete storage vault designed to store multiple storage containers of spent nuclear fuel. MVDS differs from other systems in that, rather than storing individual casks on a concrete storage pad outdoors, the spent fuel is stored in tube like containers within an indoor concrete vault. One fuel assembly is loaded into each container. The MVDS system consists of: (1) the storage vault, (2) fuel storage containers to hold the spent fuel assemblies, (3) a container handling machine to transfer the containers, (4) a structure that supports the fuel containers, and (5) an overhead crane to lift the container handling machine. Several vaults can be constructed end-to-end to provide a larger vault. Each vault is designed to hold up to 83 fuel assemblies, each within its own storage container.

The MVDS System is expected to have relatively greater upfront costs for design, licensing, and installation compared to the proposed non-canister system. The vault system is used by one utility and its primary purpose was to support decommissioning of the Fort St. Vrain plant in Colorado. Transferring fuel to the MVDS system would be relatively more time consuming and complicated since only a single fuel assembly is placed in each storage container and transfer of the container involves additional handling compared to the proposed system.

6.4 ALTERNATIVE ISFSI SIZE – NO ISFSI EXPANSION, CEASING PINGP OPERATIONS in 2014

Xcel Energy's proposed 35-cask expansion of the Prairie Island ISFSI is intended to support storage of spent nuclear fuel for the 20 year term of its proposed license renewal (2014 – 2034). The availability of off-site storage alternatives is uncertain. Accordingly, to ensure that the Prairie Island plant is reliably available and to facilitate long-term planning, it is reasonable to consider the proposed Prairie Island ISFSI expansion appropriately sized. No larger or smaller expansion is proposed by Xcel Energy. No other expansion size is considered in this document, except consideration of a no expansion alternative, which is discussed here.

If a Certificate of Need is not granted by the Minnesota Public Utilities Commission for the proposed ISFSI expansion, the PINGP could not operate beyond 2014 and would be forced to shut down. The PINGP would be decommissioned. To complete the decommissioning process, spent fuel assemblies would be removed from the reactor and pool, and eventually stored at the Prairie Island ISFSI. Thus, denial of a Certificate of Need does not eliminate the need for additional ISFSI storage, but rather changes the purpose of dry cask storage expansion from support for continued operations to support for decommissioning. Xcel Energy would be required to apply to the Commission for an ISFSI expansion to accommodate decommissioning.

It's anticipated that 39 additional dry storage casks will be required to decommission the PINGP. Thus the potential human and environmental impacts of a decommissioning expansion would be very similar to the continuing operation impacts discussed in this chapter (35 casks).[162]

There would be some additional impacts due to decommissioning. Decommissioning activities must be completed within 60 years after operations cease and are subject to environmental review under the National Environmental Policy Act. The NRC Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (NUREG-0586) provides a summary of decommissioning activities, generic environmental impacts of the decommissioning process, and an evaluation of potential changes in impact that could result from deferring decommissioning.[163] Decommissioning of the Prairie Island plant is more specifically discussed in Appendix J of Xcel Energy's Certificates of Need Application.[164]

Finally, there would be additional human and environmental impacts from activities undertaken to replace the electrical power currently produced by the PINGP. These potential impacts are discussed in Section 7 of this chapter.

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[162] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 4.6.3, May 16, 2008.
[163] NRC (U.S. Nuclear Regulatory Commission). 1988. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*. NUREG-0586. Office of Nuclear Regulatory Research. Washington, D.C.
[164] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Section 7.1, May 16, 2008.

7.0 PRAIRIE ISLAND PLANT ALTERNATIVES

The "No ISFSI Expansion" alternative, described in Section 6.4 of this chapter, would lead to the shutdown and decommissioning of the PINGP and subsequent loss of 1,100 megawatts (MW) of generating capacity. This section discusses alternatives for replacing this electrical power and examines the potential human and environmental impacts of these alternatives.

7.1 ELECTRICAL ENERGY SOURCES

In 2005, Minnesota's electrical generators had a total generating capacity of 12,105 megawatts electrical (MWe).[165] This capacity is primarily coal (45%), natural gas (26%), and nuclear (13%), with smaller contributions from renewables (8%), petroleum (6%), and others sources.

The PINGP currently has a net generating capacity of 1,100 megawatts electrical (MWe). The plant provides approximately 10 percent of the electricity used by Xcel Energy customers. In 2007, the plant generated approximately 8,913,000 megawatt-hours (MWh) of electricity.[166] The plant is a reliable energy producer with an average capacity factor over the past five years of 90.2 percent.

7.2 ALTERNATIVES to CONTINUED OPERATION of the PINGP

This section discusses the potential human and environmental impacts of reasonable alternatives for replacing the electrical power currently generated by the PINGP.[167] The PINGP is highly reliable plant that produces a substantial portion of Xcel Energy's generation portfolio. Reasonable alternatives would be energy sources, or combinations of sources, that could effectively replace the electrical generating characteristics of the PINGP.

Xcel Energy's Environmental Report for its operating license renewal considered three reasonable alternatives to the PINGP: (1) purchased power, (2) gas-fired generation, and (3) coal-fired generation.[168] Xcel Energy's Certificates of Need application considered two feasible alternatives to the PINGP: (1) coal-fired generation with carbon sequestration and (2) gas-fired generation.[169] Other possible energy sources (e.g., wind, DSM) were not considered reasonable alternatives to the PINGP. Factors that made these options unreasonable included reliability, economics, and difficulty in implementation.[170]

[165] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Environmental Report, May 16, 2008.
[166] Energy Information Administration (EIA), http://www.eia.doe.gov/cneaf/nuclear/page/nuc_generation/usreact07.xls
[167] Minn. Rules 4410.2300, Part G.
[168] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Environmental Report, May 16, 2008.
[169] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 4, May 16, 2008.
[170] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Section 7.2.3, Environmental Report, May 16, 2008

Considerations of reliability, economics (in particular, valuing externalities), and difficulty of implementation are, for the greater part, beyond the scope of this document. These factors will be discussed by parties to the Certificates of Need proceedings, including by the Office of Energy Security, Energy Regulation and Planning unit. General economic impacts of PINGP alternatives are discussed in Section 7.3 of this chapter. For purposes of analysis here, reasonable alternatives include energy sources which by themselves, or in combination with other resources, could effectively replace the electrical generating characteristics of the PINGP.

Six reasonable alternative scenarios to continued operation of the PINGP are discussed in this section:

1) Purchased power
2) Pulverized coal power plant
3) Pulverized coal power plant with partial carbon sequestration
4) Natural gas combined cycle plant
5) Large wind energy conversion system (LWECS) and natural gas plant combination
6) Renewable resource technologies

Potential human and environmental impacts of each of these scenarios could be reduced through demand side management (DSM). Thus, the impacts discussed for each of the scenarios are bounding, i.e., they are worst-case impacts which could be mitigated by DSM. For example, if DSM could reduce the need for generating capacity by 10 percent, then environmental impacts would be reduced by 10 percent.

Human and environmental impacts of the alternative scenarios, because they are hypothetical scenarios, are of a generic nature. General characteristics of the energy sources in these scenarios are discussed in Chapter 1, Section 3. Land use, fuel consumption, emissions, and other environmental characteristics are estimated for each scenario. Additional facilities such as new natural gas supply pipelines, new rail for delivery of coal, and new transmission lines to connect to the grid would be required for some scenarios.

Purchased Power

A purchased power scenario would include a long-term power purchase agreement between Xcel Energy and a power provider (e.g., utility, group of utilities, merchant plant). Impacts from purchased power are difficult to estimate due to two uncertainties: (1) uncertainty as to the how the purchased power will be generated and (2) uncertainty related to transmission of the power itself.

If there is not sufficient power in Mid-Continent Area Power Pool (MAPP) for purchase, then a power purchase scenario would likely require construction of an energy source somewhere in the region. The need to construct a replacement energy source as well as many of the potential impacts from the source would be shifted to this region. Technologies that would be used to generate the purchased power are a matter of conjecture; however, based on Minnesota capacity and utilization data and national and regional projections, Xcel Energy believes that the most likely candidates would be coal-fired and nuclear sources during off-peak periods and gas-fired sources during on-peak periods, probably supplemented by power from renewable sources, particularly wind turbines.[171]

In view of constraints in the existing transmission infrastructure, Xcel Energy projects that substantial additions to either the 500 kV or 345 kV transmission systems in the Upper Midwest would be required to import power into Minnesota in amounts that would replace generation from the PINGP.[172] The construction and operation of new transmission lines would impact land uses, ecosystems, and aesthetics. Assuming for purposes of analysis that 100 miles of new 345-kV transmission line with a 150-foot wide right-of-way is required, approximately 1,800 acres would be affected.

Pulverized Coal Power Plant

A pulverized coal power plant scenario would replace the PINGP with a supercritical, pulverized coal-fired steam plant with advanced, clean-coal technology and air emission controls. Such technology is commercially available in large-capacity unit sizes that could effectively replace the generating capacity of the PINGP.

The plant would consist of two 550 MWe units (for a total of 1,100 MWe). Projected operating and environmental characteristics of the plant are shown in **Table 7-1**.

The plant would be designed to meet applicable Minnesota Pollution Control Agency (MPCA) emissions standards and Minnesota Department of Natural Resources (DNR) water appropriation permit standards. As noted in Chapter 1, Section 3, the primary environmental impacts of a pulverized coal power plant include air emissions, solid waste (ash), discharge of waste heat to the environment, land use, and rail or barge traffic.

Pulverized Coal Power Plant with Partial Carbon Sequestration

A pulverized coal power plant with partial carbon sequestration scenario would replace the PINGP with a supercritical, pulverized coal power plant with some type of carbon sequestration technology. Carbon sequestration technology is not currently commercially available; it is confined to demonstration projects. U.S. Department of Energy analysis identifies the price of the technology as a limiting factor in its deployment:

> Existing [carbon] capture technologies…are not cost-effective when considered in the context of sequestering CO_2 from power plants. Most power plants and other large point sources use air-fired combustors, a process that exhausts CO_2 diluted with nitrogen. Flue gas from coal-fired power plants contains 10-12 percent CO_2 by volume, while flue gas from natural gas combined cycle plants contains only 3-6 percent CO_2. For effective carbon sequestration, the CO_2 in these exhaust gases must be separated and concentrated.

[171] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Section 7, Environmental Report, May 16, 2008
[172] *Id.*

> CO_2 is currently recovered from combustion exhaust by using amine absorbers and cryogenic coolers. The cost of CO_2 capture using current technology, however, is on the order of $150 per ton of carbon - much too high for carbon emissions reduction applications. Analysis performed by SFA Pacific, Inc., indicates that adding existing technologies for CO_2 capture to an electricity generation process could increase the cost of electricity by 2.5 cents to 4 cents/kWh depending on the type of process. Furthermore, carbon dioxide capture is generally estimated to represent three-fourths of the total cost of a carbon capture, storage, transport, and sequestration system.[173]

Operating and environmental characteristics of this plant would be similar to the pulverized coal power plant, with an anticipated 50 percent reduction in CO_2 emissions. There would likely be a greater land requirement for this plant in order to place carbon sequestration facilities.

Natural Gas Combined Cycle Plant
A natural gas combined cycle plant scenario would replace the PINGP with a combined cycle natural gas plant. For purposes of analysis, the plant would consist of two 520 MWe units (for a total of 1040 MWe). Though this generating capacity is slightly less than that of the PINGP, it facilitates comparisons with recently constructed plants and is reasonably comparable. Each unit is assumed to consist of two steam combustion turbines (CTs), each with an associated heat recovery steam generator (HRSG) that together supply steam to a single steam turbine generator.

Projected operating and environmental characteristics of the plant are shown in **Table 7-2**.

The NGCC plant would be designed to meet applicable MPCA emissions standards. **Offsite infrastructure needed for this scenario could include a natural gas supply pipeline and new transmission facilities to connect the plant to the grid. However, if NGCC plant was sited at Prairie Island, no new transmission facilities would be required. The feasibility of converting (repowering) the PINGP to an NGCC plant has been studied.[174]**

LWECS and Natural Gas Plant
In the LWECS and natural gas plant scenario, the PINGP is replaced by 990 MW of natural gas generation and 440 MW of wind power generation. The relative generation contributions of each power source are based on the LWECS and gas plant scenario proposed in the Monticello Nuclear Generating Plant ISFSI EIS.[175] Wind power is an intermittent source of electric generation; power output varies depending on the speed of the wind and ability of the transmission system to carry the power when it is generated. Wind power's discontinuous availability means it is not, by itself, well suited to replace the generating characteristics of the

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[173] Carbon Capture Research, http://fossil.energy.gov/sequestration/capture/index.html
[174] Feasibility Study for Conversion of Prairie Island to Natural Gas Fired Generation, November 2002, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={CCE97585-7A52-4194-8EE0-959DC9BAB69F}&documentTitle=20096-38560-03
[175] Monticello Spent Fuel Storage Installation Final Environmental Impact Statement, March 2006, http://energyfacilities.puc.state.mn.us/documents/9901/Final-EIS-CN-05-123.pdf

PINGP. In order to provide an equivalent reliability and generating capacity, wind power must be combined with some other energy source or storage capability.[176] In this scenario, wind power is paired with natural gas power generation.

The operating and environmental characteristics of a combined cycle natural gas plant are shown in Table 7.2. This scenario assumes the same operating characteristics, but with impacts modified to reflect the addition of wind power generation. The operating and environmental characteristics of a typical LWECS (wind farm) are shown in **Table 7-3**. Projected environmental impacts of an LWECS and natural gas plant scenario are shown in **Table 7-4**.

The environmental impacts an LWECS – natural gas plant scenario are dependent on a number of site-specific factors such as the availability of a large gas pipeline, adequate wind resources, sufficient transmission capacity, and proximity to power demand. Thus, there are uncertainties in estimating these impacts.

Renewable Resources Technologies

In the renewable resources technologies scenario, the PINGP is replaced by a combination of renewable resource technologies – wind, biomass, anaerobic digestion, and solar. Renewable energy sources have the potential to be sustainable energy sources with relatively fewer environmental impacts. Renewable energy sources are typically diffuse and geographically dispersed. These characteristics have potential benefits and drawbacks. Benefits include fewer environmental impacts (though impacts vary with the technology) and the potential to integrate energy sources more directly into communities which they might serve. Drawbacks include the need to connect dispersed energy sources to the electrical grid. These connections may require the construction of additional transmission lines. Because they rely on relatively diffuse energy sources, renewables also have relatively lower capacity factors, i.e., their power generation tracks the sporadic nature of their energy source (e.g., wind, sunlight).

The scenario discussed here is adapted from the distributed generation scenario proposed in the Monticello Nuclear Generating Plant ISFSI EIS.[177] This is one scenario of many possible renewable technology scenarios; nonetheless, it is representative and provides a reasonable basis for comparing potential impacts.

The operating and environmental characteristics of an LWECS are shown in Table 7-3. This scenario assumes the same operating characteristics, but with impacts modified to reflect the addition of other energy sources. The operating and environmental characteristics of typical biomass power generation, anaerobic digestion, and solar (photovoltaic) power generation are shown in **Table 7-5**.

[176] As noted in Chapter 1, Section 3, the growth of interconnected and geographically dispersed wind power generation in the Upper Midwest has increased the system-wide capacity and reliability of this generation alternative.
[177] Monticello Spent Fuel Storage Installation Final Environmental Impact Statement, March 2006, http://energyfacilities.puc.state.mn.us/documents/9901/Final-EIS-CN-05-123.pdf

For purposes of analysis, this scenario assumes that each renewable resource technology provides a percentage of the total replacement generating capacity for the PINGP. In this scenario the PINGP is replaced by 1600 MW of wind generation, 700 MW of biomass generation, 50 MW of anaerobic digestion generation, and 200 MW of solar generation. This combination provides an approximate accredited generation capacity of 976 MW.

Wind power. This scenario relies heavily on generation by large energy wind conversion systems (LWECS). As noted above, this technology has a relatively lower capacity factor and performs best when combined with another energy source.

Biomass. This scenario also relies heavily on generation powered by biomass – including woody biomass, crop residues, and biodiesel. Biomass technologies are commercially available and there is strong state and federal support for their development. As an example, in September, 2008, Xcel Energy announced its intention to convert a coal-fired unit at its Bay Front Power Plant in Ashland, WI, to biomass gasification technology.[178] Challenges to implementing biomass technology include long-term biomass availability, transportation, and competition for biomass with other uses, e.g., food, fiber.

Biodiesel is included in this scenario as a biomass generation source. Biodiesel can be used in commercially available diesel fueled turbines and associated generators. Biodiesel is readily available in Minnesota; the state has capacity to produce approximately 63 million gallons of biodiesel per year.[179] Ethanol is not included in this scenario as a biomass generation source. Reasons for not including ethanol include: (1) a lack of suitable ethanol fueled generating equipment, (2) the quantity of ethanol that would be required, and (3) the lack of mature markets for ethanol as an electrical generation resource.

Anaerobic Digestion. Anaerobic digesters of animal manure, food processing waste, and municipal waste water solids provide a limited amount of power generation in this scenario. The capacity factor for anaerobic digesters is based on experience in Minnesota with anaerobic digestion of dairy cow manure.[180]

Solar. Solar power (photovoltaic) provides a limited amount of power generation in this scenario. Solar power is a renewable resource with few operational environmental impacts. Photovoltaic technology is just beginning to reach commercial viability and utility scale application.[181] Due to it reliance on direct sunlight, it has a very limited capacity factor.

[178] Xcel Energy Announces Largest Biomass Plant in Midwest, September 30, 2008, http://www.xcelenergy.com/Company/Newsroom/Pages/XcelEnergyAnnouncesLargestBiomassPlantintheMidwest.aspx
[179] Prospects for Expansion of the Soy-Based Biodiesel Industry in Minnesota, November 2006, http://www.auri.org/research/diesel/pdfs/Executive%20Summary%20Bio-Diesel%20Study%20December%2006.pdf
[180] Final Report: Haubenschild Farms Anaerobic Digester, August 2002, http://www.mnproject.org/pdf/Haubyrptupdated.pdf
[181] PG&E Signs Historic 800 Mw Photovoltaic Solar Power Agreements With Optisolar and Sunpower, http://www.pge.com/about/news/mediarelations/newsreleases/q3_2008/080814.shtml

The potential environmental impacts of a renewable resources technologies scenario are shown in **Table 7-6**. These impacts are highly dependent on the relative proportion of each technology in the scenario.

7.3 COMPARISON of IMPACTS of the ALTERNATIVES

This section compares the potential human and environmental impacts associated with continued operation of the PINGP with those of the six alternatives scenarios. Human impacts include economic, employment, and sociological impacts.[182] **Detailed economic analysis was conducted by the Office of Energy Security, Energy Regulation and Planning (OES-ERP) unit in the Certificates of Need proceedings for this project. See the testimony of Ham, Rakow, and Davis.**

Environmental Impacts
The potential environmental impacts associated with alternatives to the PINGP are summarized in **Table 7-7**. Potential impacts from operation of the PINGP and Prairie Island ISFSI are discussed in this document. As appropriate, these impacts have been included in Table 7-7 for comparison purposes.

PINGP and Prairie Island ISFSI. The relative environmental advantages of continued operation of the PINGP include no new land use, no CO_2, SO_x, or NO_x emissions, and a compact fuel cycle with relatively small fuel throughput and solid waste generation. Additionally, continued operation of the PINGP requires no new transmission line construction. The environmental impacts include water consumption, discharge of heat to the environment, and controlled emissions of radioactivity (see Chapter 1, Section 4 and Chapter 2, Sections 4 and 5).

Fossil Fuel Technologies. The relative environmental advantages of fossil fuel technologies are limited. Fossil fuel technologies require high fuel throughput which creates substantial CO_2, SO_x, and NO_x emissions as well as solid wastes (ash). If operated without evaporative cooling towers, these technologies can consume relatively less water than the PINGP. Carbon dioxide (CO_2) is now understood to be the most important greenhouse gas (GHG) – responsible for global warming and associated environmental impacts including significant changes to world weather systems and ecosystems.[183] Sulfur oxides (SO_x) can cause acid rain and human respiratory illness.[184] Nitrous oxides (NO_x) are greenhouse gases that also cause ozone and related respiratory illnesses.[185] As an example of the debilitating effect of nitrous oxides, a recent EPA rulemaking to strengthen NO_x standards projected that the rulemaking change would avoid 200 – 2000 premature deaths annually by 2020.[186] Potential local impacts from SO_x and

[182] Minn. Rules 4410.2300, Subd. H.
[183] Climate Change 2007: Synthesis Report, Summary for Policymakers, An Assessment of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/
[184] Health and Environmental Impacts of SO_2, http://www.epa.gov/oar/urbanair/so2/hlth1.html
[185] Health and Environmental Impacts of NO_x, http://www.epa.gov/air/urbanair/nox/hlth.html
[186] Strengthened National Standards for Ground Level Ozone, http://www.epa.gov/air/ozonepollution/actions.html#mar07s

NO_x emissions can be mitigated by dispersion of these emissions by prevailing winds to other regions of the country. Dispersion is not a mitigating strategy for CO_2 emissions.

Impacts related to fossil fuel technologies can be mitigated by sequestering carbon before it can become a greenhouse gas (scenario #3), or by using natural gas, which has a relatively lower potential for CO_2 generation (scenario #4). A natural gas plant, compared to other fossil fuel technologies, has relatively lower SO_x and NO_x emissions, consumes less water for operations, and generates no solid wastes. Of the fossil fuel technologies, a natural gas plant has the fewest potential environmental impacts. All of the fossil fuel technologies, if sited other than at the current Prairie Island plant, would likely require the development of new transmission lines.

Renewable Resource Technologies. The relative environmental advantages of renewable resource technologies vary with the technology. In general these technologies use or capture a more diffuse energy resource. Thus, they typically have a relatively greater land use impact and lower waste impacts. Of the renewable resource technologies that are commercially available, wind power has the fewest potential environmental impacts. Wind turbines do not consume fuel or water, or create emissions or wastes. They do have a relatively higher land use impact. However, these impacts are limited because wind turbine operations allow for concurrent land uses, e.g., agriculture. Direct land use impacts – impacts associated with the physical footprint of the wind turbine – are minor. Of the technologies considered in this section, including the PINGP, wind power has the fewest potential environmental impacts.

Renewable resource technologies that utilize carbon energy sources have drawbacks associated with fossil fuel technologies, e.g., emissions, solid wastes. However, these technologies (biomass, biodiesel, anaerobic digestion) have a greater potential to operate as carbon neutral technologies. Because they depend on current, annually renewable carbon stocks (plants, trees, manures), they cannot as easily draw down their fuel stocks. Or, rather, the effect of doing so is more readily apparent as compared to fossil fuel technologies.

Renewable resource technologies may or may not require the development of new transmission lines to distribute their power generation. If transmission lines are needed, these lines would have negative environmental impacts associated with them. A study commissioned by the Minnesota Legislature concluded that there is potential for locating 600 megawatts (MW) of dispersed renewable generation within Minnesota's existing transmission infrastructure.[187] Thus, approximately half of the PINGP's generating capacity could be met with renewable resource technologies that do not require additional transmission. Depending on the transmission needs for the remainder of the renewable resource capacity required, environmental impacts from transmission lines for renewable

[187] Dispersed Renewable Generation Transmission Study, June 2008, http://www.state.mn.us/portal/mn/jsp/content.do?subchannel=-536881736&programid=536916477&sc3=null&sc2=-536887792&id=-536881351&agency=Commerce

resource technologies could be less than those for fossil fuel technologies.[188] If renewable resource technologies were combined with a natural gas repowering of the PINGP, there could be no additional transmission required, i.e., the renewable resources could be dispersed across existing transmission infrastructure and the Prairie Island site has existing transmission infrastructure regardless of the energy source.

Risks and Uncertainties. The alternative scenarios to the PINGP all involve impacts, risks, and uncertainties. In the near term, renewable resource technologies will likely need to be supplemented by fossil fuel technologies in order to replace the generating characteristics of the PINGP. Fossil fuel technologies create significant risks and uncertainties related to global warming. Though research has illuminated the linkages between human activities, greenhouse gas (GHG) emissions, and global warming, there is uncertainty as to the projected effects of these linkages, how to mitigate them, and how to value them in public decision-making processes.[189,190]

The PINGP and Prairie Island ISFSI avoid the uncertainties of GHG emissions, but do so by trading them for uncertainties related to the safe handling, storage, and eventual placement in a federal repository of spent nuclear fuel (SNF) generated at the PINGP. The potential human and environmental impacts of handling and storing SNF have been discussed in this document in the context of the Prairie Island ISFSI. They are not anticipated to be significant. Nonetheless, uncertainties remain, e.g., the uncertainty of a terrorist attack on the ISFSI, the uncertainties related to the availability of a federal repository.

All this is to say that potential human and environmental impacts associated with the PINGP and alternatives to the PINGP – in particular, those related to safe handling of SNF and to GHG emissions – are subject to social-political-institutional forces and value judgments. Accordingly, there may be differences of opinion as to potential risks and impacts.

Economic and Employment Impacts

Xcel Energy analyzed the economics of alternatives to the PINGP in its Certificates of Need application.[191] Its analysis indicated that continued operation of the PINGP was more cost effective than coal-fired or gas-fired generation. In addition, sensitivity analysis indicated that the cost effectiveness of the PINGP was relatively robust, i.e., not sensitive to changes in assumptions about costs and externalities. **Under all scenarios examined, continued operation**

[188] Id. Phase II of the study will examine the potential for locating an additional 600 MW of generation on the existing transmission infrastructure, for a total of 1200 MW. This total would exceed the generating capacity of the PINGP.
[189] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 11.4, May 16, 2008
[190] Climate Change 2007: Synthesis Report, Summary for Policymakers, An Assessment of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/
[191] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 4, May 16, 2008 and Supplemental Filing, March 20, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult#{3FD82E10-A1D4-4968-B1C6-1238FED9F025}

of the PINGP was less expensive than alternatives by between $0.44 billion and $2.78 billion dollars.[192]

The Minnesota Department of Commerce, Office of Energy Security, analyzed alternatives to the PINGP, including renewables (wind), coal-fired generation, gas-fired generation, and combinations of renewables with least-cost non-renewables. Its analysis indicated that continued operation of the PINGP, under a variety of cost and externality scenarios, was between $0.51 billion and $2.78 billion dollars less expensive than the alternatives**[193] **(see Table 7.8). The analysis incorporated externalities (societal costs), e.g., greenhouse gas emissions (CO_2), radiological exposure. Among the scenarios examined was the possibility of no increase in demand for electricity through 2034, a scenario under which continued operation of the PINGP was between $0.77 billion and $1.93 billion dollars less expensive than the alternatives ("no load growth" scenario). Inclusion of costs for dry cask storage for up to 200 years at the Prairie Island ISFSI did not significantly affect the analysis – continued operation of the PINGP remained the least-cost alternative.[194]

Economic impacts to Minnesota communities and citizens were analyzed in Xcel Energy's Environmental Report accompanying its NRC license renewal application.[195] This analysis projects socioeconomic impacts of PINGP alternatives to be "moderate" to "large," based on loss of tax revenue for the City of Red Wing. This impact is more properly framed as economic impact to citizens of Red Wing, not citizens of Minnesota. Alternatives to the PINGP, located in other cities within Minnesota, would generate similar tax revenues for these cities. Thus, the economic impact within Minnesota would be minimal. Loss of the PINGP would disrupt tax revenues and negatively impact citizens of Red Wing; however, these revenues would likely be generated elsewhere in the state by a PINPG alternative and positively impact citizens in these regions.

The Environmental Report estimates that economic impacts due to changes in employment would be small. However, the report does project changes in long-term employment under alternative scenarios to the PINGP. The report estimates that it takes approximately 520 permanent employees to operate the PINGP; whereas, it would take only 120 employees to operate a coal plant, and 35 employees to operate a gas plant.[196] Thus, alternatives to the PINGP could have an adverse economic impact related to long-term employment. As the Environmental

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[192] Id. Revised Table 4-4 PVRR Sensitivities
[193] Direct Testimony of Dr. Steve Rakow, April 22, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult#{73C3F5D1-548D-46C0-BDB5-CF9640957F18}; Direct Attachment of Dr. Steve, Rakow, April 22, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult#{3213F1D9-AA7C-420D-A148-E2875275487C}.
[194] Rebuttal Testimony and Attachments of Dr. Steve Rakow, May 22, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={2DD285A6-F035-47A3-92E9-B1E86ABB0C7A}&documentTitle=20095-37422-01
[195] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Environmental Report, May 16, 2008.
[196] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Environmental Report, Table 8-2, May 16, 2008.

Report did not analyze potential employment impacts related to wind power generation or other renewable resource technologies, it's uncertain how these alternatives would impact employment. Because these technologies harness relatively more diffuse energy sources, it's likely that they would employ more persons than a coal or gas plant. [197] Thus, renewable resource technologies could have a neutral or positive long-term employment impact compared to continued operation of the PINGP.

All alternatives to the PINGP would likely have a positive economic impact on short-term construction employment.

Sociological Impacts

Potential sociological impacts related to the PINGP and PINGP alternatives are difficult to assess. Sociological impacts include but are not equivalent to socioeconomic impacts. The relative economic impacts of the PINGP alternative scenarios are discussed in this section. The economic dislocation that would occur to citizens of Red Wing should the PINGP be shut down and an alternative constructed, is likely better described as a sociological impact than an economic impact to the State of Minnesota. All of the alternative scenarios would disrupt the Red Wing community. They would also likely foster growth in other Minnesota communities.

Aesthetics is likely a factor in assessing sociological impacts. How citizens feel about their community depends to some degree on the perceived beauty that they interact with on a daily basis. Thus, generally, alternatives that require new land use (e.g., new power plant, new transmission lines, new pipeline) would likely have a negative aesthetic and sociological impact. Continuing operation of the PINGP (no new land use) would likely have a neutral aesthetic and sociological impact. There will be differences of opinion as to the extent of new land use impacts. For example, some persons find wind turbines graceful and peaceful; others find them to be a blight on the landscape.

Additionally, new land use could interfere with cultural and social activities, e.g., hunting, gathering, recreation, worship. When such activities are associated with a particular geography, impacts to this geography create negative sociological impacts.

Finally, psychology likely plays a factor in sociological impacts. The psyche of a community could be influenced independent of aesthetics. For example, a person might be positively impacted by the thought of using renewable resource technologies, yet not like the sight of wind turbines out their back window. The potential psychological impacts of the PINGP are discussed in Chapter 1, Section 4.5. **The potential psychological impacts borne by the Prairie Island Indian Community (PIIC), and other communities near the PINGP, are discussed in Chapter 2, Section 5.4.**

Whether the psychological impacts of PINGP alternatives would be relatively less or more than continued operation of the PINGP is uncertain; **however, alternatives that use relatively more**

[197] Putting Renewables to Work: How Many Jobs can the Clean Energy Industry Generate?, RAEL Report, University of California, Berkeley, 2006, http://rael.berkeley.edu/old-site/renewables.jobs.2006.pdf

diffuse energy sources would have less potential for impacts that can be projected through distance or time. All of the alternatives would be subject to incidents, i.e., they are all human endeavors. Alternatives that use diffuse energy sources (e.g., wind, solar) are less capable of turning an incident into a far-reaching impact.

A negative psychological impact could occur due to fear or distrust of a PINGP alternative that is located close to a citizen's home. For example, research on the effect of transmission lines on property values indicates that part of the potential negative impact on property values is due to safety concerns of homeowners.[198] Research also indicates that the passage of time can ameliorate psychological impacts, i.e., known risks that have been lived with are less likely to have a negative psychological impact than the introduction of new risks. **Thus, the type of PINGP alternative, its location(s), and a community's sense of whether a new risk is being introduced are all factors in determining psychological and sociological impacts.**

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[198] Power Lines and Property Values Revisited, Appraisal Journal, Fall 2007, http://www.entrepreneur.com/tradejournals/article/171851335.html

8.0 UNAVOIDABLE IMPACTS AND MITIGATION

The primary impact of the proposed expansion of dry cask storage at the Prairie Island ISFSI is an increase in the annual radiological doses received by plant personnel and the general public. The increase in radiological exposure to plant personnel results from cask handling and skyshine radiation. The increase in radiological exposure to the general public is due to skyshine radiation. The increases in radiological doses are not anticipated to be significant and all doses are projected to remain below federal regulatory limits (See Chapter 2, Section 5). Accordingly, mitigating measures, beyond policies and procedures already in place at the PINGP, do not appear necessary.

Indirect or cumulative impacts of the proposed dry cask storage expansion include: (1) those associated with continued operation of the PINGP until 2034, and (2) use of the Prairie Island ISFSI to facilitate decommissioning of the PINGP. Unavoidable impacts related to continued operation of the PINGP are discussed in Chapter 1 of this document. In addition, continued operation introduces an incremental risk related to the possibility of an incident at the PINGP which could result in radiological exposures to plant personnel, emergency responders, and the general public. These exposures are projected to be below federal regulatory limits. This risk is not anticipated to be significant (See Chapter 2, Section 5).

Use of the Prairie Island ISFSI to facilitate decommissioning of the PINGP introduces impacts related to the placing of additional casks on the ISFSI pad and the storage of these casks until placement in a federal repository. Handling and storing the casks will increase radiological exposures to plant personnel. Skyshine radiation from the casks will increase radiological exposure to the general public. The increases will be within federal regulatory limits. Storage of the dry storage casks until placement in a federal repository introduces an incremental risk related to the possibly of an incident at the Prairie Island ISFSI that could result in radiological exposures. From a technical standpoint, this risk is not anticipated to be significant. However, there are uncertainties in the socio-political components of the risk that, left unmanaged, would make the risk significant, i.e., a lack of institutional control during the time period for which the casks are stored at the Prairie Island ISFSI would lead to significant radiological exposures and health impacts (See Chapter 2, Section 5).

TABLES

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Table 2.1. Federal Regulations and Guidance Applicable to the Prairie Island Plant

Title	Agency	Regulation
Requirements for Renewal of Operating Licenses for Nuclear Power Plants	U.S. NRC	10 CFR 54
Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.	U.S. NRC	10 CFR 51
Electronic Maintenance and Submission of Information. Federal Register Notice – Final NRC Rule.	U.S. NRC	68 FR 58792
Industry Guideline for Implementing the Requirements of 10 CFR part 54 – The License Renewal Rule, Rev 4	Nuclear Energy Institute	NEI 95-10
Standard review Plan for Review of License Renewal Applications for Nuclear Power Plants	U.S. NRC	NUREG-1800
Generic Aging Lessons Learned (GALL) Report	U.S. NRC	NUREG-1801
NRC regulations for source material, special nuclear material, and by-product material licenses	U.S. NRC	10 CFR 30, 40, 70
NRC regulations for orders, license conditions, exemptions, waste and spent fuel storage, transportation, and technical specifications including plant-specific design-basis information.	U.S. NRC	10 CFR 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 70, 71, 72, 73, 100
NRC enforcement of U.S. Environmental Protection Agency (EPA) rules on nuclear power operations.	U.S. NRC, U.S. EPA	40 CFR 190 and 191
NRC regulations for the release of effluents from nuclear generating plants and dose limits.	U.S. NRC	10 CFR 20 and 50
Nuclear generating plants are required to have a formal emergency response plan and to exercise that plan periodically to ensure workability.	U.S. NRC, HSEM	10 CFR 50

Table 3.1 Spent Fuel Assembly Inventory

Date	Number of Additional Spent Fuel Assemblies Discharged During Unit 1 Refueling	Number of Additional Spent Fuel Assemblies Discharged During Unit 2 Refueling	Total Number of Spent Fuel Assemblies Produced at Prairie Island
As 4/15/2008			2109
Remainder of 2008		49	2158
2009	49		2207
2010		56	2263
2011	44		2307
2012	44	45	2396
2013		44	2440
2014	49		2489
2015	48	48	2585
2016		49	2634
2017	48		2682
2018	49	48	2779
2019		48	2827
2020	48		2875
2021	48	49	2972
2022		48	3020
2023	49		3069
2024	48	48	3165
2025		49	3214
2026	48		3262
2027	49	48	3359
2028		48	3407
2029	48		3455
2030	48	49	3552
2031		48	3600
2032	40		3640
2033	121	13	3774
2034		121	3895

Table 5-1. Annual Estimated Doses to Personnel from ISFSI Cask Operations

Exposure	Annual Dose from TN-40 Casks (person-rem)[1]	Annual Dose from TN-40HT Casks (person-rem)[2]
Cask Handling	2.3	3.1
Cask Surveillance and Maintenance	3.1	4.5

[1] Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Section 7.4
[2] Prairie Island Independent Spent Fuel Storage Installation, Safety Analysis Report, Section A7.4

Table 5-2 Cask Handling Risks – EPRI Report

Handling Phase	**First Year Risk** (latent cancer deaths per cask per year)	**Subsequent Years Risk** (latent cancer deaths per cask per year)
Cask Loading	6.3 E-14	N/A
Cask Transportation	3.3 E-13	N/A
Cask Storage	1.7 E-13	1.7 E-13
Total	5.6 E-13	1.7 E-13

Table 5-3 Skyshine Dose Estimates to the Nearest Permanent Residence and Assumptions

Assumptions	SAR	SAR Addendum A	CON Application
Type of Cask	TN-40	TN-40HT	TN-40HT
Number of Casks	48	48	64
Fuel Loading (kg of Uranium per fuel assembly)	410	410	360 (casks 1-56) 400 (casks 57-64)
Fuel Burnup (MWD/MTU)	**45,000**	60,000	53,000 (casks 1-56) 50,000 (casks 57-54)
Cask Loading Rate	**2 casks every year**	4 casks every 2 years	2 casks every year
Estimated Annual Dose to Nearest Residence (mrem/yr.)	1.0	2.2	0.4

Table 5A-1 Summary of Estimated Doses and Cancer Incidences for the General Public and Plant Personnel with Dry Storage Cask Expansion[1]

General Public			
Exposure Pathway	**Estimated Whole Body Dose (mrem/yr)**	**Estimated Additional Risk of Cancer Incidence[2]**	**Estimated Additional Cancer Incidences[3]**
Skyshine Radiation (64 casks)	0.4	2.8 in 100,000	0.013
Plant Personnel – Cask Handling			
Cask Handling and Maintenance	---[4]	---	0.32
Plant Personnel – General[5]			
Skyshine Radiation	14.0	98 in 100,000	0.90

mrem = millirem

[1] See Chapter 2, Section 5.2 for discussion of assumptions and calculations.
[2] For residents within 2 miles (approximately 450 persons) who receive the estimated dose annually for 70 years.
[3] Id.
[4] Cask handling and maintenance are specialized, high exposure tasks for which it is difficult to estimate individual dose rate and impacts. Because these doses are managed under the PINGP radiation protection program, the number of persons exposed, their exposure rate(s), and their time of exposure will vary.
[5] For plant personnel (approximately 923 persons) who receive the estimated dose annually for 70 years.

Table 5A-2 Summary of Estimated Doses and Cancer Incidences for the General Public and Plant Personnel – Cumulative Impacts[1]

General Public			
Exposure Pathway	**Estimated Whole Body Dose (mrem/yr)**	**Estimated Additional Risk of Cancer Incidence[2]**	**Estimated Additional Cancer Incidences[3]**
Gaseous Effluents	0.01	0.07 in 100,000	0.0003
Liquid Effluents	0.04	0.28 in 100,000	0.0012
Skyshine Radiation (64 casks)	0.4	2.8 in 100,000	0.013
Skyshine Radiation (98 casks)	5.0	35 in 100,000	0.48[4]
Plant Personnel – Cask Handling			
Cask Handling and Maintenance[5]	---[6]	---	0.32
Plant Personnel – General			
Plant Operations and Maintenance	132	660 in 100,000	6.1
Skyshine Radiation (64 casks)	14.0	98 in 100,000	0.90
Skyshine Radiation (98 casks)	---[7]	---	---

mrem = millirem

[1] See Chapter 2, Section 5.4 for discussion and calculations. This table incorporates information from Chapter 1, Table 4-10 and Chapter 2, Table 5A-1.
[2] For residents within 2 miles (approximately 450 persons) who receive the estimated dose annually for 70 years.
[3] Id.
[4] Assuming exposure over approximately three 70-yr. lifetimes (3 x 70 yr. = 210 years). See Chapter 2, Section 5.4 for discussion.
[5] Once the 98th cask in placed on the ISFSI pad, cask handling exposures would be minimal; exposures related to maintenance would continue until the casks are moved to a federal repository. Estimated cancer incidences for maintenance are not expected to exceed those for handling plus maintenance.
[6] Cask handling and maintenance are specialized, high exposure tasks for which it is difficult to estimate individual dose rate and impacts. Because these doses are managed under the PINGP radiation protection program, the number of persons exposed, their exposure rate(s), and their time of exposure will vary.
[7] When the 98th cask in placed on the ISFSI pad, the plant will have ceased operation. Staffing levels would drop significantly at the PINGP and this exposure pathway would be eliminated.

Table 7.1 Operating and Environmental Characteristics of a Pulverized Coal Power Plant[1]

Characteristic	Basis / Detail
Unit size = 550 MWe	2 units @ 550 MWE = 1100 MWe
Capacity factor = 0.85	Typical for coal-fired units
Heat rate = 10,200 BTU/kWh	Typical for coal-fired units (EIA 2002)
Fuel type = sub-bituminous, pulverized coal	Coal typically used in MN
Fuel heating value = 8,914 BTU/lb.	2004 value for coal in MN (EIA 2007)
Fuel ash content by weight = 6.47%	2001 value for coal in MN (EIA 2007)
Fuel sulfur content by weight = 0.44	2001 value for coal in MN (EIA 2007)
Uncontrolled NO_x emission = 7.2 lb/ton	EPA estimate
CO_2 emissions = 2.117 lbs/kWh	DOE estimate[2]
Scenario Impacts	
Minimum land required	350 acres (plus buffer)
Annual fuel consumption	4.7 million tons
Annual CO_2 emissions	8.7 millions tons
Annual SO_x emissions	1,815 tons
Annual NO_x emissions	848 tons
Annual water consumption	4.0 billion gallons
Annual solid waste generation	340,000 tons

[1] Adapted from Table 7.2-2, Coal-Fired Alternative, Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Section 7, Environmental Report, May 16, 2008

[2] Carbon Dioxide Emissions from the Generation of Electric Power in the United States, U.S. Dept. of Energy, July 2000.

Table 7.2 Operating and Environmental Characteristics of a Natural Gas Power Plant[1]

Characteristic	Basis / Detail
Unit size = 520 MWe	2 units @ 520 MWE = 1040 MWe
Capacity factor = 0.85	Typical for gas-fired units
Heat rate = 6.040 BTU/kWh	Typical for gas-fired units
Fuel type = natural gas	
Fuel heating value = 1,008 BTU/ft^3	2004 value for gas in MN (EIA 2007)
Fuel SO_x content = 0.0034 lb/MMBtu	EPA estimate
Fuel NO_x content = 0.0128 lb/MMBtu	EPA estimate
CO_2 emissions = 1.314 lbs/kWh	DOE estimate[2]
Scenario Impacts	
Minimum land required	41 acres (plus buffer)
Annual fuel consumption	48.3 billion ft^3
Annual CO_2 emissions	5.1 million tons
Annual SO_x emissions	83 tons
Annual NO_x emissions	312 tons
Annual water consumption	2.4 billion gallons[3]
Annual solid waste generation	0

[1] Adapted from Table 7.2-1, Gas-Fired Alternative, Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix J, Section 7, Environmental Report, May 16, 2008
[2] Carbon Dioxide Emissions from the Generation of Electric Power in the United States, U.S. Dept. of Energy, July 2000.
[3] Water Consumption – Conventional Power Plants, http://www.awea.org/faq/wwt_environment.html.

Table 7.3 Operating and Environmental Characteristics of a Large Wind Energy Conversion System (LWECS)

Characteristic	Value / Detail
Typical wind turbine size	1.5 MWe[1]
Capacity factor	0.36 (variable with location)
Accreditation factor	0.135
SO_x, NO_x, and CO_2 emissions	0
Land requirement per MW	16 acres (wind rights, 3 x 5 RD) 100 acres (typical wind farm in MN) ≤ 0.01 acres (actual footprint)
Annual water consumption	0
Annual solid waste generation	0

[1] Annual Report on U.S. Wind Power, Installation, Cost and Performance Trends: 2007, U.S. Dept. of Energy, May 2008. The average installed wind turbine size in the United States in 2007 was 1.65 MWe (Figure 9).

Table 7.4 Environmental Impacts of an LWECS and Natural Gas Plant Scenario

Scenario Impacts	
Minimum land required	24,000 acres
Annual fuel consumption	38.6 billion ft^3
Annual CO_2 emissions	4.1 millions tons
Annual SO_x emissions	66 tons
Annual NO_x emissions	249 tons
Annual water consumption	1.9 billion gallons
Annual solid waste generation	0

Table 7.5 Operating and Environmental Characteristics of Renewable Resource Technologies (Biomass, Anaerobic Digestion, Solar)

Characteristic	Value / Detail[1]
Biomass	
Capacity factor	0.82
Fuel SO_x content	0.003 lb/MMBtu
Fuel NO_x content	0.115 lb/MMBtu
CO_2 emissions	23.5 lbs/MMBtu
Annual fuel consumption per MW	6,800 tons dry wood
Land requirement per MW	1000 acres
Annual solid waste generation per MW	1700 tons
Anaerobic Digestion	
Capacity factor	0.85
SO_x, NO_x, and CO_2 emissions	Minimal
Land requirement per MW	2000 acres
Annual water consumption	Minimal
Annual solid waste generation per MW	Minimal
Solar (Photovoltaic)	
Land requirement per MW	11 acres[2]
Capacity factor	0.15[3] (estimated)
Accreditation factor	0.05 (estimated)

[1] Monticello Spent Fuel Storage Installation Final Environmental Impact Statement, March 2006, http://energyfacilities.puc.state.mn.us/documents/9901/Final-EIS-CN-05-123.pdf

[2] Estimate based on the Optisolar Topaz Solar Farm, http://www.optisolar.com/topaz.htm.

[3] Projecting the Impact of State Portfolio Standards on Renewable Energy and Solar Installations, http://209.85.173.132/search?q=cache:fnzKw_UjGMEJ:www.newrules.org/de/solarestimates0105.ppt+photovoltaic+capacity+factor+minnesota&hl=en&ct=clnk&cd=3&gl=us

Table 7.6 Environmental Impacts of an Renewable Resources Technologies Scenario

Scenario Impacts	
Minimum land required	962,000
Annual fuel consumption	4.8 million tons (dry wood)
Annual CO_2 emissions	900,000 tons
Annual SO_x emissions	200
Annual NO_x emissions	4,666
Annual water consumption	*
Annual solid waste generation	1.2 million tons

* Too uncertain to provide a reasonable estimate

Table 7.7 Comparison of Environmental Impacts of PINGP Alternatives

Scenario Number / Name	0	1	2	3	4	5	6
	PINGP	Purchased Power	Generic Coal	Coal 50%[1]	Generic Gas	Gas plus Wind	Renewable Resources
Land Use (acres)	0	1,800	350	500	45	24,000	962,000
Annual Fuel Consumption (tons, ft^3)	353 ft^3 (fuel assemblies)	*	4.7 E06 (tons)	4.7 E06 (tons)	48 E09 (ft^3)	39 E09 (ft^3)	4.8 E06 (tons)
Annual CO_2 emissions (tons)	0	*	8.7 E06	4.4 E06	5.1 E06	4.1 E06	0.9 E06
Annual SO_x emissions (tons)	0	*	1,815	1,815	83	66	200
Annual NO_x emissions (tons)	0	*	848	848	312	249	4,666
Annual water consumption (gallons)	9.2 E09[2]	*	4.0 E09	4.0 E09	2.4 E09	1.9 E 09	*
Annual solid waste generation (tons)	25.4 (tons Uranium)[3]	*	340,000	340,000	0	0	1.2 E06

* Too uncertain to provide a reasonable estimate

[1] Environmental impacts of a coal plant with 50% carbon sequestration are assumed to be identical to impacts from a generic coal plant, with the exception of CO_2 emissions and land use.
[2] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Section 8.2.3.2, May 16, 2008
[3] Prairie Island Nuclear Generating Plant, Certificates of Need Application, Appendix G, May 16, 2008

Table 7.8 Economic Comparison of PINGP Alternatives under Various Scenarios

Scenarios	Alternatives: Cost Differentials from PINGP Re-licensing ($ million dollars present value societal cost)[1]		
	Unconstrained[2]	Gas Wind	Coal
Base Case	1,347	1,687	2,216
High Capital Costs	1,453	1,983	2,584
Low Capital Costs	1,267	1,391	1,895
High Carbon Costs	1,866	2,014	2,783
Low Carbon Costs	798	1,339	1,685
High Coal Costs	1,473	1,771	2,573
Low Coal Costs	1,293	1,645	1,900
High Gas Costs	2,107	2,240	2,359
Low Gas Costs	505	1097	2,049
High Uranium Costs	1,129	1,469	1,998
Low Uranium Costs	1,565	1,905	2,433
No Load Growth	771	1,190	1,932

[1] Adapted from OES Attachment SRR-8, Direct Attachments of Dr. Steve Rakow, April 22, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult#{3213F1D9-AA7C-420D-A148-E2875275487C}

[2] The "unconstrained" alternative is a least-cost combination of non-renewable energy sources; See Direct Testimony of Dr. Steve Rakow, April 22, 2009, https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult#{73C3F5D1-548D-46C0-BDB5-CF9640957F18}

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FIGURES

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Figure 3.1 Prairie Island Plant and ISFSI

Figure 3.2 Prairie Island ISFSI Pad and Cask Layout

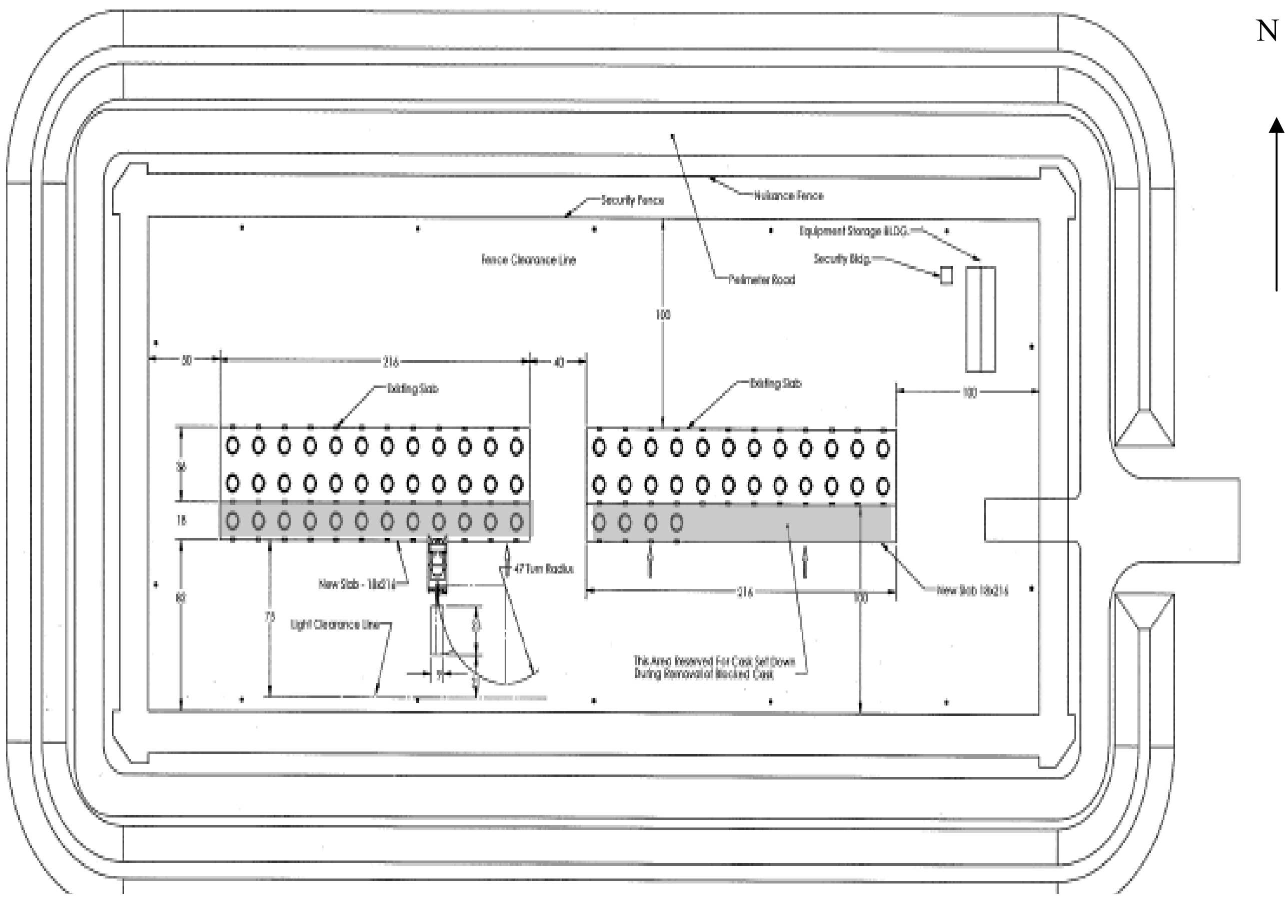
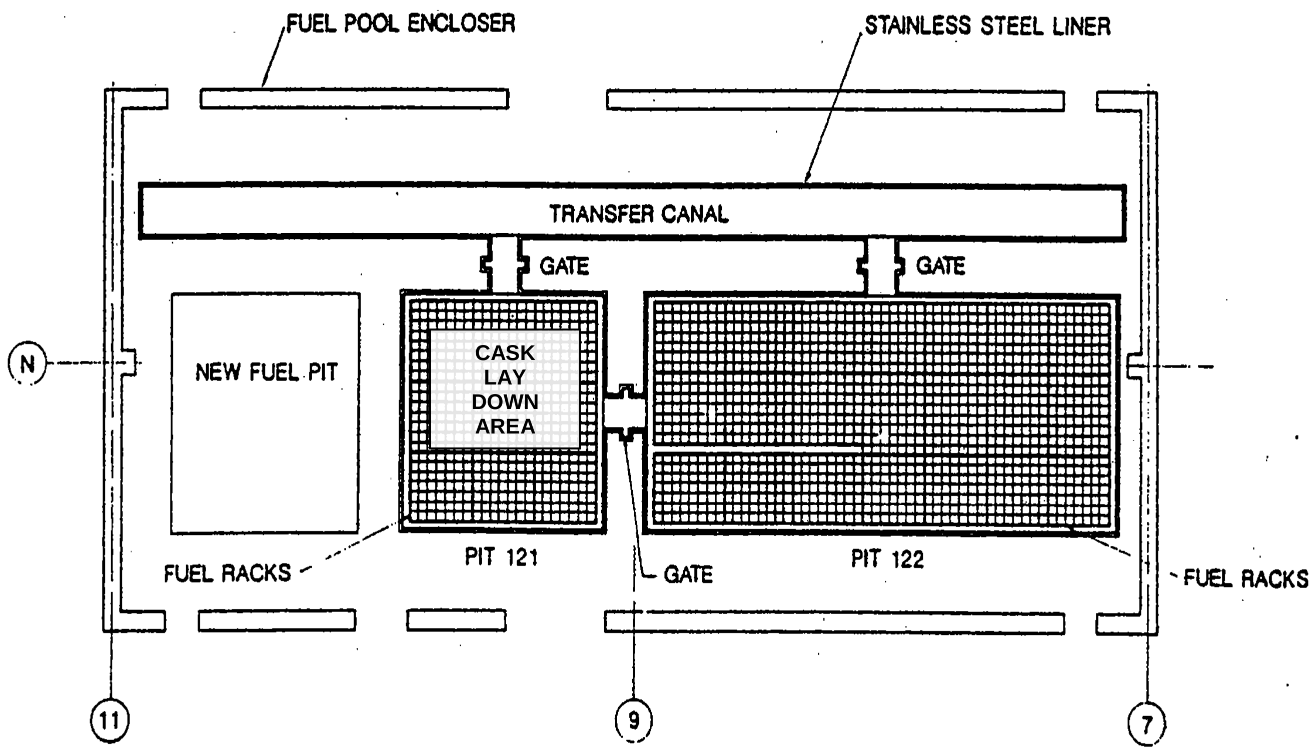


Figure 3.3 Transnuclear TN-40 Dry Storage Cask

Figure 3.4 Spent Fuel Pool



CHAPTER 3

ENVIRONMENTAL IMPACT STATEMENT

COMMENT RESPONSE DOCUMENT

Xcel Energy Prairie Island Nuclear Generating Plant
Extended Power Uprate Project

PUC Docket No. E002/CN-08-509
PUC Docket No. E002/CN-08-510
PUC Docket No. E002/GS-08-690

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TABLE OF CONTENTS

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1.0 INTRODUCTION

This chapter provides a summary of the public meetings and public hearings, explains the methodology for receiving and organizing comments, and provides responses to comments received.

The Draft Environmental Impact Statement (DEIS) for the Prairie Island Nuclear Generating Plant (PINGP) Extended Power Uprate (EPU) and request for additional dry cask storage was published on March 17, 2009. Notice of the availability of the DEIS was sent to those person on the Office of Energy Security's project contact and agency technical representative lists, and published in the Environmental Quality Board Monitor and newspapers of local circulation.

The OES distributed copies of the DEIS to those persons requesting individual copies, former members of the advisory task force, local libraries and to those state agencies identified on the technical representatives list.

A public meeting on the DEIS was held on April 21, 2009, at the Red Wing Public Library. Based on sign-in sheets, the DEIS meeting was attended by 47 individuals. OES staff led the presentation and presided over the public meeting. The public was encouraged to provide oral comments at the public meeting and to submit written comments to the OES by May 8, 2009. A court reporter was present at the public meeting to ensure that all oral comments were recorded accurately.

1.0 METHODOLOGY

In preparing the Final EIS, the OES Energy Facility Permitting (EFP) staff considered all comments to the extent practicable. An identification number was assigned to each commenter, including those who expressed comments orally at the public meeting. Individuals who submitted comments in multiple separate submissions were assigned a separate commenter number for each submission. Each specific comment by the same commenter was assigned a sequential comment number; for example, Comment 15-14 refers to the 14th comment by the commenter assigned as number 15.

Based on the comments received on the Draft EIS, OES EFP prepared responses and modified the EIS (Chapters 1 and 2) where appropriate. The EIS was also revised based on OES EFP's internal technical and editorial review of the DEIS (i.e., changes made to the EIS that were not in response to a comment received).

Transcripts of the public meeting, as well as scanned images of the original comment documents in order by assigned commenter number, are included in their entirety in Section 3 of this chapter. The commenters and their comments are identified and labeled on each document image beginning with the public meeting transcripts. All comment documents on the DEIS, as included in this comment-response chapter, as well as any supporting attachments, have been entered into the administrative record for these dockets. Individual responses for each comment are provided on the right side of each page in close proximity to the corresponding comment. In cases where subsequent comments address the same issue, references are made to the earlier comment number for appropriate responses.

Oral comments were given by 12 individuals at the DEIS public meeting; OES received 15 written comments during the public comment period. Table 3-1 provides a listing of the commenters, their assigned identification numbers and their affiliations.

Commenter Number	Commenter Name	Affiliation
1	Joan Marshman	Citizen
2	Andru Peters	Citizen
3	George Crocker	North American Water Office
4	Kristen Eide-Tollefson	PINGP Study Group
5	Roger Cuthbertson	Citizen
6	Michelle Meyer	Red Wing Sustainability Commission
7	Katie Himanga	Citizen
8	Michael Childs Jr.	Member PIIC
9	Lea Foushee	North American Water Office
10	Michael Childs Sr.	Member PIIC
11	Susan Johnson	Citizen
12	Andru Peters	Citizen
13	Kristen Eide-Tollefson	PINGP Study Group
14	Xcel Energy	Xcel Energy
15	Sierra Club	Sierra Club
16	Paula Maccabee	PINGP Study Group
17	Philip Mahowald	Prairie Island Indian Community
18	Lea Foushee	North American Water Office
19	Craig Affeldt	Minnesota Pollution Control Agency
20	Matt langan	Minnesota Department of Natural Resources
21	Joan Marshman	Citizen
22	Katie Himanga	Citizen
23	Kristen Eide-Tollefson	Citizen
24	Dennis Hatleli	Citizen
25	Thomas Harlan	City of Red Wing
26	Bruce McBeath	Citizen
27	Andru Peters	Citizen
28	Britta Bloomberg	Minnesota Historical Society

PUBLIC COMMENTS

TUESDAY, APRIL 21, 2009

6:00 p.m.

Prairie Island Nuclear Generating Plant

Certificate of Need Extended Power Uprate
PUC Docket Number E002/CN-08-509

Certificate of Need Additional Dry Cask Storage
E002/CN-08-510

Site Permit Extended Power Uprate
E002/GS-08-690

Red Wing Public Library
225 East Avenue
Red Wing, Minnesota

I N D E X

MR. STORM: Good evening. Thank you for coming.

MR. PETERS: Good evening, Bill.

MR. STORM: My name is Bill Storm. As many of you know, I am with the Office of Energy Security within the Department of Commerce, Energy Facility Permitting Unit. We're here tonight for a meeting to get public input on the draft environmental impact statement for three dockets that are before the PUC, Public Utilities Commission. Those dockets are the certificate of need docket for the extended power uprate, the certificate of need docket for the request for additional dry cask storage, and the site permit docket for the extended power uprate.

MR. CHILDS, SR.: Before we start, could you tell me what uprate means?

MR. STORM: Extended power uprate?

MR. CHILDS, SR.: Yeah.

MR. STORM: For those who don't know, Xcel Energy has applied to the PUC for three applications before the PUC. The first application is for a CON for extended power uprate. The extended power uprate is to ramp the power capacity of Prairie Island from 1,100 megawatts, bring it up

164 megawatts, an increase. So that's what the uprate stands for. Okay?

They need -- in order to do that, they need to get -- they need to have approval from the PUC to prove need, and that's what the certificate of need for the extended power uprate is about.

The site permit for the extended power uprate deals with the same issue, the request by Xcel to increase the capacity of Prairie Island nuclear generating plant by 164 megawatts. They need a site permit to do that from the PUC. That's one of the applications that's before the PUC.

The second item there -- the third item there is the certificate of need for additional dry cask storage. Along with the power uprate, Xcel Energy is also requesting to expand the ISFSI to allow for more dry cask storage on the ISFSI.

So those are the three dockets before the PUC relative to the Prairie Island nuclear power plant.

I'm having equipment failures tonight, folks. Sorry.

Before we get into tonight's meeting, I just want to go over a few items on the agenda. One, as with all the meetings that we hold, I have a sign-in sheet, and I encourage you to sign it as you come in. It does a couple of things. It allows me to track the kind of public participation I'm getting in my meetings, and it also gives you an avenue if you want to sign up for my project contact list. There's a check box on the sign-in sheet where you can do that. What that does is those people who have checked that box, I will put their names -- if your names aren't already on the project contact list, I'll put that on my database of people who are interested about this project; and when I need to do mailings or notices for future meetings or hearings, you'll be sure to get one.

Okay. In addition to the sign-in sheet, there are these neon-colored cards. Tonight's meeting is so that we can gather input from the public on the draft EIS that the Office of Energy Security has developed. And if you would like to speak, I ask that you fill out one of these cards and give it to either Ray or myself. And when I get through my little talk on the process so far, I will call people up and everybody will get a chance to speak.

There is also a copy of my slides there, which you -- which you can have. And if you would

like a copy of the draft environmental impact statement, let Ray or I know, and we can provide you with a copy of the draft environmental impact statement.

Like I said, my name is Bill Storm with the Office of Energy Security. Ray Kirsch is assisting. He's the public advisor for these three dockets. And so if you ever -- if you have questions as we move through the process, you can contact -- my card's on the table. Ray's card's on the table. You can contact us and ask us questions.

What I want to do is, since this is the second meeting that we've had down here in Red Wing -- the first meeting was the initial meeting. It was a public information meeting, and it was a meeting to solicit input from the public on the scope of the environmental document. Tonight's meeting now is to solicit input from the public on that document that we produced. But what I want to do is -- before I get to your comments, I want to just give you a very short synopsis of what the process that we've done to date. And then when I'm done with that, then we will turn it over to the audience, and I will call people from the cards, and we'll allow you to speak. Once we get through the cards, if people still want to speak who haven't filled a card out, we'll do that by raising of hands. And once we've done that, if there's people who want to speak again, we will certainly allow them, if time allows, to speak again.

As I said, there are three dockets from the PUC relative to the Prairie Island nuclear generating plant. If you were here at the initial public meeting where I went through what the process would be, you'll remember that those dockets have processes that are common among them. One of those is environmental review. Each docket being reviewed by the PUC has an environmental review component to it. The CON for the uprate requires by rule and law an environmental report, the site permit for the uprate requires an environmental impact statement, and the CON for the request for dry cask storage also requires an environmental impact statement, under a different rule but still an environmental impact statement.

What we have done at the Office of Energy Security is we've held -- we've tried to coordinate these processes so we weren't down here every other week having public meetings, and it's hard for the public to track that. So what we did is we held a

single public information and scoping meeting where we came down, we allowed Xcel to give a presentation on what the project is that they want to do, the three projects that they want to do, we ran through what the processes would be, and then we also took input on what the public would like to see covered in the environmental document, review document.

We then issued one scoping decision. The commissioner of the Department of Commerce is responsible for determining what the scope of the environmental review should be. So we had our scoping meeting.

Following that scoping meeting was a comment period. We took those comments into consideration. I made a recommendation to the commissioner on what should be in the scope, and the commissioner released the scoping decision. That scoping decision covered all three dockets.

And then the third thing we did was we produced the environmental document. It's an environmental impact statement. And that document fulfills the requirements for environmental review for all three of these dockets before the PUC.

As with the environmental review, all three dockets require a public hearing in their process. Since all three dockets require a contested case hearing, we are coordinating that process. The contested case hearing will follow this meeting. I think it's scheduled for May 14th right now. So it's in the future. But the contested case hearing will be another opportunity for the public to speak on this project. When we hold it on May 14th, we will hold an afternoon session here in the library and an evening session at the Prairie Island Indian Community.

We decided to coordinate the environmental review processes and the hearing process, the public hearing processes to gain efficiencies so we're not producing twice the amount of paperwork and we're not coming down here three or four times. It's much more efficient, I think, to coordinate the processes.

And for those of you who were here during the public meeting, information meeting, you might remember this slide (indicating). I have three slides that are going to be following here. Each slide is a graphic representation of the process. This slide (indicating) is a graphic representation of the certificate of need process for the extended power uprate. And as you can see, an application is

submitted, an application is accepted, we hold a public meeting -- that's that one public meeting that we held -- we have a scoping process, the ER is released -- the ER is an environmental report, it's an environmental document -- you go into a contested case hearing, the ALJ's report, and a PUC decision.

Now, if you look at the flowchart for the site permit process, you can see a lot of the milestones are similar or overlap. There's the application is submitted. The application is accepted. There's a public meeting. That's that same public meeting we had down here. There's a scoping decision. The scoping decision outlines what will be in the environmental document. The environmental document is released. The public is given an opportunity to speak to it. That's what we're doing here tonight. Then from there we go into a contested case hearing. Following the hearing the ALJ will submit a report and a recommendation, and then that will be taken to the PUC for a final decision.

And, likewise, with the request for dry cask storage, there's a similar process again. You can see application submitted, accepted, public meeting, environmental scoping decision, environmental document, contested case hearing, ALJ's report, final decision by the PUC.

Even though those three dockets are under different rules and processes -- the processes are under different rules and statutes, there's so much overlap that combining them just seemed to make sense.

And I just want to track the dates and what we did up to this point and maybe lead you a little bit into what's going to happen in the future.

Application submittal date. The certificate of need for the uprate and the certificate of need for the request for dry cask storage, they were both submitted to the Public Utilities on May 16th. The application for the site permit was submitted on August 1st. The PUC accepted the CON applications as substantially complete on July 22nd. They accepted the site permit application as substantially complete on August 15th. Following the acceptance of those applications and before the public meeting, I put out a -- the Office of Energy Security developed a scoping -- EAW draft scoping document. That was a draft of what I thought the environmental review

document should contain. And I released that to the public a few weeks -- well, August 25th so it would be out there to the public in time for the upcoming meeting. We held the first meeting -- and, again, the meeting was held for all three dockets -- on September 10th. We had a ten-day comment period. We received comments from the public following that meeting on what they thought should be in the scope.

Then the next thing that happened was the PUC was petitioned by citizens to have an advisory task force. The PUC agreed that the task force should be formed. They ordered that the OES, Office of Energy Security, form a task force. And that was done on October 10th.

The task force was formed. It met three times in October. And when the task force was finished with their work, the scoping decision came out. As I said before, the scoping decision, which defines what will be in the environmental document, that's the responsibility of the commission -- the commissioner of the Department of Commerce. He makes the decision on what should be in the scope. That scoping decision came out on November 14th. And, again, that scoping decision covered all three dockets.

The draft EIS, which again covers all three dockets, was developed by OES, the Department of Health had some input into it, and that was released on March 17th, '09. That brings us to tonight. Okay?

As I stated, we are here tonight to receive comments from the public on the draft environmental impact statement. If there are areas of the draft environmental impact statement that you think are deficient or areas that you would like to see more information added, that's what we're here to do, to get that input. And what we'll do is we'll have -- we'll have a comment period opened till May 8th. So you have till May 8th to get written comments to me, to my office.

Once the comment period closes, I will start working on the final. And basically what the final EIS is, it takes all the comments I receive of the draft EIS and I tabulate them, and then I respond to each one. And if a comment that we receive requires that there's a section of the EIS be beefed up or added to, we will do that. But what you'll get then is you'll get the revised environmental impact statement and attached to it will be a section that has every comment that we

received and our response to them. That response may be one sentence that the comment is out of scope, meaning the comment is outside the scope of the document, or it may be the comment resulted in us rewriting a section. It will refer you to that section within the environmental impact statement. So that's how that will be formed. The final environmental impact statement will be entered into the record during the contested case hearing.

So we're here tonight, the public meeting. You have until May 8th to submit your written comments on the draft EIS. Following the close of that comment period and as I start working on the final EIS, the public hearings, the contested case hearing will start.

The contested case hearing is held before an ALJ, administrative law judge. The administrative law judge assigned to this case is Richard Luis. He's already had two prehearing conferences to get the schedule down and to entertain parties or entities that wanted to become parties, official parties to the proceedings. But the hearing is scheduled for May 14th. And as I said, we'll have an afternoon session here in the library, and we will have an evening session at the

Prairie Island Indian Community.

Following the public hearing, there will be a comment period; and that's up to the ALJ to specify when that will be, how long that will be. It will be a minimum of ten days. Following that there will be the evidentiary portion of the hearing, contested case hearing. The evidentiary hearing is a hearing in which parties, those people who chose to intervene -- Prairie Island Indian Community, the City of Red Wing, and Xcel is obviously a party -- it's an opportunity for them to present evidence and testimony, just like the public hearing is an opportunity for the public to enter material into the record, question the applicant and their witnesses, and enter their statements into the record.

Once the evidentiary hearing closes, there will be a period that will be set by the ALJ for reply for briefs, reply briefs of the parties. And then the hearing will close. And sometime after that, to be determined, the ALJ will issue a report and recommendation. That report and recommendation will come back to staff with the record.

Staff -- staff -- OES staff will then write our comments and recommendations, which are

basically a history of the process, what we did, what kind of comments we got, the history of the pro -- a review of the record basically, and then our recommendations. And then we will present that in front of the PUC for a final decision, and that date's yet to be determined.

That meeting is also open to the public. It is up to the Commission whether they entertain input from the public or not at that meeting. So I can't really speak to that. But that meeting is also open to the public.

So that's the process that we've gone through up to this date and where we're headed to in the future.

Now, for those of you who are interested -- and you may remember this from our first meeting. If you're interested in what other people's comments are, what other agency comments are, if you're interested in some of the documents, be it the environmental impact statement or the scoping document, all that information is maintained on two websites. The first website up here is a website that OES staff maintains for the PUC. It's a PUC website, but we sort of refer to it as our website. We, the project managers at the OES for what you said down on the record, and we won't have any misunderstanding about what information you're trying to get at.

The last point I'd like to make is, again, we're here to take input on the draft environmental impact statement. So to the extent possible, I ask that you make your comments specific to the draft environmental impact statement.

And, as I mentioned, you have tonight to make oral comments into the record. There's also a comment period. The comment period closes May 8th. If you want to -- in addition to making oral comments, if want to put it down in writing where you can be a little bit more extensive on it, that's fine. I encourage you to do that. If you're not comfortable talking in front of people, it's fine just to submit me a written comment. You can e-mail your comments to me, you can snail mail your comments to me at the address there, and you can also -- a new feature that we have on that first website that I showed you, the first URL site there, when you go -- when you go to that docket page, which is the docket for the Prairie Island nuclear power plant, you will see that we've added a feature to the website that, for those dockets that have

Commenter 1 - Joan Marshman

Responses

open comment periods, you can make your comments electronically. You can log on and make your comment right there, and the system will send your comment to me via e-mail. So if you -- so if you want to -- you can comment that way, if you want.

But, remember, May 8th, close of business May 8th is the date for commenting.

And, with that, I'd like to get to the reason we're here tonight, and that's to hear what you have to say. What I'll do is I will -- like I said, I will go by the cards, call you up. Ray will hand you the microphone. Remember to state your name and spell it for the court reporter and then state your comment.

First on my card is Joan Marshman. Are you here, Joan?

MS. MARSHMAN: Yeah. My name is Joan Marshman, M-A-R-S-H-M-A-N. I am a Florence Township supervisor, and I did serve on the advisory task force.

1-1 And after reviewing the draft EIS for the Prairie Island request for uprate and additional dry cask storage, I feel there are many unanswered questions and concerns regarding the additional storage request.

The issue of permanency has long been a

Commenter 1 - Joan Marshman

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1-1

concern for many Minnesota residents and continues to do so. The federal repository at Yucca Mountain, Nevada has been a politically charged issue; and its future regarding acceptance of any nuclear waste is highly doubtful, to say the least.

The highest political office in the nation, along with Congressional support, has stated that the Yucca Mountain facility is not an option. Still, the draft EIS continues to assume and depend on the federal repository being the final resting place for Minnesota's high-level nuclear waste. You cannot assume or depend on something that will not happen in any foreseeable future. Minnesota must actively address how to safely and responsibly store the Prairie Island waste. It is unlikely that any federal repository will be available to accept any waste; hence, the Prairie Island ISFSI will become a permanent facility.

In 1993 the Minnesota Court of Appeals regarding the dry cask storage at the Prairie Island plant said, quote, The proposed facility is probably classified as one in which waste is permanently stored, unquote. The administrative law judge found it unlikely that the federal facility would be available to take waste from dry cask storage in the

Responses

Comment 1-1

As discussed in Chapter 2, Section 5.4, the only spent fuel storage scenario in accordance with current Minnesota and federal law is temporary long-term storage of spent nuclear fuel at the Prairie Island ISFSI until the storage casks can be transported to a federal repository. A federal repository remains a federal obligation. Uncertainty related to this obligation is discussed in Chapter 2, Section 6. Text in Chapter 2, Section 5.4 has been modified and supplemented to include information from the Yucca Mountain EIS applicable to long-term storage at commercial reactor sites.

Commenter 1 - Joan Marshman

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predictable future and that the facility is likely permanent in the sense that no -- it has no foreseeable end.

Permanent or long-term storage has much different sets of issues and impacts associated with them than does the 20- to 150-year storage term. The Nuclear Regulatory Commission has not done an EIS for long-term storage at the reactor sites.

The actual term of storage at the Prairie Island facility has not been determined, nor has there been any attempts to do so. We must enter into a careful, considered, and honest assessment of the current dry cask storage at the Prairie Island plant.

Since no permanent storage has been authorized, nuclear plants all across the country have been running out of spent fuel storage capacity space. Approximately 60 facilities have -- will have no more storage space in their spent fuel pools and will need to develop reactor site storage.

1-2 In 1994 Minnesota House Research information brief stated, quote, The state cannot prohibit storage from high-level radioactive waste from other states or other power plants at the dry cask facility at Prairie Island. Given the

Responses

Commenter 1 - Joan Marshman; Commenter 2 - Andru Peters

1-2

pervasive federal preemption of concerns related to high-level radioactive waste, it is unlikely that the state would be allowed to prohibit entry into the state waste generated elsewhere as long as the NRC has approved the facility and the transport of the waste, unquote.

The draft EIS depends on the Department of Energy taking title to the waste to go to the federal repository, whose funding is doubtful nor has it been licensed to accept anyway.

1-3

There is no assurances that the dry cask storage at Prairie Island will not become permanent -- a permanent facility, so we must consider all possible options and avenues available. The draft EIS must address all the storage issues, along with the fact that there is no federal repository for the waste to go to in the future.

Thank you.

MR. STORM: Thank you, Joan.

Andrew Peters.

MR. PETERS: I guess since I'm up front, I'll face the audience. My name is Andrew Peters. I am a council member of the City of Lake City. I also was a member of the advisory task force team and also on the Prairie Island study group.

Responses

Comment 1-2
It's unclear whether Minnesota could prohibit storage of spent nuclear fuel generated in other states. Such transport and storage would appear to be contrary to Minnesota law (Minn. Stat. § 116C.83, Subd. 4). The Department of Energy (DOE) and Nuclear Regulatory Commission (NRC) may have, under the Nuclear Waste Policy Act (NWPA), as amended, authority to preempt state law and require centralized storage of spent nuclear fuel at commercial reactor sites. Such storage would require modifications to current ISFSI licenses with accompanying hearings. See discussion in Chapter 2, Section 6.1 and associated DOE reports.

Comment 1-3
Text in Chapter 2, Section 5.4 has been modified and supplemented to include information from the Yucca Mountain EIS concerning long-term storage options, including the unavailability of a federal repository.

Commenter 2 - Andru Peters

My comments are going to be addressing specifically Chapter 4, Human Environmental Impacts, sub 4.9, Transportation. And I'm going to be citing a couple of Department of Transportation regulations and documents that the report was silent on. And primarily I want to talk about Code of Federal Regulations Title 49, Transportation, part 171, subchapter C, Hazardous Materials Regulations; part 172, subpart D, Marking; subpart E, Labeling; subpart F, Placards; part 173, subpart B, Preparation of Hazardous Materials for Transportation; and subpart I, Radioactive Materials.

There's been a number of discussions regarding Yucca Mountain. I was living in California, and I was heavily involved in the discussion period of the Yucca Mountain in the early 1990s. I'll be honest. I'm surprised the issue is still alive, because in 1995 the state of California and Nevada killed it because the transportation industry would not support it. Primarily, for those that don't realize it, every city, county, and state has to prove their route in all agencies. Emergency services agencies have to be equipped to allow that movement, whether it's by rail or by motor, through

Responses

Commenter 2 - Andru Peters

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the city with the appropriate forces. And that's why -- that's why I'm surprised that it's still an issue today. Maybe it's something that just keeps coming back, and hopefully they put pressure on Nevada and California.

At paragraph 172.2, No person may offer or accept hazardous materials for transportation in commerce unless the material is properly classified, described, package, marked, labeled, and in condition for shipping as required or authorized per this subchapter.

Looking at the Section 4.9, a good

2-1 overview of the transportation route's but nothing specific as what's happening. As a matter of fact, the one route that was detailed, I think in the second paragraph, has identified Highway 61 coming from Prairie Island/Red Wing down through following the Mississippi River to La Crosse -- Winona/La Crosse. That is a contradiction on what DOT has in charts, and I'll talk about that briefly. I did not see any reference complying with DOT standards, guidelines and, as far as that goes, Environmental Protection Agency.

Paragraph 171.3, paragraph 3 states, Delivers as designated on the entire manifest of the

Responses

Comment 2-1

The Scoping Decision signed by the Director of the OES on November 14, 2008 addressed the issue of transportation of spent fuel from PINGP. A detailed discussion of the issue was specifically excluded in that decision. Chapter 1, Section 1.1.3 of the EIS refers the reader to the National Transportation Plan for a detailed analysis of issues surrounding the transportation of spent fuel.

Commenter 2 - Andru Peters

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generator, the entire quantity of the waste received
from a generator or transporter. Nothing is said
how many casks are going to be moved. There are
three nuclear plants in -- on the Mississippi River.
Nothing has really been said on either three. Will
2-2 they be moving dry cask storage into the Prairie
Island facility? I've seen nothing on the
Monticello or the La Crosse plant on enhancing
storage capability. So I suspect the reason they're
going for 24 to 35 additional spots is to allow for
storage of casks from other sites traveling within
the state of Minnesota. And from the position of
La Crosse, that will be interstate commerce.
Paragraph 171.3, subsection D, states, If
a discharge of hazardous waste or other hazardous
material occurs during transportation and an
official of a state or local government or a federal
2-3 agency, basically in summary, needs to be notified
or protocol -- and I know the county of Wabasha has
no emergency service plans for a nuclear or
radioactive waste accident, and I don't think
Goodhue County has -- or does Goodhue County have
something on -- you're probably forced because of
the Prairie Island situation. But I know Lake City
does not, and I suspect Wabasha, Kellogg, and those

Responses

Comment 2-2
The storage of spent nuclear fuel at the PINGP is managed to facilitate the shipment of the waste out of state to a permanent or interim storage facility (Minn. Statute 116C.83, Subdivision 4, item a).

Total number of casks anticipated through 2034 operations and decommissioning is 98.

Current legislation (Minn. Statute 116C.83, Subdivision 4, item b) limits the storage of spent nuclear fuel to that generated by a Minnesota facility and stored at said facility. See response to Comment 1-2, which addresses the same concerns.

Comment 2-3
See response to Comment 2-1, which addresses the same concern.

Commenter 2 - Andru Peters

cities do not. So we have a hole there.

Paragraph 171.12(e) states, Radioactive material being shipped must meet IAEA regulations for safe transport of radioactive materials and as amended. The reason I said that is because my CFR is dated 1990, and I'm sure they have been updated.

Part 1034, Routing of Traffic, DOT allows

2-4

railroads to reroute trains in case of situations. And when you reroute, you're going to have counties and cities who are not on the regular route that you're going to have some issues. So that needs to be addressed.

On one of the maps -- let me go through the maps. It's important. Minnesota counties affected by truck transportation. Basically in this case it's Yucca Mountain or just intrastate within the state of Minnesota. This particular map shows no designated route from Hastings to Winona. The route is from La Crosse, Winona, to Highway 30 -- it looks like Highway 35 going north into the Twin Cities. That contradicts what's in Chapter 4.9 that you identified Highway 61.

Then on a state map that pretty much outlines the major routes, it looks like it was -- it looks like it's Interstate 80 for most of the way

Responses

Comment 2-4
See response to Comment 2-1, which addresses the same concern.

Commenter 2- Andru Peters

until you get to Salt Lake City, then it diverts down. But the state/federal highway system is very limited in how you move nuclear waste.

The last -- the last map shows the transportation routes, and they identified -- I'll have to attest, I don't know for what period -- but they show coming out of La Crosse, following I-90 to I-35, 37 casks into Albert Lea, down to Monticello 263 casks going down to Albert Lea, for a total of 300 casks. And that's a tremendous number of casks moving. And I know currently Prairie Island stores 24, and they're going to expand to 24 or more. But when you're talking 300 casks there and then for Prairie Island going via rail using Sioux Line going -- or actually now Kennedy Pacific going north to the Twin Cities then going south, they have identified in here 127 casks coming out of Prairie Island. So there's some discrepancy information, and I think they need to take a really good look on the transportation side, because -- and you will have to move nuclear waste, which is hazardous materials, and that type of thing. So I just want to make you aware that you need to take a look at that.

Thank you.

2-5

Responses

Comment 2-5
The total number of casks anticipated to support operation of the PINGP through 2033/2034 is 98.

Commenter 3 - George Crocker

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MR. STORM: Thank you, Andrew.

George Crocker.

MR. CROCKER: Thank you. My name is George Crocker, C-R-O-C-K-E-R. I'm the executive director of the North American Water Office.

3-1

I guess for starters I'd like to point out the inadequacy of this EIS in terms of environmental impacts that may result from breaking reactor parts or operator error. There is no discussion that I saw about what the consequences of such incidents might be or discussions of their probability or what mitigation strategies might need to be incorporated if such events were to occur.

But, beyond that, this document I think is extraordinarily inadequate in terms of its discussion of the consequences of routine radiation releases. You point out on page 82, I guess it is, that, you know, there will be one person in one and a half million that gets cancer or something like that.

I'm going to give you a document that was prepared by Rosalie Bertell, an internationally renowned physicist, nuclear physicist, public health expert. And her information calculates that with the operations prior to the uprate -- and the uprate

Responses

Comment 3-1

Text in Chapter 2, Section 5.4 has been modified and supplemented to include potential incidents and impacts related to continued operation of the PINGP through 2034.

Commenter 3 - George Crocker

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will expand these impacts by 10 percent or so -- why, for every year of nuclear operations at Prairie Island, we are committed to somewhere between 11 and 46 cancer fatalities over the next thousand years.

Your problem, in significant part, has to

3-2 do with the term of exposure. The term of exposure has to do with the period of time in which the radionuclides are radioactive. They don't end that at a 70-year period. And because of the insufficient methodology that you use to calculate the public health impacts, you create the impression that the impact is negligible. The fact of the matter is across this country we see rising incidents of a large number of disease symptoms with question marks behind them as to what is the cause. And the reason we have the question marks behind them is because we are very, very purposeful in not finding out. And this document is part of what you could call a conspiracy to continue keeping the public unaware of the causes, the exposures to radionuclides that can cause these disease symptoms.

3-3 Bear in mind that the National Academies of Science has stated categorically and unequivocally -- there was no discussion of the BEIR reports, the Biological Effects of Ionizing

Responses

Comment 3-2

The potential radiological health impacts discussed in the EIS are analyzed with proper exposure levels and a proper term of exposure. Three things happen to radionuclides released from the PINGP: (1) the gases and particulates are dispersed, (2) the particulates ultimately precipitate to a surface (e.g., land, water), and (3) they decay. The analysis by Dr. Rosalie Bertell (Analysis of the Cancer Deaths Attributable to Each Year of Operation of the Prairie Island 1 and 2 Nuclear Generators), correctly indicates that some radionuclides released during operations are long-lived. However, the analysis by Dr. Bertell is not applicable to the Prairie Island plant and this EIS.

The analysis by Dr. Bertell relies on reports issued by the United Nations (e.g., UNSCEAR 1988). The UNSCEAR reports, though well respected, specifically note that they are based on generic modeling and should not be applied to a specific power plant in a specific geography with known radionuclide release data.

Radionuclides released into the air by the Prairie Island Nuclear Generating Plant in 2006 are included in a table here. As indicated in the table, many of the radionuclides have relatively short half-lives (e.g., hours, days). As a rule of thumb, eight half-lives are considered to be sufficient to diminish radioactivity to a level below detection. Assuming no dispersion of the radionuclides, only Krypton-85, Cobalt-60, and Cesium-137 would likely be detectable after one year; most radionuclides would not be detectable after 90 days. However, dispersion does occur – Krypton moves throughout the atmosphere, Cobalt and Cesium move with the atmosphere until deposition. Thus, though there is exposure from these select radionuclides over time, the dose to persons from these radionuclides is substantially less than that estimated at the PINGP boundary, which is less than 0.01 mrem/yr. Sampling and monitoring by Xcel Energy, Minnesota Department of Health (MDH), and Wisconsin Department of Health Services (WDHS) indicates that there is no "build up" or increase in background radiation in the environment (see Chapter 1, Section 4.13). These programs are attuned to detecting radionuclides from power plant operations (e.g., Cesium-137).

Commenter 3 - George Crocker; Commenter 4 - Kristen Eide-Tollefson

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3-3 Radiation, that I saw. And I think, Mr. Storm, that not including the BEIR documentations in your document is unacceptable.

The National Academies of Science says there is no safe dose. The radionuclides that will be -- that are being and will continue to be released at Prairie Island will continue to be biologically active on into the distant future. Your document has an obligation to take that full impact into account.

Are you paying attention?

MR. STORM: I hear you, George.

MR. CROCKER: Thank you.

MR. STORM: Thank you, George.

Kristen.

MS. EIDE-TOLLEFSON: I'm Kristen Eide-Tollefson. And I followed -- oh, last name -- first name K-R-I-S-T-E-N. Last name Eide-Tollefson, E-I-D-E, hyphen, T-O-L-L-E-F-S-O-N.

I followed this -- creation of this document closely and the work of the task force very closely, which I -- 15 closely -- closely written charted concerns that were identified by the communities that the OES put together down here, the individuals, the communities who analyzed the issues

Responses

Comment 3-2 (continued)

PINGP Gaseous Radionuclide Releases, 2006

Radionuclide		Half-life	
Gases			
Argon-41	Ar-41	1.827	hours
Krypton-85	Kr-85	10.720	years
Krypton-85m	Kr-85m	4.480	hours
Krypton-87	Kr-87	73.600	minutes
Krypton-88	Kr-88	2.840	hours
Xenon-131m	Xe-131m	11.840	days
Xenon-133	Xe-133	5.245	days
Xenon-133m	Xe-133m	2.190	days
Xenon-135	Xe-135	9.110	days
Xenon-138	Xe-138	14.130	minutes
Iodines			
Iodine-131	I-131	8.040	days
Iodine-133	I-133	20.800	hours
Particulates			
Beryllium-7	Be-7	53.440	days
Cobalt-58	Co-58	70.800	days
Cobalt-60	Co-60	5.271	years
Cesium-137	Cs-137	30.170	years
Rhodium-108	Rh-108	35.360	hours

Comment 3-3

The National Academy of Sciences' Biological Effects of Ionizing Radiation (BEIR) VII report is discussed in Chapter 1, Section 4.13. Dose calculations throughout the EIS utilize the BEIR report's recommended linear no-threshold model, and cancer incidences are calculated using the BEIR report's suggested dose-to-risk coefficient.

Commenter 3 - George Crocker;
Commenter 4 - Kristen Eide-Tollefson

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and sent them on to be included in the environmental impact statement.

4-1

I've really had quite a bit of trouble just getting a handle on this document. The uprate is 90 pages long. The environmental review for the increased storage is 56 pages long. When I borrowed the original Prairie Island environmental impact statement to read it when the ISFSI was first cited here, I had to get a box and I had to haul three huge binders to my car, and it took me two weeks to go through all the material and all the details and all the information in it.

So I think that what I would like to do here is to just take three of the issues that were raised by the task force and to read aloud the treatments and the conclusions.

4-2

The first issue raised by the task force was stranded waste, the high-level nuclear waste that is at this point, because we have no Yucca Mountain, stranded on the banks of the Mississippi. Obviously communities and citizens, even legislators are wondering how long will the waste be here, what will we do if it's not moved, how will we keep it safe? And the storage pad and casking pool are not designed for long-term storage. So what does the

Responses

Comment 4-1
The EIS has attempted to develop a "thorough but succinct" discussion of alternatives and impacts (Minn. Rules 4410.2300). Several areas of text have been supplemented based on comments received on the draft EIS.

Comment 4-2
See response to Comment 1-1, which addresses some of the same concerns. Text in Chapter 2, Section 5.4 has been modified and supplemented to include information from the Yucca Mountain EIS and discusses the need for institutional control in order for ISFSIs to function as designed and protect public health.

Commenter 4 - Kristen Eide-Tollefson

EIS have to tell us about this?

In the discussion of the impacts on page 34 to 37, although there is uncertainty as to the storage alternatives that will be available in 2034, a likely scenario is temporary long-term storage -- that's actually a new phrase in my experience -- at the Prairie Island ISFSI until dry storage casks can be transported to a federal repository. Given the uncertainty as to when a federal repository will be available to accept casks, this document assumes for analysis purposes only that the casks will be at the ISFSI for up to 200 years. And assuming that regular monitoring and maintenance continue, radiological impacts will be -- for up to 200 years will be within NRC regulatory limits and would not be significant during normal operations.

Then there's a general discussion that time is a consideration for the risks related to the handling of casks. But once they're on the pad, the EIS notes, they won't be handled. Now, perhaps we're looking for statistical analysis of the radiological effects. This is what we have:

Current analysis indicates that the risk of radiological impacts from these events is small. If emergency measures, planning measures remain

Responses

Commenter 4 - Kristen Eide-Tollefson

effective into the future -- we're talking 200 years at least -- and if we assume they remain relatively constant over time, then multiplying the risks over an additional 200 years will not make them significant. That's your statistical analysis.

And then -- then we go to the NRC's analysis, which proposes that the dry casks can be safely stored until at least 2094, which I will note is not 200 years. NRC -- the EIS says that the NRC notes that there are no technical limitations for safe storage. And perhaps if you're looking for an analysis of what the technical limitations discussion might be, we are out of luck because that is outside -- that's one of the many, many things outside the scope of this environmental review.

So the conclusion is -- just a second, I have one more piece on that -- this is the extent of the analysis of the design of the casks. The minimum design life for the TN40 series of transnuclear casks is 25 years. However, due to the passive nature of the dry storage casks and the robustness of the components, it is anticipated that the ISFSI could physically be operated for several hundred years. Now, this is a conclusion that has absolutely no documentation in the -- in the record

Responses

Commenter 4 - Kristen Eide-Tollefson

and is in stark contrast to the conclusions of the draft environmental impact statement for Yucca Mountain, which is fairly extensive. And I think that one of the important things that we need to realize is that if there is no Yucca Mountain, then the storage at Prairie Island is an ad hoc no action alternative.

Let me then summarize the position of the EIS on a matter of concern to us all. This is temporary long-term storage. Assuming regulatory monitoring and maintenance, they will be okay up to 20 years if you don't touch or move them after 50. And NRC says they can be stored safely at least until 2094.

In the EIS for Yucca Mountain, the no action alternative is based upon extensive engineering studies that support the analysis, and these extensive engineering studies outline three major factors that increase or affect the risks of long-term at reactor site storage. One is the amount of and exposure to precipitation. Two, the freeze/thaw cycle. And, three, proximity to human populations and other sensitive biological systems, which I would say the Prairie Island Indian Community, Red Wing, and the Mississippi River rate

Responses

Commenter 4 - Kristen Eide-Tollefson

36

quite high.

The Yucca Mountain DEIS notes that existing storage facilities could begin to be compromised as early as 50 years and should be replaced within the first 100 years and every hundred years thereafter.

4-3

The second item that I'd like to address is the issues identified in the task force recommendations for the EIS that have to do with the psychological and social and economic impacts of living near a nuclear plant. Of course, the Prairie Island Indian Community has been attempting to communicate to regulators, legislators, and federal agencies for many years the difficulties and effects of living this close. And the cumulative effects of the proposed actions of uprating, extending -- relicensing the plant and extending storage are a concern of all neighboring communities. There was a psychologist on the task force who was specifically interested in helping to address these concerns. What does the EIS have to say about psychological impacts?

I'm sorry, I'm shaking a little. It makes it harder.

Okay. The analysis is 20 lines long in

Responses

Comment 4-3
OES-EFP staff believe that an assessment of the psychological impacts of the proposed projects to the surrounding communities would require time and resources that are outside the scope of environmental review. A peer reviewable assessment of these impacts is not a simple "data mining" of information from other social study data, but must be designed and implemented with purpose in mind.

Commenter 4 - Kristen Eide-Tollefson

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the middle of page 57. DES staff conducted a literary search in an effort to obtain information on the potential psychological impacts associated with living near a nuclear generator plant. The vast majority of articles dealt with post-incident surveys, after Chernobyl or something has happened. Then the EIS briefly states that the phenomenon that there are often higher levels of support for nuclear power near a plant, particularly for those who benefit from it, and -- but it also acknowledges that even where there's support or acceptance, there is sometimes underlying unease.

Then the EIS refers the reader to do their own research and gives three studies from a British study that may be of interest, and it concludes: Considering the comments received during the site permitting process for the Monticello nuclear generating uprate versus the public comments expressed during these proceedings, it would appear that assessing the potential psychological impacts of a given facility at its host community would be very specific to each community. Good observation. To adequately assess this impact would require a level of detail, i.e. basic research, that is, again, outside the scope of this study.

Responses

Commenter 4 - Kristen Eide-Tollefson

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4-4

I have only one more, and that is that one of the things that has been of the greatest ongoing discussion among the task -- people who served on the task force and then those of us who have continued to get together and study these issues is that people are being asked to live with a number of uncertainties and multiple interacting affects of the uprate, extending storage, and extending the term of storage. And I think that the requests that are being made and that have been put on paper in the Prairie -- in the Red Wing Resolution that several of the other communities are also considering are not unreasonable requests. They take into consideration that we're all living here together and we have to live with each other and we will be living with each other and we will very like have a nuclear plant in the community, but the fact that -- but what has been requested is a number of -- is a number of considerations around mitigations that have to do with monitoring, knowing where the plume goes, the plume for the thermal -- the thermal discharges, for the emissions discharges.

But we're discussing the EIS, and so I'm going to read you the only treatment of mitigation

Responses

Comment 4-4
Text has been added as Chapter 2, Section 8.0, describing unavoidable impacts and mitigation for the proposed expansion of dry cask storage.

The EIS does not recommend permit conditions, but rather provides information on potential impacts and identifies uncertainties to facilitate a thorough consideration of whether or not the proposed project is permittable by the Minnesota Public Utilities Commission and other appropriate state agencies, e.g., Minnesota Department of Natural Resources, Minnesota Pollution Control Agency. Whether additional monitoring or other mitigations are appropriate permit conditions is a determination to be made by these agencies.

Commenter 4 - Kristen Eide-Tollefson

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that I could find -- now, I might have missed it -- the only treatment of mitigations that I could find in the EIS. It's under 5.0 on page 90.

Unavoidable impacts in mitigation. The primary impact of the proposed uprate, I'll use, is an increase in the temperature of the circulating water leaving the main condenser due to an increase in thermal output. Cooling water discharge temperature will be maintained for increased use of cooling towers or other methods. Thermal discharge will remain within the limit. No change in permitted water appropriation is needed. The proposed uprate will also increase gaseous radionuclide emissions but will not measurably change the maximum projected annual offsite radiation dose. In other words, there are no recommendations -- recommended mitigations or even listing of mitigations recommended by the task force.

4-5 And so I will -- I will conclude my remarks with a request that the -- that a number -- and I'll turn that -- this in a written form -- of two things. One, that we recognize that the failure -- that the EIS recognize that as we now have a failure of the only federal storage option

Responses

Comment 4-5
See response to Comment 1-1, which addresses the same concerns.

Commenter 4 - Kristen Eide-Tollefson;
Commenter 5 - Roger Cuthbertson

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4-5 that we had, that this constitutes a major change of circumstance for the -- for the Prairie Island reactor and those of us who live near it and that this change of circumstance warrants a different look at the options that -- for storage, for

4-6 technology before us; and it also warrants another look at the decline in energy demand and the necessity of the uprate, which --

So thank you for your great patience.

MR. STORM: Thank you, Kristen.

Roger Cuthbertson.

MR. CUTHBERTSON: I am Roger Cuthbertson, R-O-G-E-R. C-U-T-H-B-E-R-T-S-O-N. I have no official capacity and not been a part of any study group. I'm a citizen and a concerned citizen. I want to say just as an aside, as a concerned citizen, there is another issue being brought before the public by Xcel Energy, and it's the rate increase. And I would just like to say in these hard times, it's troubling to have to face a rate increase. And I would just say to Xcel Energy, if they need to do -- if they absolutely have to do a rate increase during these hard economic times, why not have smaller rates for people that don't use very much electricity because they can't afford to

Responses

Comment 4-6
Analysis by the Office of Energy Security, Energy Regulation and Planning unit (OES-ERP) indicates that the extended power uprate (EPU) is the least-cost alternative by at least $435 million; therefore, the EPU results in the least-cost system.

OES-ERP analysis notes that considerations of recent declines in energy demand are not relevant. While the economy is currently experiencing a recession, recessions have occurred in the past. Thus, the effects of typical recessions are already included in the forecast process through historical data. OES-ERP analysis of the EPU included a scenario with no growth in either capacity or energy requirements between 2008 and 2034.

Commenter 5 - Roger Cuthbertson

have one of these humongous houses that uses up so much energy. So I would just suggest some kind of sliding scale. But that's -- I know that's a little bit off the topic. I'm sorry.

My hat says stop -- stop nuclear power. And I really -- that's where I come from. I don't think we should even have to be here today because it was about 15 years ago when there was quite a public outcry about the idea of having casks in the first place. It wasn't that casks weren't better than the storage pools, which are just an accident waiting to happen, but we -- we somehow knew that these casks would not be the answer. And even at that time they were talking about Yucca Mountain that's going to be this permanent repository for nuclear waste. And this has been the promise ever since nuclear -- the nuclear industry forced it upon us, that science was going to come up with an answer to the waste problem, and it still hasn't. And shamelessly they're before us again asking for help when the legislature in 1994 or shortly thereafter said, okay, we'll give you the casks but only -- this is -- this is just a one-time deal; you can't have any more; and if -- and this is -- and that's it. And even the legislature got into the act.

Responses

Commenter 5 - Roger Cuthbertson

And, of course, they've already violated their promise. That's another promise not kept.

Nuclear energy seems like such a good deal. I mean, you don't see any smoke coming out of stack and it seems cheap. But it's a false-end deal because it's extremely dangerous. And it's extremely immoral, in my opinion, because what it does is it let's us have our electricity and party up and let's use it up now and we don't have to pay the price; but the people that follow us, our children and our children's children and our children's children's children, on and on, for thousands of generations pay the price for our use of electricity today and our refusal to con -- our refusal to conserve or to find -- or to follow -- or to investigate other methods of producing electrical power like wind generation, which is my -- would be my favorite.

Nuclear, the -- the lady before me that spoke -- I can't remember your name. But the matter of asking for more power generation, this is dangerous. More heat, more fuel, higher temperatures, more threat to the wildlife and the rivers, more chance for accidents. And we know that accidents will happen. More routine emissions of

Responses

Commenter 5 - Roger Cuthbertson

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the radioactive substances that are causing cancer and causing birth defects in human beings and affecting the wildlife too.

What's in those casks is very dangerous. We're talking about stuff that has to be kept completely out of the environment and out of reach of animals and people for thousands and thousands of years. In those casks are such things as amounts of even plutonium with a half-life of 24,000 years. I mean, think about it. Are we going to -- I mean, we're going to enjoy this electricity today and then have people for not just 24,000 years, multiply it times 10, two hundred -- 240,000 years taking care of our waste? I mean, it's like having a party on Saturday night, having people clean up after your party for 35 years. It's crazy. It's -- it's just immoral, in my opinion.

5-1

Like let's go back to plutonium. I've heard it said that it's like 2 million times more deadly than cobra venom. So after 24,000 years -- and, mind you, human history is only 8,000 years. After 24,000 years, oh, boy, it's only going to be 1 million times more deadly than cobra venom. This is not the route we should be taking. And the casks and these substances aren't just dangerous and

Responses

Comment 5-1
Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 5 - Roger Cuthbertson

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aren't just dangerous in a long lasting way, these substances are corrosive and hot and chemically toxic. And these casks -- these casks are not going to Yucca Mountain because Yucca Mountain is not ready. It probably never will be. Somebody's going to have to change those casks, take the material out of those casks and put them in a new cask. You want to be a part of the labor force doing that, working in these kind of conditions? I wouldn't want that job. You couldn't pay me enough to do this. And how many times do they have to change the casks? How many times is this going to happen? Hundred times? Thousand times? What do you think the workers donning their outfits to try to keep them -- keep their health halfway safe are going to be saying -- in the year 11,000 are going to be saying about their job of cleaning up casks so that people -- you know, that -- they can't even read about it anymore in history books because it's so long ago -- enjoy their cheaper electricity?

I don't know. Maybe I'm rambling here, but I just -- I just think we should -- we should not be doing this. What we should be doing is thinking about these casks. Let's take a good look at them. They might need changing already. Start

Responses

Commenter 5 - Roger Cuthbertson

thinking about that. Start thinking about alternatives. Put our money into wind power, biomass, other things. I -- I know it's very tempting to -- especially with global warning -- warming, to go nuclear; but at least with global warming, you -- at least with coal, using coal from coal plants, the effects that are produced are witnessed by the people that create -- that use the electricity, and they can see the changes happening before their eyes, and they can do something about it to turn around their actions. But with nuclear power it's so easy to use this power today and not worry because the effects are -- the deleterious effects to humans and animals is put off to the far distant future, on and on and on. And it's just -- it's -- it's not a -- it's like a deficit spending of the worst order is what I think, using nuclear power. And I just hope we don't -- I hope we don't do this. We should not.

I thought we had a deal before. I was protesting against the casks in 1994. Like I say, I did agree that the casks were better than the storage pools. I mean, the water goes out of the storage pools, it's volatile, you've contaminated hundreds and thousands of square miles. It just

Responses

Commenter 5 - Roger Cuthbertson; Commenter 6 - Michelle Meyer

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takes one little thing, you know. But -- the casks are better than that, but the casks are not a solution either. They were never meant to be a permanent solution. And we're going to end up with a permanent mess, I'm afraid, if we go this route.

MR. STORM: Thank you, Roger.

Okay. That's everybody who's preregistered to speak.

Is there anyone who would like to take the opportunity to speak now?

Please state your name and spell it for the court reporter.

MS. MEYER: My name is Michelle Meyer, M-I-C-H-E-L-L-E, M-E-Y-E-R. I am a new member of the Red Wing Sustainability Commission. And I've just received this EIS report tonight, so I haven't had a long opportunity to go over it. I do have some immediate questions, though, that I would like to see further explored.

6-1 I'm not clear on who created this report. So initially when I'm reading it, it seems to me that what I'm seeing is a report about why nothing else is possible except nuclear, and to me that's completely unacceptable.

One thing that I do see in the report on

Responses

Comment 6-1
The list of preparers appears on page ii of the EIS. A discussion of alternatives to the proposed EPU appears in Chapter 1, Section 3.0 of the EIS.

Commenter 6 - Michelle Meyer

page 34 under Alternative Energies, there is conversation about wind turbines. And it says that if wind turbines can help meet overall system energy needs. It seems to me that that's really all we're asking for or you're asking for. You're asking to increase your output. I'm unclear as to why that needs to happen as well. Maybe that's stated somewhere within here, and I haven't seen it yet. But I'm completely unclear as to why we need to increase our energy output. But if wind turbines can help meet our overall system needs, I would like to see further exploration as to how that can happen.

6-2

Some years ago there was a wind energy test done near the high school, and the land near the high school is noted as being a perfect spot for wind generation. And so, again, we have a spot. I think we need to explore that.

Also, it says wind generation must be coupled with other technologies or resources. We already have that. You are already here. I don't see the need to expand.

So I think it's important, before moving forward with expansion of a system that is highly flawed, that we look to something or explore

Responses

Comment 6-2
A discussion of the use of wind turbines as an alternative to the proposed EPU appears in Chapter 2, Section 3.4.2 of the EIS.

Commenter 6 - Michelle Meyer; Commenter 7 - Katie Himanga

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something that has no consequences, that has no toxic waste and no emissions. No need to pour hot water into our river that is already flowing during the winter unnaturally.

6-3

So I guess I -- the other -- the other point I'd like to make is it's my understanding that Xcel Energy receives money from the government to explore these technologies. And I'd like to see that money put to use, you know, in order -- if we need to increase our energy capacities, isn't that where it's supposed to be going towards? Aren't we supposed to be looking at our alternatives? Why are we even looking at a third generator and looking at further storage? The licensure was supposed to end. This is stuff that's supposed to have been taken care of already. And I want to know why -- why we even -- why we have this and why we're not exploring those alternatives.

Thank you.

MR. STORM: Thank you.

Anyone else?

Please state and spell your name for the court reporter.

MS. HIMANGA: My name is Katie Himanga. Katie is spelled K-A-T-I-E. Himanga, H-I-M-A-N-G-A.

Responses

Comment 6-3
As a general rule, Xcel Energy does not receive federal funds for alternative energy research and exploration. However, from time to time the company may apply for federal grant funding for specific research/ demonstration projects. These could include specific projects such as Xcel Energy's IGCC project in Colorado or seeking federal stimulus funding for a Smart Grid project. Applications for stimulus dollars are due the end of July 2009.

Commenter 7 - Katie Himanga

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Resident of Lake City and the former mayor of Lake City. Many of the speakers who preceded me shared comments. I would second their comments, especially concerns about the storages of nuclear waste on Prairie Island for what appears to be an indefinite period of time.

7-1

But I want to make just a few comments very specific to the EIS, some things that I offer for your consideration. In Chapter 1, page 36 and on Table 3.2, you discuss carbon emissions from a variety of different electricity-generating plants. And unless it is not already, it is my opinion that that should reflect life cycle carbon dioxide emissions and not just emissions at the plant site.

7-2

Then for Chapter 4.2, on page 47, in discussing fish population, the remark is included that it looks -- that it looks like fish populations -- the current fish populations look much like they did in the 1970s. And I would offer that the 1970s might not be an appropriate baseline or benchmark for fish populations. As I recall, in the 1970s the river was still very much polluted by -- from a number of factors. And I would offer that a pre-World War II benchmark is more likely appropriate.

Responses

Comment 7-1
The November 14, 2008, Scoping Decision signed by the Director of the OES specifically excluded the impacts of the nuclear fuel cycle; a description of the nuclear fuel cycle appears in Chapter 1, Section 1.1.4 of the EIS.

Comment 7-2
In its October 7, 2008, letter to the OES-EFP staff, the DNR stated that, while the operation of the PINGP has resulted in some fish redistribution towards the warm water plume during the winter, the monitoring conducted by Xcel Energy and the Wisconsin and Minnesota DNRs has not detected any substantial negative effects on the fish community to date.

Commenter 7 - Katie Himanga

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7-3 In Chapter 4.2 on page 47 it mentions chlorination as being an identified problem associated with the plant, but it doesn't offer any solution.

And then two things that are a particular -- particular interest to me, in Chapter 4.6 on page 64 it describes the locations of various parks and so on. 7-4 It mentions play grounds in the city of Red Wing, but it does not make mention of play grounds or ceremonial grounds that are on Prairie Island and part of the Prairie Island Indian Community, and I would ask that they be included so that it is more complete.

And then also in -- I apologize, I don't have the chapter reference here. 7-5 But in talking about cultural resources and so on, you have included some maps and some inventories and so on, but nothing is offered for mitigation of the impact of disturbance of burial grounds or other sacred grounds. And I would offer that religious traditions, including my own, have strategies for the blessing and restoration of desecrated sacred places. And can't we bring some of this to the Prairie Island nuclear generating plant?

Thank you.

Responses

Comment 7-3
The text in Chapter 1, Section 4.2-*Thermophillic Organisms and Pathogens* has been modified to reflect these concerns.

Comment 7-4
The text in Chapter 1, Section 4.6-*Recreational* has been modified to reflect the subject facilities.

Comment 7-5
The activities associated with the proposed EPU will not include any work performed outside the footprint of existing buildings; no impacts to archaeological artifacts are anticipated. Construction activities associated with the request for additional dry cask storage will occur within the existing ISFSI; no impacts to archaeological artifacts are anticipated.

Commenter 7 - Katie Himanga; Commenter 8 - Michael Childs Jr.

MR. STORM: Thank you, Katie.

Anybody who hasn't spoken want to speak?

Yes, sir.

Again, state your name and spell it for the court reporter.

MR. CHILDS, JR.: Michael Childs, Jr. M-I-C-H-A-E-L. C-H-I-L-D-S. Junior. There's a couple things I think were omitted in this draft EIS pertaining to both parts, the cultural, archeological, and historic resources. It came to my light last October that -- well, I'll give you a history so you know who I am. I worked at Prairie Island for 12 years as an Xcel employee. Also I'm a tribal member, just so you know. So when I found

8-1 out about some desecration of burial mounds, which doesn't seem to be added since -- since the, you know, last fall when we went through this stuff. I guess I kind of wonder why it wasn't added. Xcel Energy knows. I have a piece of paper here that I'll give to you that shows the fact that during construction of the plant that burial mounds were desecrated. And being an employee at the time of this discovery process -- this is 40 years ago during construction of the plant when some ancestral, you know, burial artifacts were removed,

Responses

Comment 8-1

Aerial photographs prior to plant construction indicated heavy cultivation of much of the potential plant site. Acknowledging the possibility of mounds and archaeological sites in the construction area, Xcel Energy provided funding to the State Archaeologist to conduct an investigation and excavation of mounds. This work was completed in accordance with acceptable archaeological practices at the time. All archaeological activities were conducted under direction of the MN State Archaeologist. The University of Minnesota (and currently the Minnesota Historical Society) house the artifacts excavated.

The mortuary artifacts and human remains excavated from mounds in the 1960s under the direction of the MN State Archaeologist were inventoried at the U of M (and MHS) and are currently undergoing the repatriation process.

Commenter 8 - Michael Childs Jr.

that basically Xcel violated some of their own procedures, diversity and code of conduct procedures. So, you know, as far as -- that kind of ties into health and safety, when you go to the psychological impacts and socioeconomic impacts of both the ISFSI and the extended power uprate because, okay, they lied to their employee, which was me -- and I had uncles and brothers and sisters that worked there -- that, you know, this lack of trust -- there's tribe -- tribal members already

8-2

have a lack of trust of NSP and Xcel, whereas this ties into that socio -- sociology and the psych -- you know, the psychology because -- because after this was brought up during a tribal council quarterly meeting that this happened, the trust level of Xcel Energy is even less now. Now, that wasn't mentioned anywhere in your psychological impacts associated with either one of these, you know. And it kind of goes back again to the socio -- social aspect of it, which is when the plant was built, the Prairie Island Indian Community didn't have any money. And even though it's not said anywhere, it is rather implied that the placement of the plant and along with this desecration that was found out last fall, there's no

Responses

Comment 8-2
Thank you for your comment. It has been noted and included in the record for the EIS.

Commenter 8 - Michael Childs Jr.; Commenter 9 - Lea Foushee

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mention of it. There's no mention of, you know, the betray of trust between NSP/Xcel and the tribal community and, like me, former employee.

So I just thought -- I thought both sections needed -- needed that to show that. And I got some stuff I'll give to you, Bill.

Thanks.

MR. STORM: Thank you.

Anyone else who hasn't spoken?

Okay. Andrew, you want to --

Lea. Sorry. Lea, you want to speak?

MS. FOUSHEE: Yes, please.

MR. STORM: Please state your name and spell it for the court reporter.

MS. FOUSHEE: My name is Lea Foushee. L-E-A. Foushee is F, like Frank, O-U-S-H-E-E. I would just like to support the statement of Mr. Childs because during the monitored retrievable storage contract, my organization worked for the Prairie Island Tribal Council. And I contacted the Minnesota Historical Society, and they provided me with a map and a diagram, and they circled the burial mounds that NSP destroyed. And so I as well have a copy of a map that shows those desecrations, and I provided it to the tribe at that time, which

9-1

Responses

Comment 9-1
Thank you for your comment. It has been noted and included in the record for the EIS.

Commenter 9 - Lea Foushee; Commenter 10 - Michael Childs Sr.

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was before the 1994 process began.

Thank you.

MR. STORM: Thank you, Lea.

Sure.

MR. CHILDS, SR.: I'm Mike Childs, Sr. M-I-C-H-A-E-L. C-H-I-L-D-S. Senior. I'm the proud father of Mike, Jr.

Anyway, I was -- I served two terms on the Prairie Island Tribal Council. It was during the 1994 dry cask storage debate. It was my pleasure to serve with George Crocker in his position then, too. But, yeah, I just wanted to bring to light that it was the purpose of our event to create the alternative energy sources such as wind power and that -- what difficulties that we had met as opposition from then Northern States Power. And they said that -- stated the impossibilities of sustainable energy from wind energy, as this young lady brought up in the statements she outlined. And -- and it was so unusual and comical how someone stood up and said that at that time in the nuclear power industry there had been no death in building or operating nuclear power plants and how at that time someone constructing a wind generator had been killed because there was ice buildup on the

Responses

Commenter 10 - Michael Childs Sr.

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propeller. And so wind generators were supposedly more deadly than nuclear power at the time.

But kind of getting back to the thing that, you know, the casks, they can't be moved in their current position. There is no transportable dry cask built as of date. And so even if there were a federal repository, there is no way of getting it there. And as this young man mentioned here about transportation, you know, the complications of transportation are just outrageous. The only thing I can under -- figure out is if we could get somebody to build a rocket that would shoot it up and land it right on Yucca Mountain. Maybe that's what they were designed for.

10-1

But it's unusual -- I mentioned in front of the Minnesota legislature at the time that it's -- it was very unusual that they had built the pads to accept 48 casks and they were applying for -- it was 14 or 16 casks at the time. And when you see it apply to the PUC for rate increases, they're always three -- they ask for three times their -- the rate they really want so when it is accepted that they get the rate that they actually wanted to begin with.

So I just wanted to remind people that

Responses

Comment 10-1
The NRC reviews and licenses spent nuclear fuel casks for transportation under 10 CFR 71. See text in Chapter 2, Section 2, describing timelines for licensing of the Transnuclear TN-40 and TN-40HT casks for transportation.

Commenter 10 - Michael Childs Sr.

56

10-2

that's what we're dealing with. And they're such a powerful force that I don't know how we can defeat them. But that's just the way it is. I mean, like Mike had mentioned, we were a very poor community. You know, it's unusual that at that time Red Wing annexed us. We were Burnside Township at the time, and Red Wing included us in their border. Between the time that they had this property and it was -- it had high value and they were supplying taxes to the city of Red Wing, there were no schools built. Once the plant was devalued and taxes that they were subject to were gone, we built Burnside School, elementary school and high school. And then, of course, the burden comes on to the taxpayer. And I especially notice in mine, because I built my original house in 1978 and I moved in in 1980. And every year subsequent to 1980 I had a 22 percent increase in property tax. And I don't know, it just -- it's sickening. I think these kind of things have to do with the psychological impact on people.

Thank you.

MR. STORM: Thank you.

Gentleman in the back who hasn't spoken before, you --

Responses

Comment 10-2
Thank you for your comment. It has been noted and included in the record for the EIS.

Commenter 11 - Susan Johnson

57

MS. JOHNSON: I am a female.

MR. STORM: Yes.

MS. JOHNSON: My name is Susan. Of course there is a boy named Sue, I guess. Susan, S-U-S-A-N. Johnson, J-O-H-N-S-O-N. And I just have to say I really appreciate seeing all these people here tonight. As a local, it's nice to see a lot of new faces on this issue as well as the old ones that have been working on it for a long time.

Back in the early '90s I had that EIS for that dry cask storage proposal probably memorized. But this is new to me, just receiving it tonight. I'm surprised at the request for additional dry cask storage, being the president of the United States has kind of condemned Yucca Mountain. And as Ms. Eide-Tollefson said, that term temporary long permanent -- what was it, permanent long-term storage is interesting to think about for our community to have in the backyard.

11-1 I have concerns also, as Mr. Crocker here, with the BEIR reports, the BEIR reports not being included, and would like to see those looked at closely.

Ms. Meyer points out things such as why are they asking for increase in power? I've never

Responses

Comment 11-1
See response to Comment 3-3 which addresses the same concerns.

Commenter 11 - Susan Johnson; Commenter 12 - Andrew Peters

58

11-2

heard that explained. And why is it necessary? I don't quite understand that. And as well as the need for looking at more alternative energies rather than increasing that.

11-3

I do have a fear that when you allow more dry casks, we all know the health issues concerned with that and the issue of the nuclear power plant becoming older as it's looking for relicensure.

And I'll leave it at that. Thank you.

MR. STORM: Thank you.

Anyone else who hasn't spoken?

Okay. Andrew, you can have your second shot.

MR. PETERS: Thank you, Bill. I would like to expand on Mayor Himanga's remarks on benchmarking data. And I want to address Section 4.11, Water Resources, specifically the section on Lake Pepin. I think Mayor Himanga is right, you should be -- on Table 4-5, you show ice sectors from 1999 through 2008, which is good. And I concur with

12-1

Mayor Himanga, let's go back to 1940 to 1955 and look at ice thickness. And the reason I'm concerned about ice thickness, I think if you remember from the task force, I was very vocal on it. Lake City dies during the winter months, and back in the '40s

Responses

Comment 11-2
See response to Comment 4-6 which addresses the same concern. A discussion of the use of alternatives to the proposed EPU appears in Chapter 1, Section 3.0 of the EIS.

Comment 11-3
Thank you for your comment. It has been noted and included in the record for the EIS.

Comment 12-1
The text in Chapter 1, Section 4.11-*Lake Pepin Ice Cover* has been modified to reflect these concerns.

Commenter 12 - Andrew Peters

and '50s we depended on the lake for economic vitality. And I will give you a compare and contrast.

I can remember the 1940s. I was amazed the state of Minnesota, MnDOT, another sister agency, created a temporary road sign, temporary three -- I think it was 395 across Lake City to Stockholm, Wisconsin. Lake City would furnish a dump truck loaded with sand and gravel with a snowplow and plow the road out after every snowstorm. I defy you to see a snowplow going across the lake in the last couple of years. I can remember as a kid, I marveled at 25 to 45 headlights going across the lake. This last year we had three to five vehicles that went through the ice on Almere Shore. I can remember ice fishing villages off of Sandy Point, which is the Villa Maria area, 50-plus icehouses. Central Point, 50 to 75 icehouses. City Point, 50 to 75 icehouses. Russian Park, 50 to 70 icehouses. Breeze Landing, 50 to 75 icehouses. Today in all those areas, I'd be willing to bet you'd find ten. We used to have an ice fishing contest which would average anywhere from 400 to a thousand people on the ice. They can never do that. So Lake City has been impacted significantly

Responses

Commenter 12 - Andrew Peters

economically in the winter months because of water discharge. I think in the IS task force, I think they did come out -- Xcel did come out and say yes, we were given authority to raise the water temperature of water discharge on the river, and that has never changed. And I think the discussion -- and on the task force we indicated with more storage charges it's going to take more water, and there will be additional, you know, water. But, again, I think you need to look at data and compare contrast. I know the Corps of Engineers probably back then kept the data. I don't think DNR was even an entity back then. But I think you need to look at compare and contrast, because I know especially the City of Lake City, we've been economically impacted after the nuclear plant went up, because before that we've had no problems. So I'd just like to add that.

I'll put that in writing and also get it in your hands too, Bill.

Thank you.

MR. STORM: Thank you, Andrew.

Would anyone else like to speak tonight before we adjourn?

Kristen, you want a second?

Responses

Commenter 13 - Kristin Eide-Tollefson

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MS. EIDE-TOLLEFSON: Thanks. One of the alternatives that was raised in the course of the study -- or the task force was the hydrokinetic power project that is the first one that has been permitted up in Hastings. You pretty much dismissed those at some point, and I would like to see that brought back in. I've been doing a little more research. Those are all being -- in the permitting process. It's not like they're ten years out. And Xcel is the utility that would be purchasing power from that alternative. So I would like to request that that not be scoped -- or not -- that that be included in the alternatives. I don't know if that's possible technically.

13-1

I -- I have to say I have tremendous admiration for the level of efficiency with which OES has amalgamated, conducted, and executed its duties so far. But I think that there is also something missing in that I think the fact that we have, you know, three meetings totally to discuss this and be part of this as a community on all three of these dockets is really challenging. It's very challenging. And I think that it would be important -- I'm going to spare everybody reading it. But under our environmental policy statute, the

Responses

Comment 13-1
A discussion of the use of hydrokinetic units as an alternative to the proposed EPU appears in Chapter 1, Section 3.4.2 of the EIS.

Commenter 13 - Kristin Eide-Tollefson

direction to the state agencies is -- no, I'm going read a couple of them. The direction of the state agencies is really much more than to just be efficient with its own resources. It's to protect the resources of the state through utilizing a systematic interdisciplinary approach that ensures the integrated use of the natural and social sciences in planning and decision making, identifying and developing methods and procedures that will ensure that all values environmental, whether quantified or not, will be given equal consideration, to study and develop and describe appropriate alternatives to recommended courses of action, to initiate the gathering and utilization of ecological information, and to undertaking contractor funds research as is needed in order to determine and clarify effects.

So I think that the -- that given the fact that this plant is likely to be with us at some time, there is a great need for this environmental impact statement to do more justice to the kind of concerns that the community has and the psychological, sociological, and long-terms affect of the uncertainties. And I don't know how you would do that. That's really a huge challenge.

13-2

Responses

Comment 13-2
See response to Comment 4-3 which addresses the same concern.

Commenter 13 - Kristin Eide-Tollefson

It's been a challenge at thinking about it. It's been a challenge all this time. And I respect how challenging that is. But I would suggest that it's essential, given the changed circumstances, the fact that we no longer have any kind of permanent repository.

Thanks.

MR. STORM: Thank you, Kristen.

Anyone else who hasn't -- anyone, I guess?

Okay. I want to remind you that written comments need to be submitted to my attention by the close of business day on May 8th. And, again, you can mail them to me, e-mail them to me, or use our electronic commenting feature that we've added to the website.

Other than that, I'd like to thank you for coming. And my cards are on the table if you need to chat with me. Please feel free to give me a call. Thank you.

(Public comments concluded.)

Responses

Commenter 14 - Xcel Energy

Xcel Energy®

414 Nicollet Mall
Minneapolis, MN 55401

May 8, 2009

Bill Storm
Minnesota Department of Commerce
85 7th Place, Suite 500
St. Paul, MN 55101-2198

RE: CERTIFICATES OF NEED FOR THE PRAIRIE ISLAND NUCLEAR GENERATING PLANT FOR EXTENDED POWER UPRATE, ADDITIONAL DRY CASK STORAGE AND SITE PERMIT APPLICATIONS – COMMENTS – DRAFT EIS

DOCKET NOS. E002/CN-08-509, E002/CN-08-510 AND E002/GS-08-690

Dear Mr. Storm:

Northern States Power Company, a Minnesota corporation ("Xcel Energy" or "Company") offers these comments on the Draft Environmental Impact Statement ("DEIS") prepared by the Department of Commerce, Office of Energy Security ("OES") for the Prairie Island Nuclear Generating Plant Additional Dry Cask Storage and Extended Power Uprate Certificate of Need dockets. We believe the DEIS provides accurate descriptions of the Additional Dry Cask Storage and Extended Power Uprate projects and a realistic and thorough review of the potential environmental impacts of the projects.

The DEIS is well organized and presents information that will assist decision makers. Xcel Energy has two primary comments regarding the DEIS and they related to the recognition of our March 20, 2009 Supplemental filing and the discussion on the Socioeconomic benefits of the proposed additional dry casks to support life extension. The remainder of our comments consist primarily of a list of specific edits/corrections with page, paragraph and line references.

Responses

Commenter 14 - Xcel Energy

Supplemental Filing

The DEIS released for comment is dated March 17, 2009 and was published in the EQB Monitor on April 20, 2009. Xcel Energy made a Supplemental filing in both the Additional Dry Cask Storage and Extended Power Uprate Dockets on March 20, 2009. Thus, any updated information provided in the Supplemental filing is not yet reflected in the DEIS. Although the Supplemental filing does not provide information that will affect the description or analysis of the potential environmental impacts provided in the DEIS, we believe information in the Supplemental filing should be referenced in the final EIS to provide updated reports on the proposed projects.

In our comments we have tried to update specific information affected by the Supplemental filing where noticed. However, we encourage the OES to review the Supplemental filing for any additional updates that may be necessary. Examples of areas where edits were made are in reference to Surplus/Deficit tables, PVRR analysis tables, DSM commitments and emission levels due to alternatives.

Socioeconomic Impacts

Extended Power Uprate (Docket 4220 E002/CN-08-509)

The socioeconomic impacts resulting from implementing the extended power uprate are significantly different than those resulting from the approval of the additional dry casks to support the continued operation of the plant. The extended power uprate will not result in a sizeable increase in workers during construction of upon implementation. Since most of the work will be done during the scheduled refueling outages, there will be many additional workers already on-site. However, the significant investment in the power uprate will provide socioeconomic benefits many years into the future. For instance, our estimate shows that the City of Red Wing alone will receive approximately $1.5 million dollars more in tax revenue from our investment in 2017 alone. (See Attachment A)

Additionally, expansion of the lowest cost generation facility Xcel Energy owns[1] will displace energy from higher cost plants, avoid the need to build new plants, and reduce air emissions. Use of the lowest cost resource option

[1] Based on expense per net kWh from FERC Form 1.

Responses

Commenter 14 - Xcel Energy

minimizes rate impacts for our customers, which in turn will help keep area and regional businesses more competitive. Also, the use of an existing generation facility located on an existing transmission system better utilizes existing assets and eliminates the need for additional investment in new transmission and generation sites. This is not only a cost saving to customers, but a land use benefit to society the power uprate provides over the alternatives. While not all of these socioeconomic benefits are easily quantifiable in dollars or otherwise, all provide significant benefits to the local, state and regional economies.

Lastly, we should also keep in mind that the socioeconomic benefits of the power uprate cannot be achieved without the approval for the Additional Dry Cask Storage Certificate of Need. Thus, when considering the socioeconomic impacts of the power uprate, we should also recognize that there are many benefits including tax revenues, employment opportunities, emission reductions, access to low cost reliable energy, and other socioeconomic impacts that will be realized by the local, state and regional economy from the continued operation of the plant.

Additional Dry Cask Storage Docket (Docket 4220 E002/CN-08-510)

The DEIS indicates that the economic impact of a shutdown of Prairie Island is "...more properly framed as economic impact to citizens of Red Wing, not citizens of Minnesota". While we agree the economic loss to the City of Red Wing would be significant, we disagree that the loss would be localized only to the City. We believe it would have more far reaching implications. The DIES goes on to indicate that the tax revenues would likely be generated elsewhere in the state. This is only true if the replacement generation were built within the state.

Both the analysis performed by the OES and Xcel Energy identified multiple benefits to the economy and society. These range from highly reliable and low cost energy production that will help businesses in Red Wing, but all Xcel Energy customers regardless of location. Additionally, the benefits of emission free extend far beyond Red Wing City limits.

There are many other economic and societal benefits to the continued operation of Prairie Island. Two of the more significant benefits are the taxes that will result from the continued operation, and the employment benefits that accrue to local and regional economies. Prairie Island currently contributes approximately $4.5 million a year in property taxes to the City of Red Wing. (See Scenario 2 of Attachment A) If the plant does not continue to operate

Responses

Commenter 14 - Xcel Energy

past 2013/2014, that tax revenue will drop to an estimated $82,000 per year by 2016. In comparison, the City would receive an estimated $6,050,0000 in 2016 tax revenue if the plant continues to operate.

The plant currently employees approximately 600 plus people full-time, with approximately 92% living within an approximate 35-mile radius of the plant. This amounts to an estimated Prairie Island payroll of approximately $47 million within a 30 to 45 minute drive from the plant.

In addition to the plants regular employees, the plant employees an additional 1,300 contractors at the plant throughout a given year. Many of the contractors are local to the area and are used during scheduled outages in various jobs including administrative, plant operations, security, inspections, engineering and management. A review of our purchase orders to contractors in the local area codes the past three years reveals that the plant spends and addition $3.8 million per year on local merchandise and services.

In addition to the tax, labor, and procurement benefits, there are also many benefits the local and regional civic economies that often go unnoticed or unrecognized. These include the charitable contributions to the local Red Wing economy from the Xcel Energy Foundation, which has averaged $15,000 per year for the last five years, or the $82,000 match the Foundation made to the local employees who donated $82,000 of their salaries to the local Unity Way's in 2008 for a $168,000 Untied Way contribution to the region.

As shown, the presence of the plant to the local and regional economies is significant. Xcel Energy contributes significantly to the local tax base and the above average incomes of nuclear employees and contracts with local vendors contribute significantly via the spending power they receive in salary and contracts with the Company. All these issues should be carefully considered when assessing the socioeconomic impact of the plant on the local and regional economies. While the continued operation of the plant may not add significant dollars other than the increased taxes that will be paid, the elimination of the plant will cause a very significant negative impact on the local and regional economies. This could affect the low rates and reliability all Xcel Energy customers now receive and would lead to increased emissions for all of society.

Responses

Commenter 14 - Xcel Energy

COMMENTS

Our suggestions are grouped by Section as titled in the DEIS. To the extent we did not include a section from the DEIS means we had no comments for consideration in that section.

Summary

14-1 Page V, paragraph 5: While the need for additional generation starts in 2010 per the Surplus/Deficit Table (Table 9-1) located on page 9-5 of our Application, the extended power uprate cannot be implemented sooner than the scheduled refueling outages of 2012 and 2015. We recommend modifying the sentence to state "Alternatives were evaluated based on Xcel Energy's stated resource deficit starting in 2010".

Chapter 1 – Extended Power Uprate

1.0 Introduction

14-2 Page 1, paragraph 2: The filing and acceptance dates should be May 16, 2008 (filing), July 15, 2008 (acceptance), and July 22, 2008 (Order).

Page 1, paragraph 3: The PUC order date should be August 15, 2008.

Page 1, paragraph 3: The correct Docket Number for the Site Permit should be: E002/GS-08-690 instead of CN.

1.1 Project Description

14-3 Page 1, paragraph 6, line 2: The second sentence should be "The initial licenses will expire in 2013 and 2014 for Unit 1 and Unit 2 respectively.

Page 2, paragraph 6: line 1: Red Wing should be Red Wing

Page 2, paragraph 6, line 2: Section should read Sections

1.1.1 Description of Power Generation...

14-4 Page 3, paragraph. 5, line 7: The last sentence should indicate that the spent fuel assemblies are stored in the spent fuel pool to cool for approximately 10-12 years.

Responses

Comments 14-1 through 14-25

Thank you for your comment. The corresponding text was reviewed and some editing may have been conducted in response to the comment(s). See the appropriate sections of the document for possible changes.

Commenter 14 - Xcel Energy

Responses

1.1.2 Description of Proposed Power …

Page 4, paragraph 5, line 3: add "the" to "completion of 'the' power uprate…"

14-5 Page 5, paragraph 3, line 1: delete "require to"

Page 5, paragraph 4: NEED RSPONE FROM MIKE CARLSON

1.1.4 Fuel Supply

14-6 Page 8, paragraph 3, lines 1 & 2: Change "criticality" to "critical"

1.1.5 Water Use

Page 9, paragraph 5, lines 1 & 3: change "of the" to "set by the" after appropriation limits.

14-7

Page 10, paragraph 2, line 1: change 'for the generating plant" to "from the generating plant"

1.1.6 Wastewater

Page 10, paragraph. 6: line 3: delete "(when daily average upstream river temperatures fall below 43° F for five consecutive days)

14-8 Page 11, paragraph 1, line 1: change "exceed" to "exceeds"

Page 11, paragraph 2, line 1: change "operating procedure" to "operating procedures"

1.1.7 Solid and Hazardous …

Page 11, paragraph. 4, line 4: delete "does" and change "hold" to "holds"

14-9

Page 11, paragraph. 5: drop "s" from "generators"

1.1.9 Operation and Maintenance

14-10 Page 11, paragraph 9: Change the first two sentence to read "How the PINGP is operated will not change due to the power uprate. However, the power

Commenter 14 - Xcel Energy

uprate will result in an increase in the cooling needs of the circulating water system."

Page 12, paragraph 1: Space needed between 2nd & 3rd line to create separate paragraph.

1.2 Purpose and Need

14-11 Page 12, paragraph 1, line 3: This section should also reference our March 20, 2009 Supplemental filing. To reflect the Supplemental filing, a period should be added after "...one percent per year" and the last sentence should be changed to read "By 2012, the estimated deficit is 154 MW and by 2022, the deficit grows to over 2,400 MW."

Also, the OES should consider adding a discussion addressing the need to reduce Greenhouse Gas Emissions per Minn. Stat. 216H.02 subd. 1.

2.1 Certificate of Need

14-12 Page 15, paragraph 3, line 3: Capitalize "o" in "order"

Page 15, paragraph 6, line 4: Capitalize E, I and S in "Environmental Impact Statement"

Page 16, paragraph 1, line 1: "Statute" ... Subd. 4 add a 's" to "require"

2.2 Site Permit

14-13 Page 17, paragraph 2: "certificate of need" should be "Site Permit" and correct file number should be E002/GS-08-690

Page 17, paragraph 4: Qualify Advisory Task Force (ATF) in this paragraph and delete in subsequent paragraph.

2.3 Nuclear Regulatory Commission

Page 19, paragraph 4: Xcel Energy filed for NRC approval for the use of the larger diameter fuel on June 26, 2008 and we anticipate receiving NRC approval by July 2009.

Responses

Commenter 14 - Xcel Energy

2.4 Other Permits

Page 20, paragraph 3: "215,000 Million Gallons" should read "235,000 Million Gallons". Also, the "R" in river should be capitalized

Page 20, paragraph 4, line 2: Change "Nation" to "National" Pollution Discharge Elimination System

14-14 Page 21, paragraph 4, line 1: "provide" should be "provides"

Page 21, paragraph 7, line 1: insert "the" between from and DNR

Page 22, paragraph 2, line 5: "F" in federal should be capitalized.

3.0 Project Alternatives

14-15 Page 23, paragraph 1, line 5: "Scoping Order" should be capitalized.

3.1 No-Build Alternative

14-16 Page 24, paragraph 4, line 5: Change "that this" to "it" and change "2,900 MW" to "over 2,400 MW" to reflect the updated numbers in the Supplemental filing.

3.2 Demand Side Management

Page 24, paragraph 5: Capitalize "Side Management" in line 1; in line 5 add an "s" to "Certificate" for "Certificates of Need".

Page 24, paragraph. 7: change "1.1 percent" to "1.3 percent" to reflect the Supplemental filing.

14-17 Page 25, paragraph 2, line 2: Change "Those impacts" to "The impacts"

Page 25, paragraph 5, line 5: Capitalize "Application"

Page 25, paragraph 6: DSM was previously qualified.

Page 25: Delete the last paragraph, as it does not appear to fit with the discussion.

Responses

Commenter 14 - Xcel Energy

3.3 Purchase Power: Change "Purchase Power" to "Purchase Power"

14-18

Page 26, paragraph 2: Use "PPA" as already qualified.

Page 26, paragraph 3: Hyphen "short-term"

Page 26, paragraph 4, line 5: Delete "'s" in "Xcel Energy's" and add "of" in-between "tons" and "air"

Page 26, paragraph 5: Add hyphen to "short-term" and add word "term" & a hyphen to "long-term." Also, capitalize "Certificate" and add "of Need" in last sentence.

Page 27, paragraphs. 1-3: Add hyphen to "Long-term" references.

3.4.1 Fossil-Fuel Technologies

14-19

Page 30, paragraph 1: End the first sentence after "the appropriate 164 MW scale" and start a new paragraph at the end of the following sentence.

Page 30, paragraph 2: Change "capital cost" to "capital costs" in last sentence.

Page 30, paragraph 4, line 1: Hyphenate "simple-cycle"

Page 30, paragraph 5, line 1: Remove second use of word "alternative" Change "through its screening process" to "through its evaluation process".

Page 30, paragraph 6: Change "a coal PPA" to "the natural gas CT" and change "519 million" to "433 million" to reflect the Supplemental filing.

3.4.2 Renewable Resource Technologies

14-20

Page 34, paragraph 1: Change "was burned " to "is burned"

Page 34, paragraph 3: Add 2 to "CO_2"

Page 36, paragraph 3; Change "approximately 1,179 million" to "974 million"

Page 36, paragraph 4: "coal PPA" should be "biomass plant"

Responses

Commenter 14 - Xcel Energy

Page 37, paragraph 5: add "gas" after "firing natural"

3.6 New Transmission

14-21 Page 43, paragraph 4, line 1: Change reference to "Monticello" to "Prairie Island"

Page 43, paragraph 4: The in-service date should be 2013 as the 2012 outage is a fall outage.

4.1 Biological Resources

14-22 Page 49, paragraph 4: Cottonwood should have (Populus deltoides) following it and all the scientific names should be in italics.

4.5 Health and Safety

14-23 Page 56: A sentence should be added containing the magnetic field strength at peak flow to give meaning to the percent increase. One recommendation would be "The average magnetic field strength from each of the lines, measured in milliGaus, is 107 mG directly under the power line (based on 2008 peak flow). An estimated 15 percent increase due to the power uprate would result in a reading of 123 mg.

4.6 Land Use

14-24 Page 59, paragraph's 3 & 4: Paragraph 3 references Red Wing's population of 16,116 in 2000 and paragraph 4 states Red Wing's population grew to 44,127 in 2000. These are inconsistent.

4.10 Water Resources

14-25 Page 67, paragraph 4, line 2: Delete the right parentheses ")" after ice cover.

Page 69, paragraph 4, line 4; Change "us" to Xcel Energy

4.13 Radiological

14-26 Page 75, paragraph 3: A report by the National Council on Radiation Protection and Measurements titled *"Ionizing Radiation Exposure of the Population of the United States"* indicates that the Americans' average total yearly radiation

Responses

Comment 14-26
Thank you for your comment. It has been noted and included in the record for this EIS. See Comment 18-3 and associated response for a discussion of background radiation.

Commenter 14 - Xcel Energy

14-26 exposure increased from 360 millirem to 620 millirem per year since the early 1980's due to the greater use of computed tomography and nuclear medicine.

Page 79, paragraph 3: "Samples types" should be changed to "sample types"

Page 83, paragraph 3, line 1: delete "the" before "Xcel Energy"

Chapter 2 – Additional Dry Cask Storage

2.0 Federal Regulation

14-27 Page 4, paragraph. 4: The draft SEIS is now scheduled to be release in mid June 2009.

Page 5, paragraph 2: Add a space after "Amendments" in the title

Page 5, paragraph 3: The list of NRC-approved spent fuel storage casks available on their web site corresponds to those that may be used in conjunction with a General storage license. Since the TN-40 cask design is license under the Prairie Island Site specific license, it is not included on the list on the NRC website.

14-28 Page 6, paragraph 1: Per the NRC letter Dated October 22 2008, the targeted approval date for the TN-40HT License Amendment Request is now 9/27/2009.

Page 6, paragraph 4: Based on the expected approval date of the TN-40HT storage License Amendment Request, it is not expected that the NRC will approve a TN-40HT Part 71 transportation submittal until 2010.

4.3 Water Resources

14-29 Page 19, paragraph 2: Per the SAR Section 10.4, the elevation of the top of the storage pads is 694 ft – 6 inches and not 697 ft.

4.7 Socioeconomic Impacts

14-30 Page 21, paragraph. 3: See overall comments at the beginning of this document.

Responses

Comment 14-26 (continued)
Text has been edited in Chapter 1, Section 4.13 to correct the noted grammatical errors.

Comment 14-27
Text has been edited in Chapter 2, Section 2.1 to correct dates and grammatical errors.

Comment 14-28
Text has been edited in Chapter 2, Section 2.1 to correct dates.

Comment 14-29
Text has been edited in Chapter 2, Section 2.1 to correct the elevation of the ISFSI pad.

Comment 14-30
Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 14 - Xcel Energy

5.3 Radiological Impacts – Potential Incidents and Off-Site Normal ISFSI Operations

14-31 Page 28, paragraph 6: Per the SAR Section 10.4, the elevation of the top of the storage pads is 694 ft – 6 inches and not 697 ft.

7.2 Alternative to Continued Operation of Prairie Island

14-32 Page 51: Need a blank line between the 5th and 6th paragraphs.

Tables & Figures

14-33 Table 5-3 **Skyshine Dose Estimates to the Nearest Permanent Residence and Assumptions**
In the "SAR" column; the fuel burnup should be "45,000" and the cask loading rate should be "2 casks every year".

Figure 3.3 **Transnuclear TN-40 Dry Storage Cask**
The picture is slightly distorted and doesn't indicate its true dimensions. It should be "stretched out" provide a better visual perspective of the cask diameter to its height. See figure 3-13 of the Certificates of Need for an example.

Copies of these Comments have been served on all parties on the attached service lists.

Please feel free to contact me at (612) 330-5641 with questions regarding any of the above-noted comments. We look forward to working with you throughout the Site Permit and Certificates of Need approval processes for the Prairie Island Nuclear Generating Plant Extended Power Uprate and Dry Cask Storage projects.

SINCERELY,

/s/

Brian R. Zelenak
MANAGER, REGULATORY ADMINISTRATION

Attachments
c: Service Lists

Responses

Comment 14-31
Text has been edited in Chapter 2, Section 5.3 to correct the elevation of the ISFSI pad.

Comment 14-32
Text has been edited in Chapter 2, Section 7.2 to correct the noted grammatical error.

Comment 14-33
Table 5-3 has beed edited to correct the SAR skyshine dose assumptions. Figure 3.3 has been edited to correct the perspective of the TN-40 cask.

Commenter 14 - Xcel Energy

Attachment A
Scenario 1

PROPERTY TAX ANALYSIS
Prairie Island Shutdown in 2013/2014

Pay Year	Goodhue County	City of Red Wing	SD 256	Other	Total
2004	4,043,443	4,515,593	2,110,570	1,089,934	11,759,540
2005	3,702,828	3,968,674	1,840,068	956,222	10,467,792
2006	3,747,250	4,318,291	1,979,347	961,504	11,006,392
2007	3,659,135	4,477,581	2,103,889	981,559	11,222,164
2008	3,486,281	4,466,496	1,940,553	819,164	10,712,494
2009	3,280,000	4,200,000	1,825,000	795,000	10,100,000
2010	2,852,000	3,658,000	1,593,000	683,000	8,786,000
2011	3,033,000	3,888,000	1,691,000	701,000	9,313,000
2012	3,223,000	4,132,000	1,794,000	731,000	9,880,000
2013	3,284,000	4,207,000	1,829,000	724,000	10,044,000
2014	3,411,000	4,371,000	1,899,000	735,000	10,416,000
2015	2,714,000	3,476,000	1,510,000	532,000	8,232,000
2016	66,000	82,000	37,000	15,000	200,000
2017	66,000	82,000	37,000	15,000	200,000
	40,567,937	49,842,635	22,189,427	9,739,383	122,339,382

2004-2008 are actuals.
2009-2017 are estimates.

Assumptions:
a) the certificate of need in E002/CN-08-510 is denied; and
b) the application to the U.S. Nuclear Regulatory Commission for renewed operating licenses at Prairie Island is denied.

Responses

Commenter 14 - Xcel Energy

Attachment A
Scenario 2

PROPERTY TAX ANALYSIS
Prairie Island Life Extension

Pay Year	Goodhue County	City of Red Wing	SD 256	Other	Total
2004	4,043,443	4,515,593	2,110,570	1,089,934	11,759,540
2005	3,702,828	3,968,674	1,840,068	956,222	10,467,792
2006	3,747,250	4,318,291	1,979,347	961,504	11,006,392
2007	3,659,135	4,477,581	2,103,889	981,559	11,222,164
2008	3,486,281	4,466,496	1,940,553	819,164	10,712,494
2009	3,280,000	4,200,000	1,825,000	795,000	10,100,000
2010	2,852,000	3,658,000	1,593,000	683,000	8,786,000
2011	3,033,000	3,888,000	1,691,000	701,000	9,313,000
2012	3,223,000	4,132,000	1,794,000	731,000	9,880,000
2013	3,284,000	4,207,000	1,829,000	724,000	10,044,000
2014	3,411,000	4,371,000	1,899,000	735,000	10,416,000
2015	4,523,000	5,793,000	2,516,000	887,000	13,719,000
2016	4,725,000	6,051,000	2,629,000	912,000	14,317,000
2017	5,978,000	7,655,000	3,323,000	1,076,000	18,034,000
	52,947,937	65,701,635	29,073,427	12,054,383	159,777,382

2004-2008 are actuals.
2009-2017 are estimates.

Responses

Commenter 14 - Xcel Energy

Attachment A
Scenario 3

PROPERTY TAX ANALYSIS
Prairie Island Life Extension with Extended Power Uprate

Pay Year	Goodhue County	City of Red Wing	SD 256	Other	Total
2004	4,043,443	4,515,593	2,110,570	1,089,934	11,759,540
2005	3,702,828	3,968,674	1,840,068	956,222	10,467,792
2006	3,747,250	4,318,291	1,979,347	961,504	11,006,392
2007	3,659,135	4,477,581	2,103,889	981,559	11,222,164
2008	3,486,281	4,466,496	1,940,553	819,164	10,712,494
2009	3,280,000	4,200,000	1,825,000	795,000	10,100,000
2010	2,852,000	3,658,000	1,593,000	683,000	8,786,000
2011	3,033,000	3,888,000	1,691,000	701,000	9,313,000
2012	3,223,000	4,132,000	1,794,000	731,000	9,880,000
2013	3,284,000	4,207,000	1,829,000	724,000	10,044,000
2014	4,125,000	5,286,000	2,297,000	892,000	12,600,000
2015	5,262,000	6,740,000	2,927,000	1,049,000	15,978,000
2016	5,488,000	7,029,000	3,054,000	1,080,000	16,651,000
2017	7,164,000	9,174,000	3,983,000	1,338,000	21,659,000
	56,349,937	70,060,635	30,967,427	12,801,383	170,179,382

2004-2008 are actuals.
2009-2017 are estimates.

Responses

Commenter 15 - Sierra Club

May 8, 2009

Bill Storm, Project Manager
Minnesota Department of Commerce
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Re: Public Comments on Draft Environmental Impact Statement for Prairie Island Nuclear Generating Plant, Extended Power Uprate, PUC Docket Nos. E002/CN-08-509 and E002/GS-08-690; Request for Additional Dry Cask Storage, PUC Docket No. E002/CN-08-510.

Dear Mr. Storm:

Please accept the Sierra Club North Star Chapter's comments on the Draft Environmental Impact Statement (DEIS) for the Prairie Island Nuclear Generating Plant (PINGP). The North Star Chapter represents 17,000 members in the state of Minnesota who share concerns about the environmental, public health, and economic impacts of Xcel's proposal to increase and extend electricity production for at least 20 years at the Prairie Island Nuclear Generating Plant and the associated on-site nuclear waste dry cask storage. The Chapter echoes the concerns of those who spoke at the Public Hearing in Red Wing on April 21, none of whom supported the extended power uprate or the expansion of the waste storage installation.[1]

In our review of the DEIS, we have identified several important elements of analysis that were incomplete. The following is a summary of the additional analysis requested in the final EIS which is described in more detail in the text of our comments:

Chapter 1

Section 3.2: Demand Side Management
- Updated demand forecasts (page 24)
- Analysis of 1.5 percent annual conservation (24)

Section 3.4.2: Renewable-Fuel Technologies
- Assessment of wind integration (31)
- Total lifecycle greenhouse gas emissions, not just operating emissions (31)
- Alternatives to the EPU utilizing combinations of renewable resources (31)

Section 3.4.3: Developing Technologies
- Updated assessment of renewable power storage technology (38)

Section 4.2: Biological Resources
- Assessment of potential cumulative effects on invasive species (50)

Section 4.13: Radiological
- Lifecycle health costs for nuclear power, not just operating costs (74)

[1] Stephanie Hemphill, "Neighbors share concerns about Prairie Island nuclear plant," Minnesota Public Radio, available at http://minnesota.publicradio.org/display/web/2009/04/22/red_wing_nuclear/.

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Chapter 2

Section 5.2: Radiological Impacts
- Total health risks (page 25)

Section 5.3: Radiological Impacts – Potential Incidents
- Assessment of potential changes in river flow over the cumulative impact period (28)
- Potential flood risks to the ISFSI given changes in river flow (28)
- Potential harm to workers from cask failure (33)

Section 5.4: Cumulative Impacts
- Forecasts of effects assuming increases in local population (35)

Section 6.1: Off-site Storage Alternatives
- Cumulative impacts of storage beyond 200 years (41)

Not addressed in the EIS:
- Discussion of environmental justice issues related to increasing risk to the Prairie Island Indian Community
- Difficulties in transporting spent fuel
- Reconciling comments by the Federal Energy Regulatory Commission Chair

Extended Power Uprate

The Sierra Club chapter has concerns about the environmental and health impacts that the Extended Power Uprate (EPU) may have and requests that the final EIS consider additional alternatives.

I. The DEIS inadequately addresses alternatives.

15-1 The Sierra Club requests analysis of Xcel Energy achieving the additional .4% conservation goal of the Next Generation Act as an alternative to the EPU. In addition, we request a more comprehensive analysis of mixed source alternatives, including conservation, renewables, and distributed generation for the proposed 164 MW EPU.

Considered Alternatives

15-2 The DEIS addresses the tax implications of selecting the no-build alternative.[2] It notes that the tax loss from a no-build alternative are high and emphasizes the benefits from the EPU and continuing to operate the facility. None of the other alternative evaluations addresses the tax benefits from new or expanded facilities constructed in Minnesota. As a result, the DEIS overlooks potential benefits from the alternatives for the uprate and the alternatives to continuing operation of Prairie Island.

[2] DEIS Chapter 1, §3.1, page 23.

Responses

Comment 15-1

Analysis by the Office of Energy Security, Energy Regulation and Planning unit (OES-ERP) included in its base forecase model a 1.3 percent DSM achievement, which means that half of the additional DSM requested was built into all OES-ERP analyses. Further, the OES-ERP analyzed a scenario where no growth was assumed to occur between 2008 and 2034. The OES-ERP verified that this scenario represented an increment to DSM in excess of the 0.4 percent requested.

The OES-ERP analyzed the no-growth scenario by comparing the OES-ERP wind plus least-cost back up scenario (additional renewables) to an EPU at PINGP. The scenario resulted in additional combustion turbines (CT) being selected. This wind plus CT distributed generation scenario was less economically feasible than the proposed EPU.

Comment 15-2

Chapter 1, Section 3.0-*No-Build Alternative*, describes the potential loss of tax benefits if the EPU were not to be built. Generally when comparing a proposed alternative against other potential alternatives, these types of benefits do not change significantly; they represent funds paid to one host community or another host community. In the Strategist model, this "constant" is represented as a cost (in percent) to the utility across all alternatives and therefore is incorporated into OES-ERP's analysis.

Commenter 15 - Sierra Club

The DEIS did not address the discrepancy between the Next Generation Energy Act goal of 1.5 percent conservation and Xcel's projected demand-side reductions of 1.1 percent.[3] While Xcel's Conservation Improvement Programs will meet the mandatory minimum goal of 1.1 percent, Xcel's projections fail to include the additional overall reduction that the Act targets. Conservation improvement programs, like demand side management and energy efficiency, provide a clean and cost-effective way to ensure that Xcel is able to provide reliable power to its customers. Conservation provides an alternative to increased power and generates neither excess emissions nor solid waste while providing additional benefits; such as lower utility bills to consumers. The DEIS does not adequately address implementation of additional conservation to further reduce the need for the uprate with less environmental impact.

15-3 The no-build option discusses the PUC's role in the certificate of need process; however, the final EIS should provide the PUC with the most up-to-date information on demand to inform that decision. In September 2008, Xcel revised its demand estimates because of economic downturn,[4] and reduced the expected demand forecast by 300 MW over the next five years.[5] Since this revised forecast, the economy has continued to slow and the PUC has approved several proposed projects. The accompanying changes in demand projections coupled with implementation of the conservation goals of the Next Generation Energy Act may significantly decrease the need for the EPU and make the no-build alternative a viable option.

The possibility of reduced demand is reinforced by the decrease in Xcel's peak demand from 2006 to 2007 and 2008. The DEIS relies on forecasts provided in Xcel's Certificate of Need, filed May 16, 2008.[6] That forecast anticipated consistent growth in demand through 2020.[7] As provided on Xcel's 10-K tax form for 2008, Xcel's peak demand fell from 9,859 MW in 2006 to 8,697 MW in 2008.[8] This decrease of nearly 12 percent contradicts the assumptions of Xcel's demand forecast and does not justify the EPU. The six percent decrease from 2007 to 2008 and a potential decrease in 2009 seem to counter the argument for rejecting demand-side management.

Moreover, the Advisory Task Force requested updated demand forecasts from Xcel. The OES responded that it would seek "updated demand forecast information to be included in the EIS."[9] The DEIS contains no evidence of an updated forecast and only refers to the filing on May 16, 2008.[10] The final EIS should contain updated forecasts.

[3] The Draft Environmental Impact Statement notes that the statute provides the overall conservation goal of 1.5 percent, but does not address the potential demand decrease caused by that reduction. Instead, the DEIS only addresses the 1.1 percent reduction currently planned by Xcel. *See* DEIS at Chapter 1, page 24.
[4] Resource Plan Reply Comments, Docket No. E002/RP-07-1572, Sept. 5, 2008, at 2. Xcel noted that increased fuel prices and slowing economic indicators forced it to reconsider its demand forecast nine months after it was made.
[5] *Id.* at 3.
[6] DEIS Chapter 1, §3.2, page 25.
[7] *Id.*
[8] See Form 10-K, filed Feb. 27, 2009. Available as attachment to "EXHIBITS--AFFIDAVIT OF PAULA G. MACCABEE WITH ATTACHMENTS," Mar. 16, 2009, on PUC Docket No. CN-06-1115.
[9] "EIS Scoping Worksheets with OES Treatment," Office of Energy Security, Nov. 3, 2008, at 3. Available at http://energyfacilities.puc.state.mn.us/documents/19602/ATF-Summary-Appendix-E.pdf
[10] DEIS Chapter 1, §3.2, page 25.

Responses

Comment 15-3
See Comment 15-1 which addresses some of the same concerns (DSM achievement, demand projections). OES-ERP included a no-build alternative in its analysis. If the no-build alternative were feasible and least cost, the economic modeling program, Strategist, would choose to add no additional units and the result would be cheaper than the EPU.

However, in the unconstrained scenario (i.e., Stragegist can pick the least-cost option from all available options, including no-build), Strategist selected additional generating units. Thus, the no-build alternative is not a least-cost option.

The text in Chapter 1, Section 3.2-*Demand Side Management* has been modified to reflect Xcel Energy's updated information.

Commenter 15 - Sierra Club

15-4 The DEIS considers the emissions of some alternatives, but fails to consider the environmental costs and emissions of the total life cycle.[11] While nuclear power does not generate carbon dioxide emissions during operation, mining and transportation of fuel do produce environmental costs. The mining, processing, and subsequent waste generate both carbon dioxide emissions and radioactive waste. Moreover, mining uranium requires processing significant quantities to achieve sufficiently enriched uranium for power generation.[12] Some of this excess waste requires special care and handling, increasing the total environmental cost of operating the facility.

In combination, renewable resources could provide sufficient power and present a feasible alternative to the EPU. The DEIS argues that wind energy cannot provide sufficient power at needed times to provide intermediate and peak load needs.[13] The 2006 Minnesota Wind Integration Study found that wind could account for twenty percent of total generation with sufficient transmission upgrades.[14] Using wind power with geographic variation will "smooth out" the variations in power generation.[15] An increase of 164 MW would be a step toward the integration of wind power that the Wind Integration Study deemed possible.

15-5 Integrating wind power does require increases in transmission capacity.[16] The DEIS's feasibility section notes that integrating wind requires building transmission infrastructure from areas that lack transmission capacity at present.[17] The combination of lower demand forecasts and the PUC's approval of CapX 2020 (with wind transmission requirements)[18] ensure the time to build infrastructure to transport renewable energy from distributed generation points.

The potential integration of wind matches current national expectations. According to the Federal Energy Regulatory Commission Chair, Jon Wellinghoff, the United States does not need additional nuclear power (or coal power for that matter).[19] Chairman Wellinghoff further stated that renewables will provide enough energy to meet baseload capacity and demand.[20] He noted that scattered wind farms can provide the kind of smooth power production that baseload capacity demands.[21] Given Xcel's decreased demand forecast and decreasing peak demands, wind power could provide a feasible alternative to the EPU. The final EIS should reconcile its analysis with Chairman Wellinghoff's statements.

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[11] *See, e.g.*, Table 3-2, which lists all emissions for Prairie Island Uprate Project as zero.
[12] U.S. Geological Survey estimates approximately three billion metric tons of solid waste result from uranium mining. "Uranium Mining Wastes," U.S. E.P.A., available at http://www.epa.gov/rpdweb00/tenorm/uranium.html.
[13] DEIS Chapter 1, §3.4.2, page 34.
[14] "Final Report – 2006 Minnesota Wind Integration Study Volume I," EnerNex Corporation for the Minnesota Public Utilities Commission, Nov. 30, 2006, at 76. Available at http://www.puc.state.mn.us/portal/groups/public/documents/pdf_files/000666.pdf.
[15] *Id.* at 2.
[16] *Id.* at 76.
[17] DEIS Chapter 1, §3.4.2, page 35.
[18] Sea Stachura, "State approves massive powerline project," Minnesota Public Radio, April 16, 2009, available at http://minnesota.publicradio.org/display/web/2009/04/16/state_approves_capx_power_line_project.
[19] Noel Straub and Peter Behr, "Energy Regulatory Chief Says New Coal, Nuclear Plants May Be Unnecessary," The New York Times, Apr. 22, 2009, available at http://www.nytimes.com/gwire/2009/04/22/22greenwire-no-need-to-build-new-us-coal-or-nuclear-plants-10630.html.
[20] *Id.*
[21] *Id.*

Responses

Comment 15-4
See response to Comment 7-1, which addresses the same concern.

Comment 15-5
The Commission's approval of the Brookings-Hampton Corners 345 kV transmission line precludes considering resources made available by that line for any purpose other than meeting the renewable energy standard (RES). Since achievement of the RES is already built into the analysis of alternatives, to consider this transmission resource would double count RES energy. While OES-ERP agrees that integrating wind energy requires building transmission infrastructure, OES-ERP's analysis of wind and the other alternatives did not include any assumptions regarding transmission costs. Therefore, to the extent that the alternatives are dependent upon transmission costs, such alternatives are less cost effective than shown in OES-ERP's analysis once the cost of transmission is added.

Commenter 15 - Sierra Club

Additional alternatives

15-6 The DEIS considered the option of combining natural gas and wind power to create a diversified replacement power, but failed to consider other combinations of power sources. Combining natural gas with additional small sources may provide a more suitable alternative. This approach increases diversity of sources while relying on renewable energy that meets the state's energy portfolio goals. Using wind, solar, and biomass can provide consistent power while reducing the waste impacts of a pure biomass alternative.

New storage technologies to capture renewable energy make renewables feasible. The development of energy storage in batteries and other forms (such as compressed air) can allow baseload power from wind and solar power sources. An additional alternative is using wind power to convert carbon dioxide emissions into methane for natural gas facilities.[22] These new technologies allow for greater reliance on wind and lower base load requirements from non-renewable sources. Wind may also be a more viable consideration because of the decision of the Public Utilities Commission to require the CapX 2020 transmission lines to carry 700 MW of wind power to the metro area.[23] This line is expected to be open by 2013, allowing increased transmission at a time when Xcel expects demand may increase.

15-7 The development of a new hydrokinetic power source provides an alternative that the DEIS identifies but does not assess.[24] In sufficient numbers, these in-stream uses of water could provide baseload power to offset the need for the EPU. The Federal Energy Regulatory Commission licensing of a hydrokinetic project in Minnesota[25] shows that the opportunity to implement and expand hydrokinetic power may be possible by the time demand rises.

II. The environmental impacts of the EPU are understated.

The EPU may have several negative impacts on aquatic life. The final EIS should address these concerns fully to ensure that the project does not undermine federal environmental protection with the increased power generation.

The DEIS states that the increased water flow will have no effect on the entrainment or impingement of aquatic life. However, the EPU will require an increased water intake of approximately ten percent. This increased intake will likely cause an increase in entrainment through either a higher rate of flow or a larger area of intake. The DEIS only makes a conclusory statement that the increased intake will have no significant effect on aquatic impingement or entrainment because no physical changes will be made.[26] For endangered

[22] For additional information, see "(WO/2008/100659) RELIABLE CARBON-NEUTRAL POWER GENERATION SYSTEM", World Intellectual Property Organization, available at http://www.wipo.int/pctdb/en/wo.jsp?WO=2008100659.
[23] Sea Stachura, "State approves massive powerline project," Minnesota Public Radio, April 16, 2009, available at http://minnesota.publicradio.org/display/web/2009/04/16/state_approves_capx_power_line_project.
[24] DEIS Chapter 1, §3.4.2 at 37.
[25] "Hydrokinetic Projects – Issued and Pending Licenses," Federal Energy Regulatory Commission, Dec. 13, 2008, available at http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics/licences.asp.
[26] DEIS, Chapter 1, at 48.

Responses

Comment 15-6

The OES-ERP analyzed the economics of the option of combining natural gas and wind resources. Solar is a variable resource similar to wind, but with a substantially higher cost. Therefore, adding solar resources to the analysis would create another renewable alternative that is more expensive than the OES-ERP renewable alternative. The OES-ERP analyzed a biomass alternative to the EPU at PINGP. The biomass alternative had a cost penalty of $763 million relative to the EPU; the wind mixed with non-renewables alternative had a cost penalty of $617 million relative to the EPU. Adding biomass would only serve to make the wind mixed with non-renewables alternative even less cost effective.

Energy storage technologies were considered and subjected to a screening analysis by Xcel Energy. None of the alternatives passed the screening tests. The OES-ERP concurred with Xcel's screening analysis. Therefore, energy storage technologies are not feasible at this time in the sense of being able to pass reasonable screening criteria.

Comment 15-7

See response to Comment 13-1 which addresses the same concern. The City of Hastings, Minnesota, the licensee for the 4.4-megawatt (MW) Mississippi Lock and Dam No. 2 Hydroelectric Project No. 4306, filed an application to amend its license to install two 35-kilowatt (kW) hydrokinetic turbines in the project's tailrace. This alternative would require approximately 4,685 turbines of 35 kW each to equal the capacity of the 164 MW EPU at PINGP. It is not likely that a sufficient number of turbines could be sited/installed, especially within the time frames considered in this proceeding.

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species like the Higgins Eye Pearlymussel, increased intake could lead to higher larvae mortality rates.[27]

15-8 The increased heat of the reactor triggers the increased need for cooling water. The DEIS concedes that the thermal plume near the water outlet may allow the growth of thermophilic organisms such as parasitic bacteria, but assesses the likelihood as "small." With increased water discharge and potentially increased temperature, the final EIS should address this issue more thoroughly.

15-9 The Higgins Eye Pearlymussel, a federally endangered species found near the facility,[28] has suffered from significant habitat loss including changes in river flows.[29] Further altering the river flow could harm the reproductive process. The Higgins Eye has also suffered from the invasion of zebra mussels, with a population particularly affected near Prairie du Chien, Wisconsin.[30] Increased water temperature in the winter may encourage the growth of Zebra mussels by increasing the thawed water in which the mussels may survive.[31] This would further harm the Higgins Eye's chances of survival.

15-10 The increased likelihood of significant drought events increases potential negative effects from water withdrawal. The effects of climate change may increase the incidence of heat waves and droughts in the region.[32] While the water withdrawal may constitute a small portion of the river under normal circumstances, with decreased water flow the withdrawal and heated effluent increase the impacts on aquatic life.

III. The DEIS insufficiently addresses health risks.

15-11 Health impacts of the EPU are addressed briefly in the DEIS, but the document provides little explanation for the conclusions it reaches. The EPU will require additional radioactive waste to be stored on-site and will increase the radiation levels at the facility. To demonstrate the full effects of the increased radiation levels, the FEIS should directly address and distinguish studies indicating an increased risk of cancer near nuclear facilities.[33]

15-12 The DEIS also fails to consider the broader health costs of operating a nuclear facility. Mining uranium ore may have additional health effects if workers are exposed to the ore, increasing the

[27] The Higgins Eye Pearlymussel larvae are sent with the river current to attach to fish. Increasing the intake would increase the larvae entrained by the screens. U.S. Forest Service, "Higgins eye pearlymussel fact sheet," available at http://www.fws.gov/Midwest/endangered/clams/higginseye/higgins_fs.html.
[28] DEIS Chapter 1, § 4.2, at 50.
[29] *Id.*
[30] *Id.*
[31] "Water Temperature," Zebra Mussel Information System of the U.S. Army Corps of Engineers, available at http://el.erdc.usace.army.mil/zebra/zmis/.
[32] UN News Centre, "Heat waves and extreme drought will increase with climate change, UN agency says," Feb. 19, 2009, available at www.un.org/apps/news/story.asp?NewsID=29957&Cr=climate+change&Cr1. For an example, see Moises Velasquez-Manoff, "Heat sends Southwest climate back in time," Christian Science Monitor, available at http://features.csmonitor.com/environment/2009/01/08/dry-us-southwest-is-growing-drier/.
[33] DEIS Chapter 2, § 4.13, at 85. The DEIS does not address why these studies would not have significance for PINGP.

Responses

Comment 15-8
A discussion of the effect of the proposed EPU on thermophilic organisms and pathogens appears in Chapter 2, Section 4.2 of the EIS.

Comment 15-9
In general, both native and introduced species of mussels respond positively to thermal plumes. Whether the thermal discharge is more advantageous to one species over another is uncertain; however, the Sturgeon Lake Higgins Eye Pearly mussel restoration project is located approximately 0.5 miles upstream of the PINGP and would not be impacted by the plume.

Comment 15-10
While the likelihood of significant drought events in the future is an unknown factor, the water appropriation program, established in 1937 and administered by the DNR, provides a water policy for the state that balances the use of the State's water resources and sets priorities for its use and protection. The PINGP's water appropriation permit contains provisions that allow the permitting authority the flexibility to accommodate these uncertainties. See Chapter 1, Section 2.4-*Other Permits* for a more detailed description.

Comment 15-11
Potential health impacts from the extended power uprate (EPU) are based on estimated dose levels and concomitant health impacts (primarily, cancer incidence). These impacts are not anticipated to be significant because dose levels are within NRC regulations and health impacts are not significant with respect to state policies.

The EPU will not require additional casks for storage of spent nuclear fuel. There will be an additional volume of spent fuel associated with the larger fuel pellets; however, these pellets will not require more or larger fuel assemblies. The larger fuel pellets will increase fuel loadings, and this increase, along with higher fuel burnup, will increase the thermal and radiological output of fuel assemblies that are stored in casks (see discussion of the TN-40HT cask; Chapter 2, Section 3). Potential radiological exposures and health impacts due to storage of the TN-40 and TN-40HT casks is discussed in Chapter 2, Section 5.

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potential health risks.[34] The health impacts of the facility's total lifecycle exceed the localized cancer risks cited in the DEIS.

Increased Dry Cask Storage

The North Star Chapter has several concerns for the increased storage requested by Xcel Energy. The most significant concern is for the long-term solution for waste storage. In the shorter term, the Chapter has additional concerns for the potential health impacts and the scope of alternatives the DEIS considered.

I. The DEIS failed to consider cumulative impacts of storage.

15-13 The DEIS considers the effects of storage for the next 200 years.[35] There is no guarantee that the federal government will provide an alternative storage site within that time. The only planned federal facility at Yucca Mountain has stalled.[36] As the DEIS notes, the amount of nuclear waste will exceed the capacity of the Yucca Mountain facility before the facility would even open.[37] The final EIS should consider the possibility of longer-term storage on site in the absence of a permanent storage solution in a federal repository.

15-14 Potential changes to the flow of the Mississippi River may also present a risk for the ongoing storage of waste even within the 200-year period. Lengthy on-site storage increases the potential for significant flood events. Given that the facility is less than half a mile from the river and is directly next to Sturgeon Lake, major flood events might flood the facility and the independent spent fuel storage installation (ISFSI). While the earthen berm is 17 feet high,[38] the entrance to the ISFSI is at equal height with the surrounding land and provides no flood protection. The DEIS notes that in extreme flood conditions, water would reach more than halfway up the casks.[39] The DEIS states that the casks would be able to withstand the water height and flow, but provides no explanation.

15-15 The proximity of the Prairie Island Indian Community (PIIC) presents a further consideration for the ISFSI expansion. Any accident in an expanded ISFSI may have a greater impact because of the corresponding increase in radiation. The nearby residents would suffer greater effects because of the ISFSI expansion. The disparate effects on the Prairie Island Indian Community also raise issues of environmental justice. Environmental justice holds that no group "should bear a disproportionate share of the negative environmental consequences."[40] The radiation effects from the facility have a significantly greater effect on the PIIC than on others, given the Community's proximity.

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[34] See L.S. Gottlieb and L.A. Husen, "Lung Cancer Among Navajo Uranium Miners," *Chest* 81 (4): 449-452, Apr. 1982, available at http://www.chestjournal.org/content/81/4/449.full.pdf+html
[35] DEIS Chapter 2, §4.10, at 23.
[36] *See*, e.g., "Yucca Mountain Plan for Nuclear Waste Dies," The Caucus Blog on The New York Times, Mar. 31, 2009, available at http://thecaucus.blogs.nytimes.com/2009/03/31/yucca-mountain-plan-for-nuclear-waste-dies/
[37] DEIS Chapter 2. §6.1, page 41.
[38] DEIS Chapter 2, §3.1, page 9.
[39] DEIS Chapter 2, § 5.3, page 28-29.
[40] "MPCA and Environmental Justice," Minnesota Pollution Control Agency, available at http://www.pca.state.mn.us/assistance/ej.html.

Responses

Comment 15-11 (continued)

Text in Chapter 1, Section 4.13 has been modified and supplemented to augment the discussion of public health studies which have analyzed cancer risks near nuclear power plants. The EIS notes that uncertainty and differences of opinion remain, despite such studies. Those studies which show a heightened risk near nuclear power plants and those that do not show a heightened risk may both be applicable to the PINGP. The studies, to some degree, appear to be irresolvable in the public health community. To the extent they are, they cannot be resolved in this EIS.

Comment 15-12

Potential impacts related to the nuclear fuel cycle (e.g. mining ore) are outside the scope of this EIS (Chapter 1, Appendix A).

Comment 15-13

See response to Comment 1-1, which addresses the same concerns.

Comment 15-14

Potential radiological impacts from the probable maximum flood at Prairie Island are discussed in Chapter 2, Section 5.3. Cumulative impacts, reflecting storage of casks at the Prairie Island ISFSI for up to 200 years are discussed in Chapter 2, Section 5.4. Use of the probable maximum flood to project potential flood impacts, as opposed to a 500-year or 1000-year flood, is intended to bound such impacts. Accordingly, assuming monitoring and maintenance of the ISFSI, the passage of time does not increase the probability that a flood-induced radiological impact will occur.

The flood analysis in Chapter 2, Section 5.3 is based on the Safety Analysis Report (SAR) for the Prairie Island ISFSI (noted in Chapter 2, Section 5.2, Sources of Information). The SAR uses probable maximum flood data to estimate water heights and velocities. These heights and velocities are compared to cask seal heights and the ability of the casks to resist associated hydrostatic forces, e.g., forces that could cause the cask to slide or tip. Analysis in the SAR indicates that flood waters will not enter the casks or move them.

Comment 15-15

Text has been added in Chapter 2, Sections 5.4 and 7.3 describing potential environmental justice concerns related to the Prairie Island Indian Community.

Commenter 15 - Sierra Club

15-16 The DEIS overlooks transportation issues that will arise if a federal location can take the casks. The PUC's scoping decision excludes transport to Yucca Mountain, but does not explicitly exclude all transportation considerations.[41] As Andrew Peters noted at the public hearing in Red Wing on April 21, the DEIS does not address how Xcel intends to remove the waste from the ISFSI. Increasing the number of casks that have to be move compounds the problem. The DEIS does note that it will not address movement of material to Yucca Mountain, which is appropriate given Yucca Mountain's current status; however, failing to address the movement of waste undercuts the assumption that the storage is only temporary. The inability to move the casks could render the ISFSI more permanent than Xcel intends.

II. The DEIS gave insufficient consideration of health impacts from storage.

15-17 No exposure to radiation is considered entirely safe. The increased storage of waste at the facility will increase the risk of cancer to facility workers and nearby residents. The Sierra Club supports additional analysis of health impacts based on the comments in section nine of the PINGP Study Group's DEIS comments written by Paula Maccabee. In addition, we have additional concerns about workers and growing populations.

15-18 The impacts will be greatest on the plant personnel, who will be exposed to increased skyshine radiation and handling radiation. The combination of uprate and ISFSI expansion combines these negative impacts. Allowing these combined increases exposes the plant personnel to unacceptably high levels of radiation.

15-19 The DEIS notes that 450 residents live close enough to the facility to have potential exposure to radiation. The city of Red Wing has grown from less than 10,000 residents to more than 15,000 in the last forty years. The DEIS should consider the impacts on additional nearby residents resulting from the growing population base in the 200-year period of analysis. An increase in nearby residents – and the additional waste at the ISFSI – would increase the risk of cancer beyond the presently projected risks.

In considering the scope of the effects, the DEIS does not sufficiently address the potential impacts beyond the Red Wing area. With the increased level of skyshine radiation, the significantly larger population within 50 miles would make one-in-two million probabilities lead to cancer cases and deaths. If an incident occurred at the ISFSI that led to greater exposure, such as mishandling of a cask or failure of a cask seal, the effects could be significantly greater.

15-20 The final EIS should address the potential harm to workers following the failure of casks in the ISFSI. The DEIS notes that recovery workers "would experience relatively greater health impacts" and fails to assess what those impacts because of substantial uncertainties in projections.[42] At a minimum, the final EIS should provide possible effects based on reasonable ranges of assumptions. To understand the full impacts of the facility, these costs must be assessed and considered.

[41] William Glahn, "Environmental Impact Scoping Decision," State of Minnesota Office of Energy Security, Docket Nos. E002/CN-08-501, E002/GS-08-690, E002/CN-08-509, Nov. 13, 2008, at 6.
[42] DEIS Chapter 2, §5.3, page 33.

8

Responses

Comment 15-16
Movement of spent nuclear fuel from commercial reactor sites remains a federal obligation, to be undertaken by the U.S. Department of Transportation, NRC and DOE, in cooperation with state and local governments. Potential impacts related to cask handling that facilitates transportation from the Prairie Island ISFSI are discussed in Chapter 2, Section 5.4. The timelines for licensing of the Transnuclear TN-40 and TN-40HT casks for transportation are discussed in Chapter 2, Section 2. Potential impacts related to transportation of the storage casks to a federal repository are outside the scope of this EIS (Chapter 1, Appendix A).

Comment 15-17
The EIS uses a linear no-threshold model to assess potential radiological health impacts (i.e., no exposure is without some risk). Increased risks of cancer to plant personnel and the general public from the proposed expansion of dry cask storage at the Prairie Island ISFSI are discussed in Chapter 2, Section 5. See responses to Commenter 16 (PINGP Study Group).

Comment 15-18
Potential radiological impacts to plant personnel are discussed in Chapter 2, Section 5. Tables have been added to assist in visualizing cumulative impacts to plant personnel; see Chapter 1, Table 4-10 and Chapter 2, Table 5A-2. Radiological doses to plant personnel are managed by the Prairie Island radiation protection program and are projected to be within federal regulatory guidelines.

The Minnesota Department of Health notes that there is a concern that the current occupational radiological dose limit is higher than it should be. The U.S. Nuclear Regulatory Commission (NRC) is currently soliciting comments from stakeholders and interested parties on the regulatory issues and options to achieve greater alignment between NRC's radiation protection regulations and the 2007 recommendations of the International Commission on Radiological Protection (ICRP) contained in ICRP Publication 103, which recommends a lower occupational limit. However, the process is not expected to be completed for several years. In the interim, licensees are required to maintain exposures as low as is reasonably achievable and within current established limits

Commenter 15 - Sierra Club

Conclusion

The DEIS should consider a broader range of alternatives, additional environmental impacts, and cumulative effects of the proposed changes to Prairie Island. As Red Wing's city council and the public hearing in Red Wing showed, residents have significant concerns about the effects of the proposed changes. The Sierra Club North Star Chapter appreciates the effort that OES staff have made in the DEIS, and respectfully request the above-mentioned additions to the final EIS to provide a more thorough analysis of this proposal which will have a significant impact on Minnesotans long into the future.

Sincerely,

Co-Chair, Clean Air and Renewable Energy Committee
Sierra Club North Star Chapter

Responses

Comment 15-19
It is likely, over a 200-year timeframe, that there would be population growth in the greater Prairie Island area, specifically in and about the City of Red Wing. This growth would increase the number of persons who could receive exposure from the Prairie Island ISFSI (skyshine radiation), and thus the annual collective dose (person-mrem/yr). However, the estimated exposure rate for the Red Wing area due to skyshine radiation is very low, roughly on the order of 0.01 mrem/yr (the exposure rate from the ISFSI decreases approximately tenfold with each doubling of distance from the ISFSI; see Chapter 2 Section 5.2). Thus, the estimated dose and associated public health risk is insignificant in comparison to federal regulations and state policies. Thus, it is not discussed in the EIS.

Because the exposure rate from skyshine radiation drops significantly with distance from the Prairie Island ISFSI, impacts beyond the Red Wing area, even with increased population levels, would not be significant. Thus, they are not discussed in the EIS. The collective annual dose due to skyshine radiation could be significant if population growth occurred very near the Prairie Island ISFSI, e.g., growth within one mile of the ISFSI. Text in Chapter 2, Section 5.4 has been modified to reflect this possibility.

Potential exposures and health risks from incidents at the Prairie Island ISFSI are discussed in Chapter 2, Section 5.3. Population growth in the Red Wing area and beyond would increase the number of persons who could receive exposure from an incident at the Prairie Island ISFSI. However, it is assumed that emergency response plans, which are designed to protect public health should an incident occur at the ISFSI, would continue over the 200-year timeframe and be appropriately scaled for the population at risk. Thus, if there is a population increase, emergency response plans would take this into account and develop measures to appropriately protect the public. Thus, an increase in population does not directly lead to an increase in dose or public health risk.

Comment 15-20
There are substantial uncertainties in estimating exposures and doses to plant personnel and emergency responders due to a hypothetical cask confinement failure (Chapter 2, Section 5.3). Exposures and doses would vary with the type of incident (i.e., what caused the cask confinement failure) and emergency response job functions.

Commenter 15 - Sierra Club

Responses

Comment 15-20 (continued)
NRC regulations limit the total effective dose to plant personnel to 5 rem/yr (10 CFR 20). Personnel wear thermoluminescent dosimeters (TLDs) to record actual exposures. Exposures and doses are limited by several strategies, including time, distance, and shielding. If we assume that exposure-limiting strategies are employed during a cask confinement failure such that individual doses are limited to 5 rem, and if we assume that 100 persons receive this dose in responding to the incident, then the collective dose would be 500 person-rem. This dose would result in an estimated 0.5 additional cancer diagnoses and 0.25 additional cancer deaths among responders over their lifetimes. Again, these estimates contain uncertainty, and potential health impacts would vary with the type of incident, the number of responders, and emergency response job functions.

Commenter 16 - PINGP Study Group (via Paula Maccabee)

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May 8, 2009

William Cole Storm, Project Manager
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RE: Environmental Impact Statement
Xcel Energy Prairie Island Nuclear Generating Plant
Extended Power Uprate Project, PUC Docket No. E002/CN-08-509, E002/GS-08-690
Request for Additional Dry Cask Storage, PUC Docket no. E002/CN-08-510

Dear Mr. Storm:

The following comments pertaining to the March 17, 2009 Draft Environmental Impact Statement ("DEIS") for the Xcel Energy Prairie Island Nuclear Generating Plant Extended Power ("PINGP") Uprate Project ("Uprate") and the Request for Additional Dry Cask Storage for high-level nuclear waste ("Cask Increase") are submitted on behalf of the Prairie Island Nuclear Generating Plant Study Group. The PINGP Study Group includes members of the Advisory Task Force appointed to comment on the scope of environmental review of the nuclear uprate and nuclear cask increase who have continued to meet after the completion of their formal report. The Study Group represents the concerns of citizens, environmental protection groups and local governments.

In order to extend its license for the Prairie Island Nuclear Generating Plant until 2034, Xcel Energy has proposed to expand storage of high-level nuclear waste, the nuclear spent fuel generated by the plant. Xcel currently stores nuclear spent fuel in 24 casks at the PINGP, and is authorized for 29. Xcel has applied for a certificate of need and site permit for 35 additional casks at the PINGP, which would more than double the amount of high-level nuclear waste stored on site at the Prairie Island Nuclear Generating Plant, bringing the total casks to 64 by 2034. (*DEIS, Ch. 2, pp. 1, 8*). There is no foreseeable prospect for a federal repository that would permit removal of this high-level nuclear waste.

In addition, Xcel has filed a certificate of need to increase by 164 MW the nuclear power produced by the Prairie Island Nuclear Generating Plant. This uprate would be obtained by increasing temperature, pressure and the amount of uranium in the reactor core to maintain the same fuel cycle length. The Nuclear Regulatory Commission hasn't yet approved the safety of the design. (*DEIS, Ch.1, pp. 2, 4*)

These proposals to continue reliance on non-renewable nuclear generation, more than double storage of high-level nuclear waste and increase the temperature and use of uranium at the

Responses

Commenter 16 - PINGP Study Group (via Paula Maccabee)

Responses

Prairie Island Nuclear Generating Plant create significant environmental impacts and raise serious economic and policy concerns, which both the Minnesota Public Utilities Commission and the Minnesota Legislature are required by law to consider. The purpose of an EIS is to provide sufficient analysis to allow decision-makers to select alternatives and mitigation to minimize adverse impacts and address policy concerns. From the perspective of the Study Group, the DEIS for the above-described Prairie Island Nuclear Generating Plant projects is so incomplete that it fundamentally fails to serve its function under law. It is respectfully requested that the additional analysis, alternatives and mitigation proposed in these comments be included in the Final EIS for the PINGP projects to ensure both compliance with law and effective decision-making.

By law, an EIS must be a "detailed" and "analytical" document prepared by the responsible governmental unit, which "describes the proposed action in detail, analyzes its significant environmental impacts, discusses appropriate alternatives to the proposed action and their impacts, and explores methods by which adverse environmental impacts of an action could be mitigated." (Minn. Stat. 116D.04, Subd. 2a). Under either the Minnesota Environmental Policy Act (MEPA) or the National Environmental Policy Act (NEPA) law on which it was based, "grudging, pro forma compliance will not do. . . the courts can, and should require full, fair, bona fide compliance." *No Power Line v. MEQC*, 262 N.W. 2d 312, 327 (1977 Minn.), citing *Lathan v. Brinegar*, 506 F.2d 677, 693 (9 Cir. 1974). A number of courts have held that it is an abdication of agency responsibility to rely solely on information prepared by a project's proponent. *See e.g., Greene County Planning Bd. v. Federal Power Comm.*, 455 F.2d 412, 420 (2 Cir. 1972).

The Prairie Island Nuclear Generating Plant DEIS unduly relies on inaccurate assertions made by Applicants, fails to consider critical alternatives, disregards applicable Minnesota policies regarding demand side management, renewable energy and environmental justice, inappropriately excludes consideration of substantial economic costs and environmental externalities pertaining to the Request for Additional Dry Cask Storage for nuclear spent fuel and the Extended Power Uprate, fails to evaluate mitigation measures that are within State jurisdiction and provides incomplete health risk assessment analysis. In addition, the DEIS fails to take into account substantial new information regarding the failure of plans for a federal nuclear waste depository at Yucca Mountain and regarding declines in energy demand of Xcel Energy.

The DEIS fails to provide either the public, the Minnesota Public Utilities Commission or future Legislative decision-makers with appropriate information from which to determine the critical decisions that are within State jurisdiction in connection with the Prairie Island nuclear power generating plant:

16-1

- Is Xcel's proposal to more than double cask storage for high-level nuclear waste prudent given the lack of any prospect for a federal depository for spent fuel from the Prairie Island Nuclear Generating Plant and the likelihood that nuclear waste will be stranded indefinitely in the Mississippi River floodplain, immediately adjacent to the Prairie Island Indian Community and within 50 miles of Minnesota's primary population center?

Commenter 16 - PINGP Study Group (via Paula Maccabee)

16-1

- Are there feasible and prudent alternatives to Xcel's proposal to increase nuclear waste cask storage and continue operation of the PINGP for at least another 25 years, given the full range of economic costs implicated by this proposal, State policies favoring demand side management and renewable energy and opportunities presented by recent declines in energy demand?
- If nuclear spent fuel cask storage will be needed for decommissioning and other purposes, what sites and criteria would mitigate environmental and human health risks of long-term radioactive waste storage consistent with environmental justice?
- Is Xcel's uprate proposal to obtain 164 MW of additional nuclear power from the Prairie Island Nuclear Generating Plant through increases in heat, pressure and uranium in the reactor core needed at all, once current electric demand information is considered?
- What measures would mitigate adverse non-radiological impacts of Xcel's proposal to increase heat and production at the Prairie Island nuclear generating plant?
- What are the cumulative cancer risks from all sources (air emissions, releases to water, skyshine radiation from casks, food source contamination) to employees and to the public presented by each aspect of Xcel's proposals?

The Final EIS should include at least the following analysis:

16-2

1. The economic and policy implications of the cask increase and continued operation of the PINGP through 2034 should be analyzed given circumstances precluding any realistic consideration of a federal nuclear waste depository, without imposing any arbitrary limit on the duration that casks will be stranded at the nuclear plant site.

2. The economic and policy implications of the cask increase and continued operation of the PINGP through 2034 should be analyzed including all economic costs of nuclear wastes and all health and environmental impacts of continued operation of the PINGP.

3. Alternatives to the cask increase and continued operation of the PINGP through 2034 should be analyzed in light of State policy preferences for demand side management and renewable energy, recent changes in electric demand and approvals of transmission.

4. Alternative sites for nuclear waste storage for decommissioning and other purposes should be considered, along with an analysis of the criteria that affect risks of nuclear spent fuel storage, such as location on a flood plain or near population centers.

5. Environmental justice implications of restricting consideration of additional nuclear waste cask storage to the area immediately adjacent to the Prairie Island Indian Community reservation should be evaluated.

Responses

Comment 16-1

Whether the proposed projects of this EIS are ultimately prudent is a consideration to be addressed by the Minnesota Public Utilities Commission. Questions regarding potential impacts, risks, and alternatives are addressed in this EIS. Responses in this section are directed to the more detailed comments provided by the Commenter which follow.

Comment 16-2

Responses in this section are directed to the more detailed comments provided by the Commenter which follow.

Commenter 16 - PINGP Study Group (via Paula Maccabee)

Responses

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16-2

6. Need for the 164 MW PINGP uprate should be reevaluated, using current information on Xcel's energy demand and reasonable forecasts.

7. Feasible and prudent alternatives to the 164 MW PINGP uprate should be reevaluated consistent with State policy preferences for demand side management and renewable energy, considering emissions reduction, smart grid and purchased power.

8. Mitigation measures to reduce thermal and other non-radiological impacts of the proposed uprate should be explicitly discussed, consistent with comments made by the Minnesota Department of Natural Resources.

9. Cumulative cancer risks from all PINGP sources of radiation to employees and to the public should be analyzed consistent with State health policies to evaluate impacts of Xcel's proposals for continued operation of the PINGP, spent fuel storage increases and power uprate increases.

1. Economic and Policy Analysis of Indefinite Storage of Stranded Nuclear Waste

Indefinite storage of stranded nuclear wastes is a critical economic and policy consideration in these proceedings. As the United States Court of Appeals for the District of Columbia Circuit recently explained in *Nuclear Energy Institute, Inc. v. EPA, 373 F.3d 1251, 1257-1258 (U.S. App. D.C. 2004):*

> Having the capacity to outlast human civilization as we know it and the potential to devastate public health and the environment, nuclear waste has vexed scientists, Congress, and regulatory agencies for the last half-century.
>
> Although nuclear power burns without emitting harmful greenhouse gases, it produces a potentially deadly and long-lasting byproduct: highly radioactive spent nuclear fuel.
>
> At massive levels, radiation exposure can cause sudden death. National Institutes of Health, Fact Sheet: What We Know About Radiation, *at* http://www.nih.gov/health/chip/od/radiation (last visited May 28, 2004). At lower doses, radiation can have devastating health effects, including increased cancer risks and serious birth defects such as mental retardation, eye malformations, and small brain or head size. *See Environmental Radiation Protection Standards for Yucca Mountain, Nevada, 64 Fed. Reg. 46,976, 46,978 (Aug. 27, 1999).*
>
> Radioactive waste and its harmful consequences persist for time spans seemingly beyond human comprehension.

The Court of Appeals for the District of Columbia Circuit upheld the State of Nevada's challenge to a United States Environmental Protection Agency decision to limit consideration of the effects of the proposed Yucca Mountain federal nuclear waste depository to "only" 10,000 years. The Court determined that radiation exposure risks and the need for geological stability could extend to several hundreds of thousands of years. *NEI v. EPA, supra, 373 F. 2d at 1270-1271.*

Commenter 16 - PINGP Study Group (via Paula Maccabee)

The budget released by President Barack Obama at the end of February 2009 cut off almost all funding to create a permanent federal repository burial site for radioactive nuclear waste in Nevada. As reported in the *Washington Post* on March 4, 2009, the Department of Energy stated, "Yucca Mountain is not an option and the budget clearly reflects that." *(http://www.washingtonpost.com/wp-dyn/content/article/2009/03/03/AR2009030303638.html)*

16-3 Any evaluation of additional cask for high-level nuclear waste at the Prairie Island Nuclear Generating Plant must consider the fact that nuclear waste must be managed indefinitely to prevent harmful radiation consequences, certainly more than 10,000 years. The recent elimination of funding for Yucca Mountain precludes any assumption that new nuclear waste stored at the PINGP will be transported to a federal repository within any foreseeable time frame. Based on current information, analysis of the consequences of nuclear waste storage at the Prairie Island Nuclear Generating Plant must consider the possibility that the nuclear waste will be stranded there indefinitely

The DEIS in these proceedings at best minimizes and, at worst, distorts the implications of increased long-term indefinite storage of nuclear wastes at the nuclear power plant site. The DEIS states that "spent fuel is in interim storage" since neither a reprocessing facility nor a federal waste repository is "currently approved." *(DEIS, Ch.1, p. 9)* The DEIS admits that "there is uncertainty" as to the storage alternatives that will be available in the future, but then suggests that "a likely scenario is temporary long-term storage of spent nuclear fuel at the Prairie Island ISFSI until the dry storage casks can be transported to a federal repository" *(DEIS, Ch. 2, pp. 22 -23)*. The DEIS then arbitrarily assumes for purposes of its analysis that up to 98 nuclear waste casks will be at the PINGP for a period not exceeding 200 years. *(DEIS, Ch. 2, p. 23)*. There are several flaws in this analysis.

16-4 First, the DEIS fails to discuss the implications of even its arbitrary 200-year time limit on weathering, degradation, maintenance and security of increased nuclear spent fuel storage. The DEIS states that the minimum design life for the TN-40 series of nuclear spent fuel casks is 25 years *(DEIS, Ch. 2, p.13)*, but provides no information as to the period of time for which casks have been warrantied or tested. The DEIS notes that the NRC's waste confidence rule is 60 years beyond the licensed life for operation *(DEIS, Ch. 2, p. 36)*, without explaining the difference between this temporary limit and potential indefinite storage at the Prairie Island site. The DEIS does note,

> Confidence at the NRC that temporary, long-term storage of dry casks at ISFSIs nationwide can be effected safely does not provide or supplant an independent decision by the State of Minnesota regarding the risks of long-term storage of dry casks at the Prairie Island ISFSI. *(DEIS, Ch. 2, p. 37)*

The current cask storage system at PINGP relies on a 7.25-inch thick steel cylinder welded to a bottom shield plate. Casks are sealed with an O-ring system and pressurized with helium, so

Responses

Comment 16-3
See response to Comment 1-1, which addresses the same concerns.

Comment 16-4
See response to Comment 4-2, which addresses the same concerns (monitoring, maintenance, assurance over a 200-year timeframe). Text in Chapter 2, Section 5 has been modified and supplemented to include information on the projected costs of assuring institutional control such that ISFSIs function as designed and protect public health. The nuclear decommissioning trust fund, which includes funding for on-going ISFSI operations, is discussed in Chapter 2, Section 3.4.

Commenter 16 - PINGP Study Group (via Paula Maccabee)

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16-4 that a drop in pressure may be monitored to determine failure of either inner or outer seals of the cask. (*DEIS, Ch. 2, p. 12*) The first dry storage cask was installed at the PINGP in 1995, only fourteen years ago. Since that time, there have been 8 low-pressure alarms. Upon investigation, leaks in monitoring system tubing or pressure transmitters have been identified, rather than cask seal leaks. Xcel has no experience with removal of casks for repair or replacement of seals. (*DEIS, Ch. 2, p. 13*). The DEIS provides no information regarding the likelihood of alarms, leaks in the monitoring system or in cask seals over 200 years given the increased number of nuclear spent fuel casks proposed by Xcel Energy.

The DEIS notes that casks are visually inspected periodically for "signs of weathering" and that casks are painted with a "corrosion-inhibiting coating" which is "inspected and touched up as necessary." (*DEIS, Ch. 2, p, 13*). The DEIS contains no information as to the likelihood of steel or weld corrosion and weathering under various conditions for a period extending to 200 years or beyond. The DEIS discusses security provided by an intrusion detection system and a security force (*DEIS, Ch.2, p. 13*) but provides no indication of how fences, electronic systems or human patrols will be assured for 200 or more years.

The DEIS makes conclusory statements rather than analyzing the significance of radiological and non-radiological risks of continued operation given time, weathering, deterioration and natural and man-made phenomena. Although the DEIS admits that, "The risk that is introduced by storing the casks for 200 years is time itself," (*DEIS, Ch. 2, p. 35*), the DEIS then assumes that the integrity of materials, seals and welds is unaffected by time, so that the ability of casks to withstand an earthquake, a flood and a tornado within a 200-year period is unaffected by time or deterioration. (*DEIS, Ch. 2, pp. 23, 35*). The DEIS also assumes, without requiring any mechanism for assurance, that monitoring and maintenance will be unaffected by more than doubling of nuclear waste storage casks, decommissioning and a time frame extending 200 years into the future. (*DEIS, Ch. 2, p. 35*).

16-5 The DEIS does not explicitly discuss the cumulative radiological impacts of continued operation of the Prairie Island Nuclear Generating Plant through 2034, the increase in waste storage on site needed for this extension or the radiological risks of indefinite on-site storage of nuclear wastes, all of which information is required to evaluate the policy and economic risks of Xcel's proposals. The DEIS merely states, "The potential radiological impacts of the continued operation of the PINGP are discussed in Chapter 1 of this DEIS. It's anticipated that no new or additional impacts, beyond those discussed in Chapter 1, would occur if the PINGP continued operations through 2034." (*DEIS, Ch. 2, p. 33*). In hypothesizing cask confinement failure, the DEIS does not discuss the possibility of multiple releases over a time frame of decades or centuries or estimate cancer risks from exposures. (*DEIS, Ch. 2, pp. 32-33*).

16-6 The PINGP Study Group believes that far more information should be contained in the Final EIS pertaining to potential failure of nuclear spent fuel casks over time due to extreme weather, terrorism, accident, long-term materials degradation, failures of maintenance and combinations of the above variables. The Final EIS should evaluate the projected lifespan of waste storage casks, including both the existing TN-40 and proposed TN-40HT based on warranties and tests of materials, welds and seals and analyze risks of radiological exposure

Responses

Comment 16-5

Radiological impacts related to continued operation of PINGP (normal operations) are discussed in Chapter 1, Section 4.13. See response to Comment 3-1, which addresses potential radiological impacts due to incidents at the PINGP. Radiological impacts related to expanded dry cask storage and the temporary, long-term storage of spent fuel to facilitate decommissioning are discussed in Chapter 2, Section 5. Tables have added to aid in visualizing cumulative impacts (Chapter 1, Table 4-10; Chapter 2, Table 5A-2).

Cask confinement failure and associated probabilities, public health impacts, and uncertainties over a 200-year timeframe are discussed in Chapter 2, Sections 5.3 and 5.4. Text has been added in Chapter 2, Section 5.4 to include information from the Yucca Mountain EIS on ISFSI incident response when institutional control is lacking.

Comment 16-6

See response to Comment 4-2 which addresses the same concerns.

Commenter 16 - PINGP Study Group (via Paula Maccabee)

16-7 under Xcel's proposal and under no-action alternatives. The Final EIS should also develop a timeline and funding plan for facility and cask maintenance and repairs according to the timelines suggested in the Yucca Mountain EIS and EPRI dry cask reports. Much of this information was specifically requested by the Advisory Task Force (*ATF Summary, EIS Scoping Worksheet/Exclusions, p.16, EIS Scoping Worksheet, p. 9; Meeting #3, p. 4*), but was disregarded by the Office of Energy Security in preparing the DEIS.

16-8 Consistent with the Court of Appeals decision in *NEI v. EPA*, the Final EIS should not be allowed to arbitrarily assume a 200-year limit on the risks of cask failure, security failure or radiological exposure from nuclear waste storage at the Prairie Island Nuclear Generating Plant. There is no evidence or assurance in the Application or the DEIS demonstrating either that casks will be removed by that time or that the highly radioactive spent fuel contained within them will cease to pose human and environmental risks within the brief time window of 200 years.

Even with the profound limitations in the analysis provided in the DEIS, the Study Group believes that sufficient concerns have been raised that risks of indefinite nuclear cask storage may outweigh potential benefits. As noted in the DEIS:

> It is possible that armaments could be used to attack the casks, creating damage or a fire that causes a cask seal failure. An airplane could be commandeered to attack the casks. These risks are difficult to assess and include substantial uncertainties. (DEIS, Ch. 2, p. 31)

> Time is also a consideration for risks posed by man-made phenomena that, unlike cask handling, will exist for the full 200 years and may change over time, e.g., risk of explosion, terrorism, airplane impact . . . Compared with natural phenomena and well-regulated cask handling systems, risks posed by these man-made phenomena are likely the more uncertain. (DEIS, Ch. 2, p.36)

2. Economic Costs and Risks of Cask Storage, Continued Nuclear Plant Operation

The United States Supreme Court has determined that it is within a State's jurisdiction to determine, as a matter of economic costs and risks, that a nuclear power plant should not be constructed or operated. *Pacific Gas & Electric Co. v. State Energy Resources Conservation & Development Commission, 461 U.S. 190 (1983)*. Specifically, the United States Supreme Court has upheld a state judgment imposing a moratorium on nuclear power due to the economic costs and risks of further development of nuclear power plants before adequate spent nuclear fuel facilities had been provided. *Id., at 216*. The Court concluded that the moratorium did not conflict with the objectives of federal law. Although the primary purpose of the Atomic Energy Act is the promotion of nuclear power, that power is not to be developed "at all costs." *Id., at 222*. Congress has left to the states to determine whether, as a matter of economic costs and risks, continued reliance on nuclear power should be authorized.

Responses

Comment 16-7

See response to Comment 16-4 which addresses the same concerns. Text in Chapter 2, Section 5 has been modified and supplemented to include discussion of funding plans to ensure institutional control of the ISFSI. The nuclear decommissioning trust fund, which includes funding for on-going ISFSI operations, is discussed in Chapter 2, Section 3.4.

Comment 16-8

Text has been added in Chapter 2, Section 5.4 discussing the availability of the Yucca Mountain repository and the use of a 200-year timeframe in this EIS to bound the uncertainty of its availability. The EIS does not assume that the public health risks associated with spent nuclear fuel at the Prairie Island ISFSI end 200 years from the present. Rather, it acknowledges that these risks continue for millions of years, but are assumed by the federal government, in accordance with current Minnesota and federal law.

Commenter 16 - PINGP Study Group (via Paula Maccabee)

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The DEIS clearly states that the State of Minnesota "decides as an economic and policy matter whether it is in the public interest to allow additional storage of spent nuclear fuel at the Prairie Island ISFSI in order to allow the PINGP to continue operating until 2034." (DEIS, p. vi, see also Ch. 2, p. 3). However, the DEIS provides an insufficient analysis of the economic and policy considerations in allowing additional storage of spent nuclear fuel at the nuclear plant.

Minnesota's certificate of need law provides, "Any certificate of need for additional storage of spent nuclear fuel for a facility seeking a license extension shall address the impacts of continued operations over the period for which approval is sought." Minn. Stat. § 216B.243, Subd. 3b(b). The DEIS' analysis of the impacts of continued operations of the Prairie Island Nuclear Power Plant is incomplete and fragmented.

16-9 Section 9 of these comments addresses gaps in the human health risk assessment of impacts of increased storage of spent fuel and continued operations at the Prairie Island Nuclear Generation Plant. This Section suggests that the Final EIS and further proceedings in this matter should quantify the economic costs and risks associated with the cask increase and continued operation of the PINGP, including costs and risks associated with health externalities and costs and risks of indefinite long-term maintenance on site of highly radioactive nuclear wastes.

The DEIS suggests that the primary sources of information regarding the cask increase were the applications filed by Xcel Energy. (*DEIS, Ch. 2, p.1*). Xcel's present value revenue requirements ("PVRR") analysis of the economic benefits of its proposed nuclear license extension and cask increase included no externality values either for continued operation of the nuclear plant or for increases high level radioactive waste storage. Costs for carbon dioxide were attributed to coal and natural gas alternatives, but no greenhouse gas impacts or other externalities were allocated to the process of uranium mining, milling, enrichment or fuel fabrication for nuclear power. (*Application to the MPUC for Certificates of Need for the PINGP for Additional Dry Cask Storage and Extended Power Uprate "Application," Table 4-4, p. 4-16*). Xcel's PVRR analysis effectively excludes the risks and economic costs associated with Xcel's proposals.

Read carefully, the DEIS suggests some of the economic risks and costs associated with Xcel's proposed cask increase in reliance on nuclear power, but a more detailed and thorough analysis is required to guide public decision-making. First, it is clear that storage and disposal of radioactive wastes incurs substantial costs. The DEIS notes that in 2008 dollars, the current cost estimates for decommissioning the Prairie Island Nuclear Generating Plant are $1.026 billion for radiological removal, $83.7 million for site restoration and $404 million for operation of the spent nuclear fuel cask installation. (*DEIS, Ch. 2, p. 15*). Though to date receiving no benefit from this cost, by December 2006 Xcel Energy's customers had paid approximately $620 million into the federal Nuclear Waste Fund to finance nuclear waste management. (*DEIS, Ch.2, p. 42*).

Responses

Comment 16-9
Text in Chapter 2, Section 7.3 has been modified and supplemented to include economic analysis by the Department of Commerce, Office of Energy Security, Energy Regulation and Planning (OES-ERP) unit, comparing continued operation of the PINGP with alternatives under a variety of costs and externality scenarios. Public health externalities and the costs of long-term operation and maintenance of the Prairie Island ISFSI are included in this analysis. The OES-ERP's analysis used externality values and carbon regulation cost estimates established by the Commission in conjunction with other externality factors – in this case, nuclear externalities.

Costs for on-going ISFSI operations are discussed in Chapter 2, Section 3.4 (nuclear decommissioning trust fund). These costs are also discussed in Chapter 2, Section 5.4; the text has been supplemented to include costs estimates from the Yucca Mountain EIS and from OES-ERP.

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The DEIS does not provide information from which it could be determined whether these projected costs reflect a minimum or maximum expenditure and over how many years it is projected that costs would be incurred for indefinite long-term storage of nuclear wastes. The DEIS states that if the cask increase is approved, from April 15, 2008 through 2034 nearly double the amount of spent fuel assemblies will be discharged from Prairie Island's reactors (3,895) as have been discharged from the time the nuclear power plant began operation through April 15, 2008 (2,109). *(DEIS, Ch. 2, p. 14)* However, no information is provided as to the degree that the sheer volume of spent fuel would affect costs for radiological removal and nuclear waste management in future decades or centuries.

16-10 The DEIS, similarly, provides insufficient information regarding the risks and externalities associated with the uranium fuel cycle. It is noted that conversion of uranium yellowcake to uranium hexafluoride results in chemical and radiological risks and "extremely corrosive" chemicals and that there is only one uranium conversion plant operating in the United States. The DEIS further explains that the primary hazard in the uranium enrichment process is the chemical and radiological hazard of uranium hexafluoride release and that there is only one gaseous diffusion uranium enrichment plant in the U.S. The DEIS further notes that the next stage in producing nuclear fuel, fuel fabrication, has similar "chemical, radiological and criticality hazards." *(DEIS, Ch. 1, pp. 6-8)*. No information is provided as to the chemical and radiological externalities, the consumption of fossil fuel energy and CO_2 required in the uranium fuel cycle or the risks that may be entailed by the scarcity in production resources.

The DEIS notes that, if the continued operation of the Prairie Island Nuclear Generating Plant avoids the uncertainties of greenhouse gas emissions at the time of combustion, it does so by trading them for uncertain costs related to the safe handling, storage, and eventual placement in a federal repository of spent nuclear fuel (SNF) generated at the PINGP. *(DEIS, Ch. 2, p. 54)*. If these economic risks and uncertainties were fully analyzed in light of the failure to secure a federal repository for wastes at Yucca Mountain, decision-makers might conclude that neither the Prairie Island Nuclear Generating Plant nor the proposed expansion of indeterminate long-term radioactive waste cask storage is in the public interest.

3. Energy Policy Analysis of Cask Increase, Prairie Island Nuclear Generating Plant

The DEIS provides an analysis of alternatives to granting the certificate of need for a nuclear waste cask increase, describing several different alternative scenarios that could replace 1,100 MW of generating capacity from the Prairie Island Nuclear Generating Plant. *(DEIS, Ch. 2, pp. 47-56)*. The DEIS also acknowledges that potential human and environmental impacts of each of these scenarios could be proportionately reduced by demand side management *(DEIS, Ch. 2, p. 48)*.

This analysis is helpful, but incomplete. Not only must costs and externalities of continued reliance on nuclear power be evaluated *(Section 2, supra)*, but State certificate of need policies and new information regarding electric demand and transmission must be analyzed in the Final EIS to evaluate feasible and prudent alternatives to Xcel's nuclear proposals. The

Responses

Comment 16-10

The uranium fuel cycle is discussed in Chapter 1, Section 1.1. The potential impacts of the uranium fuel cycle are outside the scope of this EIS (Chapter 1, Appendix A).

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16-11 Study Group believes that an updated analysis could demonstrate that demand side management and renewable energy backed up by natural gas or purchased power provide feasible and prudent alternatives which are more consistent with State policy and create fewer adverse environmental impacts than continued operation of PINGP and increased nuclear waste storage. New information regarding declines in electric demand and the availability of transmission to support large wind energy conversion systems across Minnesota to the Buffalo Ridge area should be included in this updated alternatives analysis.

First, the assumptions regarding electric demand in Xcel's Application and in the DEIS are out-of-date and thus inaccurate. Xcel stated in its Application, based on a December 14, 2007 Resource Plan filing, that annual energy demand and energy would grow at a rate of about 1.1 percent per year, or 133 MW per year, so that Xcel would have a 126 MW energy deficit by 2012 and a deficit of over 2,800 MW by 2022. (*Application, 1-6, 1-7, 9-4*). These projections were accepted in the DEIS. (*DEIS, Ch.1, pp. 12,24*). The base line for this energy need was provided in the Application in Figure 9.1, which represented net 2008 summer peak demand at approximately 9,250 MW. (*Application, 9-5*)

More recent information indicates that projections from this base line would overstate demand and energy deficits. According to Xcel's Form 10-K filed with the SEC on February 27, 2009, (*http://www.secinfo.com/dVut2.s1Uy.htm#1stPage, p. 10*), Xcel's peak demand declined 11.79 percent from 2006 through 2008, and actual summer peak demand in 2008 was 8,697 MW, more than 500 MW lower than what was assumed in the Application and DEIS.

In its February 9, 2009 Resource Plan Update, Xcel proposed to delay several resources due to the "economic downturn" and the need "to address the effects of this recession." (*Resource Plan Update, 2/9/09, MPUC Docket No. E002/RP-07-1572, p. 2*). In conversations with industry media shortly after this filing, Xcel reported that Minnesota was seeing sales decline in its service territory, mainly with residential customers. As a result of the slumping economy, Xcel projected peak load declines of 374 MW in 2012 and of 613 MW by 2023 as compared with its December 2007 Resource Plan. (*Global Power Report, February 12, 2009*).

Declines in Xcel's peak demand provide a greater opportunity to evaluate feasible and prudent alternatives to increased nuclear waste storage and continued operation of the Prairie Island Nuclear Power Plant, consistent with the policy priorities of Minnesota's certificate of need law. The Final EIS should base its assessment of feasible and prudent alternatives to the PINGP on accurate demand information and Minnesota certificate of need policy.

Minnesota's certificate of need law states a clear preference for demand side management as an alternative to any large energy generation facility:

> No proposed large energy facility shall be certified for construction unless the applicant can show that demand for electricity cannot be met more cost effectively through energy conservation and load-management measures and unless the applicant has otherwise justified its need. (*Minn. Stat. § 216B.243, Subd. 3*)

Responses

Comment 16-11
Text in Chapter 2, Section 7.3 has been modified and supplemented to include economic analysis by the Department of Commerce, Office of Energy Security, Energy Regulation and Planning (OES-ERP) unit, comparing continued operation of the PINGP with alternatives under a variety of costs and externality scenarios. This analysis is based on updated demand information and projections. The analysis takes into account strategies to reduce and manage demand, i.e., demand side management (DSM).

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Smart grid technology, as well as incentive programs historically implemented by utilities, should be explicitly evaluated in the Final EIS and in further proceedings to determine whether demand side management provides a cost-effective alternative, in whole or in part, to a large energy facility. A number of communities are already applying smart grid technologies to substantially reduce peak demand. In addition to the Xcel project in Boulder, Colorado, the large metropolitan area of Austin, Texas has begun implementation of smart grid technology. Approximately $4.5 billion has been allocated in the current federal stimulus package to support smart grid technology. (*The Wall Street Journal, April 1, 2009*).

Minnesota certificate of need law also states a clear preference for renewable energy, rather than non-renewable nuclear generation:

> The commission may not issue a certificate of need under this section for a large energy facility that generates electric power by means of a nonrenewable energy source, or that transmits electric power generated by means of a nonrenewable energy source, unless the applicant for the certificate has demonstrated to the commission's satisfaction that it has explored the possibility of generating power by means of renewable energy sources and has demonstrated that the alternative selected is less expensive (including environmental costs) than power generated by a renewable energy source. For purposes of this subdivision, "renewable energy source" includes hydro, wind, solar, and geothermal energy and the use of trees or other vegetation as fuel. (*Minn. Stat. §216B.243, Subd. 3a*)

16-12 The Final EIS as well as further proceedings in this matter should provide more detailed analysis of a wholly or predominantly renewable energy alternative to replace the PINGP. Although the DEIS improved upon the Application, which gave no serious consideration to renewable energy, reliance on information prepared for the for the 2006 Monticello Project Final EIS is insufficient to analyze alternatives to Xcel's current PINGP proposals. (*See DEIS, Ch. 1, p. 50, note 128*).

First, in reviewing the impacts and costs of gas combustion to back up intermittent wind energy pending development of cost-effective storage technologies, the Final EIS should consider both the alternative of using capacity at existing natural gas plants and the alternative of repowering coal plants to natural gas to reduce greenhouse gas externalities. Although Xcel deferred consideration of repowering Black Dog coal combustion Units 3 and 4 in its February 9, 2009 Resource Plan Update (*Update, 2/9/09, MPUC Docket No. E002/RP-07-1572, p. 3*) repowering of the coal plant units could produce several hundred megawatts of generation, while reducing emissions and externalities. Minnesota policy supports the repowering of coal plants with natural gas to reduce mercury, nitrogen oxides, sulfide dioxide and particulates as well as carbon dioxide emissions, as reflected in the emissions reduction rider legislation, Minnesota Statutes § 216B.1692.

Second, in addition to the alternative of large wind energy conversion systems backed up with natural gas, the Final DEIS should analyze alternatives providing support for wind energy through smart grids and distributed generation or through transmission and purchased power

Responses

Comment 16-12
Text in Chapter 2, Section 7.3 has been modified and supplemented to include economic analysis by the Department of Commerce, Office of Energy Security, Energy Regulation and Planning (OES-ERP) unit, comparing continued operation of the PINGP with alternatives under a variety of costs and externality scenarios.

OES-ERP analyzed an alternative that included 1,000 MW of wind, approximately matching the capacity of PINGP, along with least-cost fossil fuel back-up ("renewable plus least-cost back up"). This alternative was about $400 million more expensive than the least-cost alternative (i.e., without forced renewables). The least-cost alternative was more expensive than continued operation of the PINGP by about $1.3 billion. Wind is generally acknowledged to be the least-cost, widely available (in terms of new sites) renewable resource. Thus, a wind or renewable alternative ("renewable plus least-cost back up") is approximatly $1.7 billion more than continued operation of the PINGP.

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through the MISO market. This alternative becomes particularly salient after certification of the CapX2020 Brookings Project, which will connect to significant new generation capacity.

Current information and policy, including the 2007 Renewable Energy Standards, the 2008 Distributed Renewable Generation report, 2009 information regarding declines in demand and smart grid implementation, and the April 2009 approval of the CapX2020 Brookings transmission for wind energy should be used in the Final EIS to provide a robust analysis of alternatives to Xcel's PINGP consistent with Minnesota renewable energy and demand management policies.

4. Site Locational Issues, Cask Storage for Decommissioning and Alternative Sites

The independent spent fuel storage installation at the Prairie Island Nuclear Generating Plant has environmental and human site issues that should raise concerns in considering increased storage of highly radioactive nuclear wastes. PINGP is located on Prairie Island, an island terrace associated with the Mississippi River flood plain. *(DEIS, Ch. 1, p. 72)* The probable maximum flood at Prairie Island has been calculated to be 706.7 feet above mean sea level (MSL), while the surface of the nuclear spent fuel installation at the PINGP is only 697 feet above MSL. *(DEIS, Ch. 2, p. 28).*

The Prairie Island Nuclear Generating Plant is also located immediately adjacent to the Prairie Island Indian Community Reservation *(DEIS, Ch. 1, p. 57)* within the city limits of Red Wing and approximately 30 miles from the Capitol City of St. Paul *(DEIS, Ch. 1, p.2).* The estimated total permanent population within 50 miles of the PINGP is 2,949,234 - nearly three million people. *(DEIS, Ch. 1, p. 59).*

16-13 Despite these site factors, the DEIS included no analysis of seismic activity, weather, wind or geologic features that could affect long-term storage of nuclear wastes, or transmittal of radioactive materials through water or air. The DEIS did not compare security issues and maximum risks from cask failure at the PINGP site as compared to other locations.

16-14 Federal law does not prohibit the State from selecting nuclear waste storage sites within its borders. The DEIS did not evaluate the potential for spent fuel storage sites outside the PINGP boundaries due to an understanding that the Commission's authority is limited by State law to the storage of spent nuclear fuel generated by an existing Minnesota nuclear generation facility and stored on the site of that facility. *(See DEIS, Ch. 1, p. 16).* The DEIS assumed that at the end of the 2034 license renewal period the nuclear spent fuel installation at the Prairie Island Nuclear Generating Plant would store 34 additional casks for decommissioning, creating a total of 98 casks on the spent fuel storage pad at the PINGP upon removal of all spent nuclear fuel from the plant. *(DEIS, Ch. 2, pp. 22-23).*

It is interesting to the PINGP Study Group that, even when discussing decommissioning and the storage of nuclear waste for up to 200 years, the DEIS did not consider the possibility of another site for nuclear waste other than the PINGP site. We read applicable Minnesota statutes to explicitly authorize the Commission to grant certificates of need for dry cask storage for decommissioning a nuclear power plant at other locations within the State.

Responses

Comment 16-13
Factors that could affect long-term storage of casks at the Prairie Island ISFSI, including seismic events, weather, and natural features are discussed in Chapter 2, Section 5. The EIS does not compare these factors at the Prairie Island ISFSI with other possible long-term storage locations as such locations are not considered available for consideration under current Minnesota law (see response to Comment 16-14).

Comment 16-14
Energy facility permitting staff of the Office of Energy Security interprets Minnesota law to limit additional dry cask storage within the state of Minnesota, regardless of the reason for the storage, to the site of the facility which generates the spent nuclear fuel and associated storage casks. Thus, under current law, the only site within Minnesota available for spent nuclear fuel generated by the PINGP is the Prairie Island site. Storage sites outside of Prairie Island would not be in accordance with current Minnesota law and consideration of such sites is outside the scope of this EIS (Chapter 1, Appendix A). Accordingly this EIS does not discuss storage sites outside of Prairie Island. Additionally, it does not discuss criteria by which alternate sites might be evaluated or identity alternates sites.

Minnesota Statute 116C.771, enacted in 1994, gave initial state authorization for storage of spent nuclear fuel on site at Prairie Island. The statute provides for a total of 17 dry storage casks and notes that this number may not be increased except for additional storage that may be required for the decommissioning of a nuclear power plant within the state (Minn. Stat. § 116C.771(e)). Subdivision (e) is silent on the location of additional storage for decommissioning.

Minnesota Statute 116C.83, enacted in 2003, provides that "any additional dry cask storage... is subject to approval of a certificate of need by the Public Utilities Commission" (Minn. Stat. 116C.83, Subd. 2). The authority of the Commission is constrained such that "authorization for storage capacity pursuant to this section is limited to the storage of spent nuclear fuel generated by a Minnesota nuclear generation facility and stored on the site of that facility" (Minn. Stat. § 116C.83, Subd. 4(b)).

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Minnesota Statutes 116C.771, enacted in 1994, states:

> (d) Except as provided under paragraph (e), dry cask storage capacity for high-level nuclear waste within the state may not be increased beyond the casks authorized by section 116C.77 or their equivalent storage capacity.
>
> (e) This section does not prohibit a public utility from applying for or the Public Utilities Commission from granting a certificate of need for dry cask storage to accommodate the decommissioning of a nuclear power plant within this state.

The Legislative authorization for additional dry cask storage enacted in 2003 does not eliminate this authority. The statute states, "The authorization for storage capacity *pursuant to this section* is limited to the storage of spent nuclear fuel generated by a Minnesota nuclear generation facility and stored on the site of that facility." (*Minn. Stat. 116C.83, Subd. 4(b), emphasis added*). The Commission's authority to certify dry cask storage for decommissioning a nuclear power plant is in a different section of statutes, enacted to balance a different set of competing policies.

16-14 The PINGP Study Group acknowledges that legislative change would be needed to authorize the siting of cask storage at a site other than the PINGP site absent the need to accommodate decommissioning of the nuclear power plant. However, when the long-term storage of nuclear wastes, including wastes from decommissioning, is proposed, the comparative unsuitability of the Prairie Island site becomes evident. An EIS need not conclude that another site will be chosen by decision-makers, some of whom may be elected officials, but it should explain the environmental and human risks that could be mitigated through consideration of alternative sites.

It is highly likely that the Yucca Mountain EIS, among other documents, provides a wealth of information as to criteria that make a site more or less suitable for the indeterminate long-term storage of highly radioactive nuclear wastes. It is also likely that the particular site characteristics of the spent fuel installation at the Prairie Island Nuclear Generating Plant would conflict with most reasonable criteria for site selection. Absent Xcel's requirement for transmission to the Twin Cities and abundant water to cool its nuclear reactor, it is unlikely that the best site alternative would be to locate radioactive materials below projected flood levels on the flood plain of the State's major river, the waters of which are used for public drinking water. It is also unlikely that the best site alternative would be to locate long-term storage of highly radioactive wastes within 30 miles of the State's capitol city and within 50 miles of its primary population center.

16-14 The Final EIS for Xcel's proposed cask increase project should propose criteria by which locations for nuclear waste decommissioning sites would be evaluated and, if possible, identify an alternative location to mitigate risks from storage of radioactive materials at the PINGP site.

16-15 The Final EIS should also discuss, in its review of various canister and vault systems of storage (*DEIS, Ch. 2, pp. 44-45*) whether any of the alternatives would entail greater or lesser difficulty in removal and transportation off-site than would the proposed TN-40 and TN-40HT casks.

Responses

Comment 16-14 (continued)
Read together, these two statutes indicate that the Commission cannot, absent further legislation, authorize the storage of spent nuclear fuel at sites within Minnesota other than the facilities which generate the spent fuel. To the extent that these statutory provisions are irreconcilable, Minnesota Statute 645.26 provides guidance. Subdivision 1 provides that the specific controls over the general; subdivision 4 provides that the later-passed law prevails over the earlier (Minn. Stat. § 645.26, Subd 1, Subd 4).

Minnesota Statute 116C.771 was enacted in 1994 and addresses generally the storage of spent fuel to facilitate the decommissioning of a nuclear power plant, without mention of siting. Minnesota Statute 116C.83 was enacted in 2003 and specifically addresses the question of siting for additional dry cask storage, regardless of the reason for additional storage. Because section 116C.83 was enacted after section 116C.771 and because it specifically provides for additional storage of any type, which would include storage for decommissioning, and because it speaks specifically to the siting of additional storage, it is, in this instance, controlling.

Comment 16-15
Text had been added to Chapter 2, Section 6.3 discussing the relative ease of handling and removal of casks to a federal repository.

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Responses

5. Environmental Justice Analysis

The nearest neighbors to the Prairie Island Nuclear Generating Plant are members of the Prairie Island Indian Community who live on the reservation. *(DEIS, Ch. 2, p. 9)*. The Prairie Island Indian Community are part of a larger group called the Dwellers of the Spirit Lake (Mdewakanton) who have lived in this area of Minnesota for hundreds of years. They refer to themselves as Dakota or Lakota, words that mean "allies" or "friends" in several dialects. *(http://www.prairieisland.org/History.htm)* In 1936, the federal government officially recognized Prairie Island Indian Community (PIIC) as a reservation for the Mdewakanton, awarding them 534 acres. The Prairie Island Indian Community is a Federally Recognized Indian Tribe organized under the Indian Reorganization Act *(25 U.S.C. 476)*.

In addition to living near the nuclear plant, the Prairie Island Indian Community operates its most significant business and recreational enterprises near the PINGP. The Community owns and operates Treasure Island Resort and Casino, employing about 1500 people. The Treasure Island Resort and Casino includes a 250-room hotel and convention center that is currently being expanded to include an additional 230 rooms. The expansion would include a 24-lane bowling center and a multi-use event center with a maximum seating capacity of 2,800. Treasure Island Resort and Casino offers gaming, dining, live entertainment, a 95- space RV park, a 137-slip marina to accommodate visitors arriving by the Mississippi River, and sightseeing and dinner cruises on their riverboat. *(DEIS, Ch. 1, p. 58, Ch. 2, p. 9)*

The DEIS mentions the fact that the persons most closely exposed to the human health risks of PINGP are members of Prairie Island Indian Community, but the DEIS contains no discussion of the environmental justice implications of increasing nuclear waste cask storage, increasing radiological impacts from the nuclear uprate or continuing a nuclear power land use in proximity to reservation lands, homes and businesses. In fact, even where the DEIS has an opportunity to evaluate whether the proposed action would have a disproportionate adverse impact upon the Prairie Island Indian Community, the DEIS fails to provide this analysis.

For example, in discussing the potential for cancer incidence related to the PINGP, the DEIS reports inconclusive information about Goodhue County, an area comprising 764 square miles, and then states, "This report was not able to address cancer rates in the Prairie Island Indian Community members who reside near the plant." *(DEIS, Ch. 1, p. 87)* The DEIS also discusses the "sociological impacts" of continued operation and increased cask storage at the Prairie Island Nuclear Generating Plant as compared with alternatives that would permit closure and decommissioning of the plant without even mentioning the Prairie Island Indian Community or the information provided through the Advisory Task Force regarding adverse social, psychological and spiritual impacts upon the Community from the presence of the nuclear power plant. *(ATF Summary, EIS Scoping Worksheet, p. 10)*. Excluding all context or community input, the DEIS blithely concludes, "Continuing operations of the PINGP (no new land use) would likely have a neutral aesthetic and sociological impact." *(DEIS, Ch. 2, p. 56)*.

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The failure to analyze environmental justice impacts violates federal policy, state policy and legal precedent pertaining to environmental review. Federal policy is reflected on the U.S. EPA web site:

> Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.
> (*http://www.epa.gov/compliance/basics/ejbackground.html*)

State policy, similarly is reflected in the commitment posted on the Minnesota Pollution Control Agency web site to ensure that minority and economically disadvantaged communities in Minnesota "do not bear a disproportionate share of the involuntary risks and consequences of environmental pollution." *(http://www.pca.state.mn.us/publications/p-gen5-01.pdf)*

Case law pertaining to environmental review consistently requires analysis of environmental justice. *DOT v. Public Citizen, 541 U.S. 752, 761 (2004).* As stated in *Mid States Coalition for Progress v. Surface Transp. Bd., 345 F.3d 520, 541 (8th Cir. 2003),* "The purpose of an environmental justice analysis is to determine whether a project will have a disproportionately adverse effect on minority and low income populations."

16-16 The Final EIS for Xcel's proposed cask increase and uprate at the Prairie Island Nuclear Generating Plant must include an analysis of environmental justice, including whether a disproportionate share of the negative environmental consequences of the nuclear plant and nuclear waste storage installation are borne by the Prairie Island Indian Community. In this context, the PINGP Study Group suggests that an analysis of site criteria for potential alternative nuclear waste storage sites be included in the Final EIS, irrespective of the fact that an alternative location might require legislative action.

The past fifteen years of legislative history has demonstrated that the apparent limitation on casks in Minn. Stat. § 116C.771(d) did not prevent the Legislature's approval of additional high-level nuclear waste storage when it suited Xcel Energy's interests. The provisions of Minn. Stat. 116C.83 cited in the DEIS were the result of Xcel's 2003 lobbying in connection with those interests. If the failure of the responsible governmental unit to consider other locations for nuclear waste were based on an assessment that the only place that the Legislature might authorize storage of PINGP highly radioactive waste is adjacent to the Prairie Island Indian Community, this itself would be evidence of environmental injustice, potentially rising to the level of violation of civil rights and equal protection.

6. Demand Decline, Lack of Need for 164 MW Uprate

Factual information pertaining to the decline in Xcel's energy demand and preferences for demand management and renewable energy in Minnesota's certificate of need statutes (*see*

Responses

Comment 16-16
See responses to Comment 15-15 (environmental justice) and Comment 16-14 (consideration of alternate sites and site criteria), which address the same concerns.

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Section 3, supra) create an even more compelling need to review alternatives to the Extended Power Uprate in rigorous detail.

16-17 Demand information provided by the DEIS in connection with the need for the uprate is inaccurate and inconsistent with Minnesota Rules 7849.7030 which provides, "The commissioner [of the Department of Commerce] shall be responsible for the completeness and accuracy of all information in the environmental report." It appears to be a cut-and-paste from some other document, reflecting inapplicable circumstances. An excerpt is provided herein:

> The only information reviewed for this document regarding the feasibility of DSM is that information provided by Xcel Energy in its Certificate of Need Application, dated May 16, 2008. Xcel Energy concludes in its application that DSM is not a feasible alternative to the proposed project.
>
> According to Xcel, the demand for electrical power will continue to grow at an average rate of 2.6 percent per year or an average of an additional 240 MW for the Xcel Energy service area each year. . . Also, Xcel maintains that the additional power will be required in the summer of 2005. It is not practical to expect that the results of the program can be doubled or tripled in less than a year, the time remaining after the result of the Commission's Need decision. (*DEIS, Ch. 1, p. 25*)

A corrected analysis of potential alternatives to the nuclear power uprate in the Final EIS would begin with assertions of demand in Xcel's Application in this proceeding, which claims a 1.1 percent per year demand growth or an average of 133 MW per year. (*Application, 1-6, 1-7, 9-4*). The updated analysis would then examine more recent evidence of decline in demand in Xcel's SEC filings, February 9, 2009 Resource Plan Update and contemporaneous communications to the media. These sources identify a potential decline in electric demand through 2012 of at least 374 MW and potentially as much as 500 MW, as compared with the data in Xcel's Application. (*see Section 3, supra, pp. 9-10*).

Reviewing the projected energy deficits in Xcel's Application in light of this current information on energy demand, the urgency of the uprate disappears. The 2012 "deficit" of 228 MW projected by Xcel (*Application, Table 9-1, p. 9-5*) is more than met by the actual decline in Xcel's peak energy demand. Even if no other new resources are brought on line, Xcel will have a surplus of energy through at least 2012, providing ample time to consider energy alternatives that are more consistent with Minnesota energy policies.

7. Feasible Alternatives to Increased Non-Renewable Nuclear Generation

The DEIS discusses Xcel's proposed nuclear power uprate as if in a vacuum. Neither adverse environmental and health consequences nor economic externalities are considered. State energy policies favoring other alternatives are similarly ignored.

Xcel's proposed nuclear power uprate would require a higher thermal power level, more steam being produced by steam generators, more uranium loaded into the reactor core to

Responses

Comment 16-17
See response to Comments 15-1 and 15-3 which addresses the same concerns (updated DSM achievement, updated demand).

The comment confuses capacity [measured in megawatts (MW)] with energy [measured in megawatt-hours (MWh)]. With baseload power plants, such as the PINGP, issues of peak capacity (demand measured at the highest-use moment each year) are not the determining factor. Baseload power plants are constructed to provide energy on an "around the clock" basis. Therefore, the utility's load shape (demand considered chronologically) and existing fleet of power plants are the important factors. A utility could have sufficient resources to meet peak capacity and yet still have a need for baseload energy depending upon the load shape and the existing power plants.

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maintain the same fuel cycle length, larger diameter fuel pellets and fuel assemblies that would operate at higher temperatures than current Prairie Island Nuclear Generating Plant fuel assemblies. (*DEIS, Ch. 1, pp. 2, 4*). As a result the uprate would require major modifications including: upgrade high-pressure turbines, replace or rewind main generators, replace generator step-up transformers, replace moisture separator reheaters, upgrade isophase bus duct cooling. (*DEIS, Ch. 1, p. 2*). Although the Nuclear Regulatory Commission ("NRC") will analyze whether the uprate temperatures and pressures and the new fuel design are safe, no such analysis has yet been completed. (*DEIS, Ch. 1, p. 4*)

Even if the new uprate designs meet NRC safety requirements, the uprate would proportionately increase radionuclide releases from the Prairie Island Nuclear Generating Plant by at least 10 percent. (*DEIS, Ch. 1, p. 81*). The DEIS notes that this impact on exposure to members of the public would be most noticeable at times of refueling and maintenance, when the primary reactor system is opened:

> [D]uring refueling and maintenance operations, when the primary reactor system is open to the building atmosphere, small quantities of noble gases, halogens, tritium, and particulates are removed by the ventilation systems. . . Xcel Energy projects that the concentration of radionuclides in the gaseous radioactive effluents streams would, at most, increase linearly with power as a result of the proposed uprate, i.e., by approximately 10 percent. (*DEIS, Ch. 1, p. 81*)

16-18 The DEIS contains no independent analysis to evaluate whether radioactive releases would increase linearly or by some other function as heat and pressure increase. Further, while the DEIS emphasizes that radiological doses will be within federal regulations, this conclusion is insufficient to assess cumulative impacts on human health risks (*see Section 9, infra*) and insufficient for a policy analysis of feasible and prudent alternatives to an energy project.

16-19 In conducting a policy analysis of energy alternatives to a coal plant, for example, the ability of the plant to comply with regulations is assumed. Calculation of environmental externalities assists decision-makers in determining whether a project that might be legally permitted is, in fact, in the public interest. The DEIS adopts without any independent analysis Xcel's misleading present value of revenue requirements analysis. (*DEIS, Ch. 1, p. 30*). Xcel's arguably self-serving PVRR includes no externalities for the uranium fuel cycle, no externalities for emissions or waste resulting from nuclear power uprate and no alternatives based on demand side management, renewable energy or the repowering of coal plants with natural gas to reduce emissions.

16-20 The statement in the DEIS that replacing any of the energy provided by the nuclear power uprate with natural gas will increase carbon emissions and impact Xcel's ability to meet legislated carbon initiatives (*DEIS, Ch. 1, pp. 44-45*) is inaccurate. As the State's experience with the Metro Emissions Reduction Project (*MPUC, Docket No. E-002/M-02-633*) demonstrates, repowering of coal-fired units with natural gas substantially reduces carbon dioxide emissions, among other adverse impacts, while increasing dispatchable generation. Similarly, statements in the DEIS that purchased power is not a viable alternative due to the lack of transmission and generating capacity (*DEIS, Ch. 1, pp. 26, 43*) are obsolete, if they

Responses

Comment 16-18
OES energy facility permitting staff consider the assumption that radioactive emissions will increase linearly with the proposed power uprate to be appropriate.

The EIS estimates potential radiological exposures, doses, and health risks in Chapters 1 and 2. These potential radiological impacts are discussed independent of whether they fall within federal regulations. That is, even if the impacts fall within federal regulations, they are discussed and examined as potential public health risks (e.g., risk of cancer incidence, number of cancer incidences). Tables have been added to assist in visualizing cumulative impacts to plant personnel and the general public (Chapter 1, Table 4-10; Chapter 2, Table 5A-2).

Comment 16-19
The OES-ERP analysis in direct testimony includes calculation of the economic benefits and costs of continued operation of PINGP, including (nuclear and other) externality values that include values for the health and environmental impacts. The costs of long-term storage are discussed above and in OES-ERP rebuttal testimony. The analysis demonstrates that every feasible alternative: 1) relies more on coal-generated electricity; 2) produces more of every pollutant monitored; and 3) costs more.

The OES-ERP's analysis used the externality values and carbon regulation cost estimate established by the Commission in conjunction with other external factors--in this case nuclear externalities. The Commission's externality values and carbon regulation cost estimate along with the OES-ERP's nuclear externality value were applied to electricity generation in a manner consistent with the statute.

Comment 16-20
The referenced EIS statement (Chapter 1, pages 44-45) refers to replacing the proposed 164 MW EPU with a new natural gas facility on a one for one basis and does not include the elimination of an additional fossil-fuel facility.

Commenter 16 - PINGP Study Group (via Paula Maccabee)

were ever accurate. Approval of the CapX 2020 Brookings Project will permit Xcel to purchase new generation capacity, including renewable generation, to meet future energy demands.

16-21 The Final EIS pertaining to the uprate should not only reevaluate the need for an additional 164 MW of nuclear energy based on current electric demand information. The Final DEIS should analyze the cumulative impacts of the proposed uprate and externalities of increased reliance on nuclear generation.

16-22 The Final EIS should evaluate whether the proposed uprate is consistent with Minnesota certificate of need preferences for demand side management and renewable energy (*Minn. Stat. § 216B.243, Subd. 3 and Subd. 3a*) as opposed to the non-renewable nuclear generation proposed in the uprate. The Final EIS should provide a detailed analysis of alternatives to the uprate focused upon smart grid demand management and renewable generation. This analysis should evaluate backing up wind power with distributed generation or purchased power as well as the most economical back-up with natural gas in order to provide robust alternatives to the uprate reflecting Minnesota law, policy and public interests.

8. Mitigation of Non-Radiological Impacts of Uprate

Mitigation of the non-radiological impacts of the proposed uprate is a matter wholly within State jurisdiction. There will be no NRC evaluation of thermal impacts of the uprate on aquatic organisms or ice on Lake Pepin.

Given the clear articulation of concerns regarding thermal impacts of the uprate by the Minnesota Department of Natural Resources ("MDNR") (*Scoping Comments letter of M. Langan, MDNR Division of Ecological Resources 10/7/08 "MDNR Scoping Comments"*), it is puzzling to the PINGP Study Group that the DEIS both accepted the Applicant's claims regarding the insignificance of the thermal impact virtually verbatim (*Compare Application 8-12 to 8-16 and DEIS, Ch. 1, pp. 48-49*) and failed to consider mitigation specifically requested by the MDNR.

The DEIS' reliance on the Applicant's assertions rather than the expertise of the MDNR within its field of specialization is inconsistent with Minnesota Statutes 116D.03, Subd. 2 (2) which provides that state agencies shall use a "systematic, interdisciplinary approach" in decision-making that may have an impact on the environment and consult "with persons in appropriate fields of specialization so as to ensure that the latest and most authoritative findings will be considered in administrative and regulatory decision-making as quickly and amply as possible."

As excerpted below, the MDNR Scoping Comments proposed an auxiliary dry cooling tower to mitigate thermal impacts if the uprate were to be approved in order to reduce mortality of aquatic organism and risks to winter recreational users of Lake Pepin:

> Based on the proposed uprate, and increase in rejected heat, DNR requests that Xcel provide companion discussion of expanded cooling tower capacity that addresses the

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Comment 16-21
The EIS describes the incremental impacts arising from the proposed EPU in the context of the existing and ongoing operations at PINGP, including existing permits and monitoring (MPCA, DNR, MDH).

Testimony from OES-ERP (Rakow, Davis, Ham) include information on externalities associated with nuclear generation and the potential alternatives.

Chapter 16-22
The issues of whether the proposed EPU is consistent with Minnesota Statute 216B.243, Subd. 3 and Subd. 3a are more appropriately reviewed by and ultimately determined by the OES-ERP and the Commission, respectively. The reader is directed to the testimony from OES-ERP (Rakow, Davis, Ham) in these dockets.

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> additional increment of thermal load to the river. The 10% increase in rejected heat, and maximum of 3 degrees F. increases at the discharge canal should be process treated through the use of an additional 10% (plus margin of safety) of cooling tower capacity. We suggest that an auxiliary dry cooling tower should be evaluated, which could address this new increment of thermal loading to the river, and eliminate any concerns of impairment to aquatic biota. This type of design would provide the partial cooling necessary during winter operation when the existing wet cooling towers would be subject to severe maintenance issues. This would prevent further deterioration of ice cover on Lake Pepin. A dry tower would also be able to provide backup capacity for those periods of low river flow and high atmospheric temperatures when PINGP is at or approaching an energy emergency.
>
> In order to maintain the established design proportions of cooling capacity to thermal output for PINGP, an additional (10%) of cooling capacity must be included in the uprate design. Without this action, the Exceedances of the 86 degree Fahrenheit summer temperature maximum will increase. While there are permit provisions (with MPCA notification) for these extreme periods and temperature violations, DNR does not want future plant operation to contribute any additional thermal pollution during these periods of high stress with potential mortality for aquatic organisms. . .
>
> The MDNR also has concern with increased thermal loading, during open cycle winter operation, contributing to the loss of fish life from cold shock. . . With an emergency shut down, there is a high degree of certainty that mortality will occur. We noted briefly a minimum of nine cold shock events since 1985, with loss of fish. Our communications with Xcel indicate that dead fish are generally counted within the discharge canal and that river currents do not make it conducive to account for fish that may have died in the river thermal plume. Again, addressing the increased potential for cold shock with an auxiliary tower would eliminate this resource concern. (*MDNR Scoping Comments, p. 2*)

16-23 The PINGP Study Group requests that the Final EIS include a detailed discussion of the mitigation measures proposed by the MDNR above. In addition, the Final EIS should evaluate measures to improve monitoring of fish mortality as a result of PINGP operations, including cold shock. This evaluation should consider methods to locate and count dead fish beyond the PINGP discharge canal.

9. Cumulative and Differential Analysis of Cancer Risk

Information regarding human health risk assessment for cancer as a result of the proposed radioactive waste cask increases, extension of reliance on the Prairie Island Nuclear Generating Plant and uprate increase in temperature and uranium are scattered throughout the DEIS. Although some important information is provided, it is neither complete nor assembled in such a way as to permit decision-makers to review the cumulative impacts of the Applicant's proposals on either workers or members of the public exposed to radiation.

The basic facts pertaining to the Prairie Island Nuclear Generating Plant and cancer are relatively clear-cut. High doses of radiation delivered in a short period of time, as in an atomic

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Comment 16-23

The text in Chapter 1, Section 4.2-*Cold Shock* and Chapter 1, Section 4.11-*Water Discharge Temperature* has been modified to reflect the DNR's concerns in these areas.

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Responses

bomb explosion or substantial release of radiation in the Chernobyl reactor incident, create substantial and immediate health effects due to irreparable cell death and damage. (*DEIS, Ch. 1, pp. 75-76*). Low-level radiation causes cancer, and the risk of cancer from low-level radiation is expressed as a probability. The best scientific evidence, cited in the DEIS, is that the relationship between dose and risk for low-level radiation exposure is linear, even at very low doses. "There is no *de minimis* does for which risks need not be considered; all doses present some level of risk." (*DEIS, Ch. 1, p. 18*).

Licensed activities utilizing radioactive materials require that licensees must achieve doses to workers and the general public that are as low as reasonably achievable (ALARA). (*Minn. R. 4731.2020*) External and internal doses of radiation should be summed for most occupational exposures. (*Minn. R. 4731.2030*). Minnesota law recognizes the vulnerability of the embryo/fetus to radiation. The dose to an embryo/fetus is the sum of the dose equivalent to the pregnant woman and the dose equivalent to the embryo/fetus from radionuclides in the embryo/fetus and radionuclides in the pregnant woman. (*Minn. R. 4731.2080*).

Minnesota rules and policies provide numeric guidance for carcinogenic risks (e.g. chemicals in groundwater or air) to which Minnesota citizens are involuntarily exposed. (*Minn. R. 4717.7100, Minn. R. 4717.8000*). These risks are considered in permit applications for air and water discharge and to determine the scope of voluntary actions to remediate pollution. Where a proposed action will result in carcinogenic exposure through more than one medium or chemical, these risks are cumulated in health risk assessment. (*Minn. R. 4717.7700, Minn. R. 4717.8550*). As stated in the DEIS, citing Minnesota Rules, the "acceptable level for additional lifetime carcinogenic risk" from contaminants is 1 in 100,000 (1 E-05)." (*DEIS, Ch. 1, p. 77, Minn. R. 4717.7300, Minn. R. 4717.8050, Subp. 3*).

Research cited by the DEIS demonstrates that there is an elevated risk of childhood cancer near nuclear facilities. As concluded in the *Archives of Environmental Health* study cited in the DEIS,

> Numerous reports document elevated cancer rates among children living near nuclear facilities in various nations. Little research has examined U.S. rates near the nation's 103 operating reactors. This study determined that cancer incidence for children < 10 yr of age who live within 30 mi (48 km) of each of 14 nuclear plants in the eastern United States (49 counties with a population > 16.8 million) exceeds the national average. The excess 12.4% risk suggests that 1 in 9 cancers among children who reside near nuclear reactors is linked to radioactive emissions. If cancer incidence in 5 western states is used as a baseline, the ratio is closer to 1 in 5. Incidence is particularly elevated for leukemia. Childhood cancer mortality exceeds the national average in 7 of the 14 study areas. (*Elevated Childhood Cancer incidence Proximate to U.S. Nuclear Power Plants, Archives of Env. Health, 2/1/2003, cited in DEIS, Ch. 1, p. 85, fn. 58*)

16-24 Cancer studies conducted by the Minnesota Department of Health from 1988-1992 in a large 10-county region and from 1988-1996, using the entire 764 square mile Goodhue County area as a data base (*DEIS, Ch. 1, pp. 85-88*), do not provide sufficient information to evaluate the

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16-24 degree to which the Prairie Island Nuclear Generating Plant may or may not be increasing cancer rates. MDH studies may have been performed too soon to identify long-term effects. More important, the breadth of the geographic areas studied precludes analysis of effects near the source of low-level radiation. The MHD information cited by the DEIS adds little to the analysis of the potential health risks of Xcel's nuclear proposals. It does not relieve state agencies from the obligation to evaluate cumulative cancer health risks from an increase in casks storing nuclear spent fuel for the indefinite future, the long term extension of PINGP operations, and the increase in heat and uranium use for a proposed nuclear power uprate.

Even the incomplete information provided by the DEIS raises serious concerns about the increased cancer risks from Xcel's proposal to increase cask storage of radioactive waste. Without considering the probability of degradation over time, untoward weather or man-made events, the low-level radiation impacts to members of the public and to PINGP personnel from "skyshine radiation" alone would exceed Minnesota's 1 in 100,000 policy threshold for acceptable lifetime carcinogenic risk.

As noted in the DEIS, the cancer risk to the general public from "skyshine radiation" with 64 nuclear spent fuel casks is 2.8 in 100,000 (*DEIS, Ch. 2, p. 26*). The cancer risk to PINGP personnel from "skyshine radiation" alone is estimated at 98 in 100,000 for 48 casks (*DEIS, Ch. 2, p. 27*). Once the maximum exposure and dose rate occurs, when the 98th cask is placed on the pad at the PINGP, the cancer risk to nearest member of the public is projected to be 35 in 100,000. (*DEIS, Ch. 2, p. 35*). These risk levels to workers and to members of the public are an order of magnitude above what the DEIS has characterized as an "acceptable risk" under Minnesota Rules and policies. (*DEIS, Ch. 1, p. 77*)

The chart below summarizes the information in the DEIS (*DEIS, Ch. 2, pp. 26, 27, 34, 35; Ch. 1, pp. 81, 84*) concerning cancer health risk assessment.

PERSONS EXPOSED	Route of Exposure	Casks	Cancer Risk per 100,000
CASK INCREASE GENERAL PUBLIC	"skyshine radiation"	64 98	2.8 35
PINGP PERSONNEL	"skyshine radiation"	48	98
USUAL OPERATION - PINGP GENERAL PUBLIC	Gaseous effluents Groundwater releases		0.07 0.28

16-25 It is recommended by the PINGP Study Group that a complete and cumulative assessment of human cancer risks be performed and set forth clearly in the Final EIS. A cumulative assessment of human cancer risks from the proposed cask increase and continued operation of PINGP would analyze at least the following risks of exposure to PINGP personnel and the public: risks from maintenance and repair of storage casks; releases from casks due to

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Comment 16-24

Cancer studies conducted by the Minnesota Department of Health (MDH) are discussed in the EIS. These studies were not conducted to determine whether cancer risks were higher because of Minnesota's nuclear power plants. Rather these studies were conducted to respond to (1) allegations that breast cancer mortality rates were elevated in ten specific counties that are proximate to either the Prairie Island or the Monticello nuclear plants, and (2) public concerns about cancer rates in Goodhue County or the city of Red Wing. The MDH studies were conducted to determine if cancer risks were higher in these specific areas, independent of the cause of such risks.

The use of a ten-county region to examine cancer risks would preclude identifying an increased cancer risk related to close proximity (as a surrogate for exposure) to nuclear power plants. A very different study design would be required and there would be an insufficient number of cases to conduct such a study in Minnesota (see response to Comment 17-11, which also discusses this limitation). With respect to whether cancer studies may have been performed too soon to identify long-term effects, this is a valid concern for studies attempting to link radiation exposure and cancer risks. It is well established that increased cancer risks typically do not become apparent until 15-30 or more years after the start of exposure to a cancer-causing agent (radiation, cigarette smoke, asbestos, etc). This period is referred to as the "latency" period. Leukemias and thyroid cancers, especially in children, however, appear to have a much shorter latency period. Minnesota's nuclear power plants came into operation in 1971 and 1973, so latency would not be a limitation on a study attempting to link radiation exposures to cancer risks. Study design and sample size would be limitations on such a study.

Commenter 16 - PINGP Study Group (via Paula Maccabee)

16-25 degradation of materials, weather events, and man-made accidents or incidents over the indefinite period of time during which the casks would remain at the PINGP site; risks from continued operations of the PINGP including regular gaseous effluents, releases during maintenance and refueling, groundwater releases and food contamination; and some risk factor reflecting the potential of man-made accidents or incidents to increase radioactive releases from plant operations to air or groundwater. In addition, a cumulative assessment of the risks from Xcel's nuclear proposals would estimate the increased cancer risk to PINGP personnel and the general public from additional predictable releases from the proposed uprate and any increased risks of untoward releases that may result from the changes in reactor design.

In order to permit decision-makers to evaluate costs and risks of the proposed nuclear projects, the assessment should explain cumulative risks to both PINGP personnel and the nearest members of the general public if either or both the cask increase and the uprate are authorized. These risks should be expressed in terms of the 1 in 100,000 risk factor, which represents the upward bound of acceptable risk under Minnesota law. Increased lifetime cancer risks to members of the public should be identified for an embryo, fetus or child as well as for an adult.

16-26 In addition to requesting a comprehensive assessment of human cancer risks, the PINGP Study Group would repeat the requests made by the Advisory Task Force that the Final EIS identify best practices for radiological monitoring, including continuous monitoring of releases to air and groundwater, identification of dispersion plumes of radioactive isotopes and analysis of tritium contamination of wells. (*See ATF Summary, Meeting #3, p. 3, EIS Scoping Worksheet, p, 5*). For however long the Prairie Island Nuclear Generating Plant continues to operate and no matter how many casks of nuclear wastes are allowed on site, communities near the nuclear plant are entitled to the best available technology for monitoring radioactive releases that may affect their health.

Conclusion

Xcel's proposals to more than double cask storage of highly radioactive nuclear waste, extend operations of the Prairie Island Nuclear Generating Plan through 2034 and increase temperature, steam pressure and uranium usage for a 164 MW nuclear power uprate create the potential for significant adverse environmental and human health impacts and substantial economic costs and externalities. These proposals may conflict with Minnesota laws and policies regarding conservation, renewable energy, environmental justice and protection from unacceptable cancer health risks. New information undermining the likelihood that a federal nuclear waste depository at Yucca Mountain increases the probability that any additional nuclear waste stored at the Prairie Island Nuclear Generating Plant will be stranded there indefinitely. New data regarding declines in demand for electricity by Xcel Energy customers as well as recent approvals for transmission to support renewable generation capacity underscore the need for a robust analysis of alternatives to Xcel's nuclear proposals to determine if there are alternatives which are more consistent with State policies and the public interest.

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Comment 16-25

The EIS discusses and estimates potential radiological health risks to plant personnel and the general public from the proposed power uprate and expansion of dry cask storage. This discussion is "cumulative" in that it examines radiological risks and impacts from, as best can be determined, all known and potential exposure pathways. Tables have been added to assist in visualizing cumulative impacts to plant personnel and the general public (Chapter 1, Table 4-10; Chapter 2, Table 5A-2). The discussion and tables express potential radiological health risks (risk of cancer incidence) in an "X by 100,000" format.

Text has been added in Chapter 1, Section 4.13 to discuss radiological risks for subsets of the general public, e.g., children.

Comment 16-26

Xcel Energy undertakes monitoring for radionuclide emissions at the PINGP to satisfy NRC requirements. Xcel's equipment and protocols are designed to provide monitoring that meets NRC standards. Accordingly, the appropriateness of monitoring technology and protocols used by Xcel Energy is a consideration for the NRC and outside the scope of this EIS (see Chapter 1, Appendix A).

The Minnesota Department of Health (MDH) conducts an independent monitoring program to identify and quantify longer-lived radionuclides (e.g., Cesium-137, Cobalt-60) and to verify, if not replace, calculation of doses with empirical data obtained using radiation monitors, air sampling equipment, and sampling methods. In some instances, Xcel Energy and MDH monitoring efforts overlap (e.g., the air sampler at Lock and Dam #3, water sampling at Lock and Dam #3). The appropriateness of the MDH program is a consideration for the State of Minnesota.

MDH believes its current monitoring program for the PINGP is reliable, accurate, and appropriate, given the level of resources available for the program. The only advanced technology available not currently employed by MDH would be air sampling technology that provided real-time data. Although the advanced technology would indicate the date and time of any measured emission, it does not provide any additional environmental information than the continuous air samplers employed by the MDH and Xcel Energy. Each real time unit costs approximately $70,000 as compared to $3,000 for the air samplers that are currently deployed around the plant and, as stated, afford no additional advantage.

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The Prairie Island Nuclear Generating Plant DEIS contains substantial gaps that would prevent its compliance with applicable laws pertaining to environmental review and prevent it from serving to assist decision-makers in reviewing alternatives and mitigation measures that would protect the environment, reflect environmental justice and preserve human health. The PINGP Study Group respectfully requests that the additional analysis described in these comments be included in the Final DEIS for these projects to comply with law, aid decision-making and protect the public interest.

Sincerely yours,

Paula G. Maccabee

Paula G. Maccabee
Counsel for the PINGP Study Group

Responses

Comment 16-26 (continued)
Procedures have been developed to perform real-time and in situ measurements for water velocities, discharge, temperature, dissolved oxygen, chlorophyll, turbidity, pH, and nitrate concentrations in lakes and rivers. However, there is no technology that can be used to measure real-time tritium levels in water bodies. The standard for analyzing tritium concentrations in water remains the periodic collection of samples.

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May 8, 2009

William Cole Storm, Project Manager
Office of Energy Security
85 -7th Place East, Suite 500
St. Paul, MN 55101-2198

Ref: Environmental Impact Statement - XCEL Energy Prairie Island Nuclear Generating Plant Extended Power Uprate Project, PUC Docket No. E002/CN-08-509, and Need for additional Dry Cask Storage, PUC Docket No. E002/CN-08-510.

Dear Mr. Storm:

This letter is in response to a request from citizens of the Goodhue and Wabasha Counties who cited concerns about public health and environmental impact of the proposed increase of generating capacity and storage of spent fuel on the Mississippi floodplain.

The Saint Anthony Falls Laboratory, University of Minnesota, has an international reputation and 70 years of experience in designing state of the art water quantity and quality monitoring systems. Our most recent technologies include in situ real-time measurements in aquatic environments with wireless data transfer and assessment over the Internet. The real-time data assessment is crucial in quantifying the impact of the range of emissions of power plants in the environment. The new technology provides data transparency and can be made readily available to the public, policy makers, and plant operators.

Our laboratory will be happy to take the lead in this interesting initiative. In addition to designing the monitoring system, we will be able to transfer the technology to the State agencies involved in this project as well as provide training to the personnel who may be engaged in data interpretation.

Sincerely,

Fotis Sotiropoulos, Ph.D.
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James L. Record Professor, Dept. of Civil Engineering
University of Minnesota

Email: fotis@umn.edu; Phone: 612-624-2022; FAX 612-624-4398

Responses

Commenter 17- Prairie Island Indian Community

Prairie Island Indian Community
Legal Department

May 8, 2009

William C. Storm, Project Manager
Minnesota Department of Commerce
85 7th Place East, Suite 500
Saint Paul, Minnesota 55101-2198

Re: Comments on the draft EIS for PUC Docket E002/CN-08-509 (Extended Power Uprate) and PUC Docket E002/GS-08-690 (Site Permit Application)

Dear Mr. Storm:

The Prairie Island Indian Community ("Community" or "Tribe") would like to offer the following comments regarding the draft Environmental Impact Statement (EIS) prepared by the Minnesota Department of Commerce, Office of Energy Security (OES), for the above-referenced PUC dockets. At this time we are providing comments on the draft EIS for the extended power uprate docket (PUC No. E002/CN08-509, E002/GS-08-690).

The Community is limiting its EIS comments to the uprate and site permit dockets. By consolidating the dry cask storage and uprate dockets, Xcel Energy has placed the Prairie Island Indian Community in an untenable position. Although treated separately in the draft EIS, the Community finds it difficult to separate cumulative and integrated health and safety concerns, including cumulative and integrated and environmental and health impacts, that could be related to either the uprate or the expansion of dry cask storage, such as increased radiation.

Proceeding is Premature

17-1 We remain concerned that the uprate CON and site permit applications are premature. As you are aware, Xcel Energy submitted its license renewal application to the NRC in April of 2008. The license renewal application contains two elements, the safety Analysis Report (SAR) and the Environmental Report (ER), which forms the basis of the NRC's supplemental EIS (SEIS). In fact, the NRC is currently in the process of developing the draft SEIS; a draft SEIS is expected by June 11, 2009. The NRC's draft

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Comment 17-1
Thank you for your comment. It has been noted and included in the record for this EIS.

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Safety Evaluation Report (SER), which is an engineering analysis of the PINGP, will be issued June 7, 2009; a final SER is expected October 22, 2009.

As was correctly stated in the draft EIS, the NRC will be completing a detailed evaluation of environmental impacts, health and safety impacts, and mitigation options for the
17-1 license extension review. Furthermore, the draft EIS states that the NRC has "sole regulatory authority" over radiation and safety issues of continued plant operation. Since the NRC's review and SEIS and SER are not expected to be final until November 2009, we maintain that it is prudent to complete the State EIS and CON process after the NRC has completed its environmental, health, and safety (which includes aging management) reviews.

According to the Minnesota rules, in order for the Commission to grant the Certificate of Need for the proposed extended power uprate, the Commission must determine, among other things, that the extended power uprate "will provide benefits to society in a manner compatible with protecting the natural and socioeconomic environments, including human health." The draft EIS, however, lacks the critical and essential analysis and review of the NRC that the OES acknowledges is with the "sole regulatory authority" of the NRC. How can the Commission make a determination that the proposed power uprate "will provide benefits to society in a manner compatible with protecting the natural and socioeconomic environments, including human health," without the NRC's analysis of the environmental, health and safety impacts?

Final approval from the NRC, for license extension, could come between April/May 2010 and November/December 2010, depending on whether there is a hearing. It should be noted that the Prairie Island Community has been admitted as a party to the licensing proceedings. In December 2008, the Atomic Safety and Licensing Board panel ruled that the Prairie Island Indian Community had identified seven issues (contentions) with Xcel's ER and/or SAR that required further information and analysis. Of the seven issues, two environmental and one safety have been addressed by Xcel. There are still three safety-related contentions to be addressed by Xcel.

There is an underlying presumption in the EIS that the LRA will be approved. As stated above, the Prairie Island Indian Community has successfully intervened in the NRC proceeding and has requested a hearing. We believe that the State proceeding should wait until the NRC has completed its process to evaluate whether the PINGP can operate safely for another twenty years. This is even more important as the ER submitted to the NRC, as part of the license renewal application, contained no information about the environmental impacts of the uprate. The SAR contains some information about the uprate. The Community believes that the environmental impacts from the uprate must be fully evaluated by the NRC before the application moves forward at the state-level.

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If the NRC approves the license renewal for the PINGP, the earliest date for approval would be February 15, 2010 (no hearing) or October 15, 2010 (hearing). According to the draft EIS, Xcel plans to submit its license amendment for the uprate in 2010.

We are concerned that approval of the uprate CON will be used as leverage to support the NRC license amendment request.

As we stated in our scoping comments, we wonder which state agency will do an engineering analysis to determine if the plant can handle the increased heat load resulting from the uprate. The state is being asked to approve the uprate before the NRC has determined that the plant can safely operated for an additional 20 years, at the current power level, let alone at an extended power uprate.

EIS is Inadequate

Too much of the information in the EIS is copied verbatim from either Xcel's Certificate of Need (CON) application to the Public Utility Commission (PUC) or its Environmental Report (ER) submitted to the NRC as part of its License Renewal Application.

According to the EIS scoping Decision, "the EIS will verify, summarize, supplement and/or incorporate by reference existing information as outlined in the Scoping EAW ad OES Treatment of Scoping Comments." We understand that there is a large body of existing information available that helps to support the State's EIS. We believe that existing data sources should have been summarized (not copied) and properly referenced. The fact that so much of the draft EIS is copied from the Applicant's sources (ER and/or CON application) casts doubt on the State's conclusions regarding unavoidable impacts from the uprate.

17-2 This draft EIS is also misleading to members of the public who have expectations about the independence and objectivity of the State's environmental review. There are too few references. There are some footnotes used, but not always and often not until the end of several paragraphs. There are even references in parentheses that were carried over from the copied sections (from the ER) that should have been removed. It seems that the draft EIS, like this proceeding, has been rushed.

Many of the conclusions made in the draft EIS are the same conclusions made by Xcel in their ER or CON application. Statements made regarding conducted studies mislead the reader into thinking that the studies were conducted by the State, when in fact they were conducted by Xcel and is stated so in the ER or CON application.

There are no consultation or concurrence letters in the draft EIS from other state agencies, such as the Minnesota Pollution Control Agency (MPCA) or the MN Department of Natural Resources (MDNR). There are conclusions made about thermal

Responses

Comment 17-2
Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 17- Prairie Island Indian Community

impacts or impacts to mussels, but no supporting documentation from the agencies with expertise.

This draft EIS does not meet the requirements of Minnesota Rules 7849.5300 (EIS Preparation) or Minnesota Statutes 116D.04 (Environmental Impact Statements). This draft EIS should either be scrapped altogether or significantly revised to reflect true authorship and independent analysis. For example, where the draft EIS copies or substantially restates the statements or analysis provided by Applicant in its ER or CON application, such statements and analysis should include the introductory clause, "According to the Applicant," or other similar phrase. Likewise, the draft EIS should also clarify which portions of the draft EIS contain no independent review or analysis, such as, for example, "The OES relies on the statements and analysis provided by Applicant and has made no independent review or analysis."

Advisory Task Force

17-3 The Advisory Task Force (ATF), comprised of representatives from the Prairie Island Indian Community, the City of Red Wing, Lake City, Florence Township, and the public met three times during the fall of 2008. The ATF developed an exhaustive set of scoping recommendations, many of which have been ignored. The Community incorporates by reference the comments submitted by the Prairie Island Nuclear Generating Plant Study Group regarding this docket.

Prairie Island Indian Community

17-4 The draft EIS still contains inaccurate information about our community (land holdings, populations), because it relies on incorrect information from Xcel's 2008 ER submitted to the NRC. As we stated in our scoping comments, the tribe's land holdings total over 3,000 acres (land and water).

As we stated in our scoping comments, the CON application discusses land use planning for Goodhue and Dakota counties (MN) and Pierce County, Wisconsin, but makes no mention of the Prairie Island Indian Community. The draft EIS makes no mention of the tribe's land use-planning activities.

Section 4.6 of the draft EIS (Demographics) makes no mention of the Prairie Island Indian Community, even though we are right next door. Other population centers are mentioned (i.e., Red Wing); 250 members of the Prairie Island Indian Community reside within 3 miles of the PINGP.

Demand Decline and Alternatives

17-5 The alternative analysis (Section 3.0) does not adequately discuss the effect State's wind energy mandate of 2600 MW by 2020. The result of the 2020 wind mandate, 2600 MW,

Responses

Comment 17-3

Thank you for your comment. It has been noted and included in the record for this EIS. See reponses to Commenter 16 (PINGP Study Group).

Comment 17-4

Text in Chapter 1, Section 4.6 has been modified and supplemented to incorporate additional information on the PIIC.

Comment 17-5

See response to Comment 15-1 which addresses the same concerns (DSM achievment, projected demand). Analysis by the Office of Energy Security, Energy Regulation and Planning (OES-ERP) unit has analyzed alternatives to the EPU under a number of scenarios, inlcuding a no-demand growth scenario. Analysis by OES-ERP indicates that the proposed EPU is the least-cost alternative.

Whether increased DSM achievement is not practical or "unreasonably risky" as an alternative to the EPU is ultimately a consideration for the Minnesota Public Utilities Commission.

Commenter 17- Prairie Island Indian Community

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17-5 is greater that two PINGP's (at current level of 1044 MW's).

The Next Generation Energy Act mandates a statewide goal of 1.5 percent annual energy savings. There is no information regarding Xcel's total energy portfolio and what effect a 1.5 percent energy savings would have on that total portfolio (i.e., total number of MW's) and how it relates to the 164 MW uprate application.

Furthermore, the conclusion reached on page 24 of the draft EIS, stating that it may be "unreasonably risky to rely on increased DSM in order to replace the energy and capacity from the PINGP EPU project" is Xcel's conclusion, not the State's (CON page 4-9).

Section 3.2 (DSM) is concluded with the statement that "it would not be practical to expect the results of the [DSM] program to be doubled or tripled in less than a year, the time remaining after the result of the Commission's Need decision." Why is this so? Does a Need decision have an expiration date? Xcel is choosing to submit its license amendment in 2010; we should not forgo an exhaustive review of alternatives to meet Xcel's timetable.

In addition, the analysis of potential alternatives to the extended power uprate in the final EIS should include actual and anticipated decline in demand reflected in Xcel's SEC filings, February 9, 2009 Resource Plan Update, and communications with the media. These sources project a decrease in demand through 2012 of at least 374 MW and as much as 500 MW as compared to Xcel's Application. The final EIS should independently and objectively review the need for the proposed power uprate and the available alternatives.

The Community also incorporates by reference Sections 6 and 7 of the Comments of the PINGP Study Group.

Environmental and Health Concerns

As set forth above, much of the information, including some conclusions, in the draft EIS is copied either from either Xcel's CON application to the PUC or its ER submitted to the NRC as part of its License Renewal Application. We remain concerned that there has been very little independent or objective analysis of the important environmental issues.

Thermal impacts

As we stated in our EIS scoping comments, the state must conduct thorough evaluation of thermal impacts to the Mississippi River resulting from the increased temperature of the circulating water discharge. There have been studies (in the early 1980's) that demonstrate that the surface waters of the river actually flow back upstream (back to Sturgeon Lake) when winds are out of the S, SE, SW, E or W (varying with the speed of the wind) – instead of distributing and disbursing water discharged from PINGP

Responses

Commenter 17- Prairie Island Indian Community

Prairie Island Indian Community DEIS Comments
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downstream, it would actually be pushed back upstream. This would certainly impact not only the thermal pollution but also the radiological effluents from the PINGP.

17-6

The Applicant constructed a discharge channel in the 1980s. How has the discharge channel affected, if at all, the thermal discharge? The PINGP continues to discharge thermal and radioactive effluent into the Mississippi River *above* Lock and Dam No. 3. However, according to the National Pollutant Discharge Elimination System (NPDES) and State Disposal System (SDS) Permit MN00004006, PINGP's heat discharge or thermal load to the river is limited by mixed river temperature ***immediately below*** Lock and Dam No. 3. The Community continues to question the effectiveness and logic of a monitoring scheme that does not adequately monitor and assess the thermal impacts above Lock and Dam No. 3. The draft EIS makes no effort to examine much less evaluate the sufficiency of the existing monitoring equipment and methodologies. Knowing that the uprate will increase the thermal and radioactive effluent, the EIS should include a comprehensive review and analysis of the monitoring equipment and methodologies to ensure Applicant's use of the best available technology for monitoring and its ongoing compliance with its permit.

As we noted in our scoping comments, the US Army Corps of Engineers (St. Paul District) is also contemplating a draw-down of Pool 3 (Sturgeon Lake) to improve habitat conditions. This ecosystem restoration project would target goals to improve water quality, emergent and submersed aquatic plants, and fish and wildlife. The effects of the uprate, relative to increased withdrawals, a drawdown of Pool 3, increased thermal discharges and its effects on aquatic life were not evaluated in the draft EIS and should be included in the final EIS.

Information about increased water appropriations and consumption by the PINGP is identical to Xcel's CON application. The conclusion in the draft EIS that "the EPU will slightly increase the temperature of the circulating water discharged to the Mississippi River (3°F maximum)" can be found on page 8-6 of the CON application. Why is there no concurrence from the MPCA, the agency with the regulatory authority? We would like to see a letter from the MPCA that includes an independent verification of the temperature increase and assurances that the 3°F increase will not have an adverse impact on aquatic life.

The Community also incorporates by reference Section 8 of the Comments of the PINGP Study Group.

<u>Threatened and Endangered Species</u>

17-7

In our EIS scoping comments, we stated our concerns about impacts to the Higgins eye pearlymussel (*Lampsilis higginsii*), an endangered species listed by both the USFWS and the MN Department of Natural Resources (MN DNR), from both the increase in water withdrawals and thermal impacts. As stated above, there have been studies that

Responses

Comment 17-6

Comments received during both the scoping process and the EIS review process from the DNR and the MPCA are contained within the public record for this docket. Certain portions of the EIS text have been modified to incorporate the concerns of these agencies (see response to Commenters 19 and 20).

The text in Chapter 1, Section 2.4-*Water Level Management Task Force* has been modified to reflect the interest in this subject.

Comment 17-7

The DNR has been directly involved with the negotiations and consultations for the licensing, permitting and general operating procedures of the PINGP. The DNR has coordinated with Xcel, MPCA, WDNR and other interested parties in matters relating to the operation of the PINGP. The required monitoring (biological, physical and water chemistry) has been conducted to provide assurance that any impairment to aquatic biota of the river is avoided or reduced to the lowest practical level.

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17-7 demonstrated that the surface waters of the river actually flow back upstream (back to Sturgeon Lake) when winds are out of the S, SE, SW, E or W. The Higgins eye restoration site is only 0.5 miles upstream of the PINGP's intake. The final EIS should evaluate whether increased thermal discharges impacts the survival of the Higgins eye.

With regard to possible entrainment, the draft EIS states, "It is conceivable that some larval *higginsii* will be carried downstream into the power plant's intake screenhouse. It should be noted, however, that mortality rate of early life stages of mussels is very high under the best of circumstances, and glochidia that do not attach to fish hosts soon after being released have a very low probability of survival." This statement was made by Xcel in the ER and there is no footnote or reference indicating that this conclusion was made by the applicant, not the State. There is no concurrence from the MN DNR indicating that they agree that there will be no impacts to the Higgins eye from the thermal discharge or increased water use resulting from the uprate.

Radiological Concerns

As the closest neighbors to the PINGP, the Prairie Island Indian Community is concerned about health impacts from radiological releases.

17-8 The discussion in the draft EIS about exposure pathways and the State's and Xcel's monitoring efforts fails to adequately address the need to use best available technology to monitor releases, verify exposure pathways, and calculate accurate dose levels to ensure that doses to the workers and the general public are as low as reasonably achievable.

17-9 There is nothing in the draft EIS, moreover, about the unique exposure pathways of Community members and potential impacts. Many tribal members consume native plants for traditional purposes (direct consumption, medicines, teas, ceremonies) that are not typically part of Xcel's or the State of Minnesota's monitoring programs.

17-10 We remain concerned about the increased radiolonuclide releases from the uprate. Particularly troubling is the statement on the page 87 that past cancer incidence reports "were not able to address cancer rates in the Prairie Island Indian Community members who reside near the plant." There is no further explanation. To our knowledge, the MN Department of Health has never offered to discuss cancer rates in our community, to study our community, or offer possible explanations as to why past studies and reports were not able to address cancer rates in our community.

17-11 The draft EIS fails to reference, much less discuss, recent studies raising troubling questions about increased rates of childhood cancers for residents in close proximity to nuclear power plants. *See, e.g.*, Direct Testimony of Gregg S. Wilkinson on behalf of the Prairie Island Indian Community and Preliminary Report of Capability of Environmental Radiological Monitoring Data to Support Radioepidemiologic Studies of Leukemia filed on April 22, 2009, and the numerous studies referenced therein which post-date those cited in footnotes 56-65 of the draft EIS. For example, peer-reviewed studies in Germany have reported increased rates of leukemia and childhood cancers for residents who live

Responses

Comment 17-7
As discussed in Chapter 1, Section 4.2-*Higgin Eye Pearly Mussel*, the larvae (glochidia) of the mussel that do not attach to a fish's gills downriver will experience almost immediate mortality regardless of whether they are drawn into the PINGP intake or not. The host fish will be protected from entering the plant by the fine mesh screens that are in place during this time of year in the intake screen house.

Also, see response to Comment 15-9 which addresses the same concern.

Comment 17-8
See response to Comment 16-23 which addresses the same concerns.

Comment 17-9
The PIIC expressed concern, both in scoping comments and through ATF participation, regarding unique exposure pathways that the community may be subject to due to the use of native plants. OES-EFP staff attempted to obtain information on the types and uses of these materials, via telephone discussions with Tribal counsel (Phillip Mahowald), and was informed that that information would most likely be proprietary. In the absence of this specific information, OES-EFP reviewed the MDH Radioactive Materials Unit environmental (milk, air, groundwater, food crops and sediments) monitoring data for summation in the EIS as a surrogate for these items.

Comment 17-10
The Minnesota Department of Health (MDH) analyses of cancer rates in Goodhue County did not and could not address cancer rates specifically in the Prairie Island Indian Community (PIIC). There were several reasons why this could not be done.

(1) The analyses were based primarily on data from the Minnesota Cancer Surveillance System (MCSS). MCSS receives cancer data from hospitals and pathology laboratories. Unfortunately, racial/ethnic information is frequently missing from these records, and particularly information identifying a person's status as an American Indian. In 2003 (several years after the completion of the Goodhue report in 2000), MCSS participated in a project to more completely characterize cancer rates among American Indians through a joint linkage project with the Indian Health Service. The number of American Indians identified in the MCSS database increased by 37% as a result of this linkage.

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17-11 closest to nuclear power plants compared with those who live further away from these facilities. A recent National Institute for Occupational Safety and Health study of nuclear workers reported increased risks for leukemia among workers who had a cumulative whole body dose of at least 3 rem compared with those who had lower cumulative doses. These findings are consistent with many other studies in Europe and the United States in which elevated rates or risks of leukemia and cancers associated with low doses of ionizing radiation or operations at nuclear facilities were reported. The results from these studies and the public health tenet of prevention indicate that a study similar to those previously conducted in Germany and currently being conducted in Switzerland of populations who reside in the vicinity of nuclear power plants should be carried out for residents of Prairie Island and surrounding communities, using latest and best available technology, including genetic epidemiology and genomic profiling differential diagnosis. The radiation and environmental (including human health) monitoring data currently available is not adequate to assess the PINGP impacts on the natural and socioeconomic environments, including human health, with acceptable certainty. Such a study is necessary in order to determine, using the best available technology, whether the proposed Extended Power Uprate at the PINGP provides benefits to society in a manner compatible with protecting the environment, including public health.

Tritium

17-12 The Prairie Island Indian Community remains concerned about tritium releases from the PINGP. Since the late 1980's tritium has been found in the tribe's groundwater. The draft EIS discusses spikes in tritium levels in certain wells and attributes the spikes to "plant operations." The draft EIS further states that the spikes are within EPA standard and are short-lived (short duration). This statement implies that it is okay to contaminate the groundwater, as along as the contamination is lower than the drinking water standard or if the event is short-lived. We do not want tritium or any other radiological contaminant in our groundwater. Instead of dismissing the issue, why not investigate the cause of the problem and require that Xcel address it? Will the proposed power uprate at an aging power plant result in even more planned and unplanned releases of tritium and other radiological contaminants? This issue should be fully addressed in the final EIS.

Tritium is still detected in observation wells on our land. We did not ask for the tritium to enter our groundwater. Community members are still concerned about the health impacts. Even though the Radiological Environmental Monitoring Program (REMP) reports states that the tritium results are far below the EPA drinking water standard of 20,000 pCi/L, the BEIR VII 2006 on radiation health effects state that Linear-No-Threshold standard should apply to chronic low dose exposure for potential cause of cancer and other radiation-induced diseases. This evaluation should be in the final EIS.

Psychological Impacts

17-13 The draft EIS minimizes the psychological impacts associated with living next to a

Responses

Comment 17-10 (continued)

(2) Even with more accurate counts of cancer occurrence among American Indians, cancer rates also require census population data. As with medical records, accuracy and completeness of census data by racial/ethnic categories – including status as an American Indian – is variable. Furthermore, it is ascertained differently (list of choices on a census questionnaire) compared to how this information is ascertained for cancer patients (noted on a medical record, name on an Indian Health Service roster, etc.).

(3) One way to access cancer occurrence in the PIIC directly would be to conduct a linkage study in which a roster of Community members would be compared to the MCSS database to look for matches. That possibility was offered by MCSS staff to the PIIC prior to completion of the Goodhue report but that option was not pursued by the PIIC. Prior to release of the Goodhue report, MDH staff met with PIIC leaders to apprise them of the findings and limitations of the report.

(4) Even had accurate counts of cancer occurrences and census data been available for the PIIC, or a record linkage study had been conducted, the small number of individuals residing near the plant (apparently only about 250) would have resulted in a statistically highly unreliable cancer rate. Thus, while it would have been possible to state quite accurately how many cancers had occurred among the PIIC during some period of time, it would have been very difficult and possibly misleading to compare that rate of occurrence with other Indian populations or with county or statewide rates. Statistically reliable cancer rates typically require data on thousands of individuals.

Comment 17-11

Text in Chapter 1, Section 4.13 has been modified and supplemented to augment the discussion of public health studies which have analyzed cancer risks near nuclear power plants. The EIS notes that there are studies on all sides of the issue, i.e., some studies indicate an elevated risk of cancer near a nuclear facility; some studies indicate no increased risk. The EIS includes discussion of studies conducted by the Minnesota Department of Health on cancer rates near nuclear power plants.

With respect to European studies, a recent study by Kaatsch and colleagues (*International Journal of Cancer, Volume 122, pages 721-726, 2008)* evaluated the incidence of leukemia among children under the age of 5 living in the vicinity of nuclear power plants in western Germany.

Commenter 17- Prairie Island Indian Community

Responses

Comment 17-11 (continued)
The study included 593 cases of leukemia living near one of the 16 nuclear power facilities at the time of diagnosis. The time period covered was 1980-2003 (24 years). The investigators found a statistically significant increased risk for all leukemias combined and for acute lymphoblastic leukemia --the most common sub-tupe of childhood leukemia.

This increase in risk occurred within 5 kilometers (3 miles) of nuclear power plants, while a statistically significant decreased risk of leukemia in young children was also found with increasing distance from nuclear power facilities.

These results again raised the question of childhood leukemia rates around nuclear power plants. Many results since the mid-1980s and extensive literature reviews indicate that globally there is no excess risk for children aged 0 -14 near nuclear power facilities. However, there are few results specifically for very young children under the age of 5.

This report was quickly embraced by some groups within Sweden (not Switzerland). However, the Swedish Radiation Safety Authority has not launched additional investigations of childhood cancer risks around nuclear power plants. The concern generated in Sweden over the German study has been combined to be referenced as the "German - Swedish studies" in the popular literature. The German study did not measure or model exposure to ionizing radiation and it did not control for other factors that might increase the risk of leukemia. The only proxy for exposure was the distance from the facility.

In response to the German study, other European investigators recently analyzed data directly comparable to the German data *(Journal of Radiological Protection, Volume 28, pages 201 - 203, 2008)*. Their results were inconsistent with the German findings, but again the only measure of exposure was distance from the facility. No measure of exposure or organ dose of ionizing radiation was available or modeled. The French findings were limited by the small number of cases (114) of leukemia in children under five.

The Minnesota Cancer Surveillance System (MCSS) has been in operation since 1988. Data are currently available through 2007. The MCSS is a high quality statewide registry of all cancers diagnosed in Minnesota residents. The MCSS would be the source of cancer cases for a study attempting to replicate the European analyses. The European studies also employed government run cancer registries for case identification.

Commenter 17- Prairie Island Indian Community

Responses

Comment 17-11 (continued)
For the period 1988 – 2007, 9 leukemias of all types were diagnosed (8.7 expected based on statewide rates) in children less than 15 in all of Goodhue County. For children less then 5, six were diagnosed (4.5 expected) in the entire county. A small percentage of the population of Goodhue County lives within 3 miles of the Prairie Island plant. Thus, the number of leukemias diagnosed in young children available for analysis (less then 5) is at least an order of magnitude too small to meaningfully replicate the European studies (the Kaatsch study included 593 leukemias).

Comment 17-12
The EIS discusses tritium concentrations in groundwater in an attempt to characterize tritium concentrations and the potential radiological exposure to the general public from drinking water. This characterization is based on the results of several monitoring programs. The EIS does not condone or otherwise judge tritium concentrations, but rather discusses them in context of federal drinking water standards.

As monitored tritium concentrations are within federal standards, it appears that mitigation related to groundwater and tritium releases from the PINGP is not necessary. This said, the EIS does not recommend permit conditions, but rather provides information on potential impacts and identifies uncertainties to facilitate a thorough consideration of whether or not the proposed project is permittable by the Minnesota Public Utilities Commission and other appropriate state agencies. Whether mitigation is an appropriate permit condition is a determination to be made by these agencies.

The proposed power uprate will increase tritium releases (curies) from the PINGP, based on an assumed linear increase with power, by approximately 10%. This increase in radiological liquid effluents is discussed in Chapter 1, Section 4.13.

The EIS adopts and uses the linear, no-threshold model suggested by the BEIR VII report to estimate potential radiological impacts from long-term, low dose exposures, including those from drinking water (Chapter 1, Section 4.13)

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17-13 nuclear power plant. Many of our youth experience increased levels of stress and anxiety because of health and safety fears related to the power plant. These are the same youth who will be our leaders in the future, the people with whom future Xcel, State and NRC representatives will be working over the re-licensing period and until the plant is fully decommissioned.

Northern States Power chose to build the PINGP next to our communality; we did not choose to develop our community next to the power plant. Most Community members have lived with the PINGP as their neighbor for all of their lives, with no hope that it will ever be shut down. Unless one has lived in the shadow of a nuclear power plant, one cannot possibly understand how frightening the consequences of a severe accident are, especially to the youth.

Emergency preparedness concerns (one entrance/exit road)

17-14 We remain concerned about an incident at the PINGP. There is only one road that would serve as an evacuation route in the event of a radiological emergency. This aspect was not included in the draft EIS.

Socio-economic impacts

17-15 The Prairie Island Indian Community is the largest, most diverse and culturally significant population immediately adjacent to the Prairie Island Nuclear Generating Plant. Since we bear the greatest risks from PINGP operation, it is our responsibility to ensure that the impacts of operation of PINGP on our Community and the surrounding environmental resources are fully evaluated. Unlike other jurisdictions, the Community does not enjoy the tax benefits generated by the PINGP.

Conclusion

For the foregoing reasons, the Community respectfully requests that the additional analysis set forth in these comments be included in the final EIS.

We appreciate this opportunity to provide these comments on the draft EIS for the extended power uprate for the PINGP. We look forward to participating in this process.

Respectfully submitted,

Philip R. Mahowald
General Counsel for the
Prairie Island Indian Community

Responses

Comment 17-13
See response to Comment 4-3 which addresses the same general concerns.

Comment 17-14
In addition to the road in and out of the Prairie Island Indian Community, there is a second road from the Prairie Island Nuclear Generating Plant that could provide an alternate route out of the PIIC in the event of a radiological emergency and the PIIC's road is blocked by a rail accident.

As part of the 2003 Settlement Agreement between Xcel Energy and the PIIC, Xcel Energy paid $25,000 to the Tribal Community to conduct a preliminary engineering study or for other activities to help facilitate construction of an overpass over the railroad that crosses Sturgeon Lake Road. The PIIC completed the study but does not appear to be pursuing an overpass at this time.

Comment 17-15
While the PIIC does not receive taxes for being located next to the Prairie Island Nuclear plant, they do receive financial benefits.

Per the 2003 Settlement Agreement with Xcel Energy, the PIIC receives $2.25 million annually for the operation of the plant, storage of the casks and other uses.

Commenter 18- North American Water Office

NORTH AMERICAN WATER OFFICE
PO BOX 174 LAKE ELMO, MN 55042
PHONE: 651-770-3861

May 8, 2009

William Cole Storm,
State Planning Director
Department of Commerce
85 7th Place East
Suite 500
St. Paul, MN 55101-2198

RE: Environmental Impact Statement
Xcel Energy Prairie Island Nuclear Generating Plant
Extended Power Uprate Project, PUC Docket No. E002/CN-08-509, E002/GS-08-690
Request for Additional Dry Cask Storage, PUC Docket no. E002/CN-08-510

Dear Mr. Storm:

As a member of the Citizen's Advisory Task Force on Xcel Energy's Prairie Island Nuclear Generating Plant Uprate and Dry Cask Storage proposal I am submitting the following comments on the Draft Environmental Impact Statement (DEIS) on behalf of the North American Water Office.

18-1 1. The current liquid and gaseous radionuclides released from the Prairie Island Nuclear Generating Plant (PINGP) characterized as indistinguishable from background radiation (page 81), are not based on monitoring that defines the dispersion plumes of said radioactive releases that are reported as part of the PING permit and license.

18-2 2. There is no cumulative total for the number of curies emitted from plant operations and are charted in scientific notation when a special request was made for language that was understandable by the public. (Table 4-7,4-8,4-9).

18-3 3. Background radiation levels in Minnesota as defined in the original Environment Statement (p. V29, 1973) for the PINGP were 150 millirem per year. Background radiation today has been defined as 360 millirem each year in the current DEIS (p.75). Every additional radioactive release adds to this level. BEIR VII states there is no safe dose of ionizing radiation and every dose is an opportunity for cancer.

www.nawo.org email: gwills@nawo.org

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Responses

Comment 18-1

Radionuclide releases during normal operations at the PINGP are at very low concentrations and are diffused into the atmosphere and Mississippi River. Accordingly, there is no definable plume related to the releases. Three separate monitoring programs (Xcel Energy, MDH, WDHS) provide a network of radiation monitors that surround the plant on all sides at a variety of distances (Chapter 1, Section 4.13). These programs have not detected radionuclides releases above background levels. This may be a function of the monitors themselves, i.e., we do not currently possess technology capable of distinguishing and measuring radionuclide releases at such low levels. However, it is likely not due to a gap in monitoring coverage. That is, monitors surround the plant such that if there were a definable plume, it would be detected.

Hypothetical release plumes are used in emergency response exercises for the plant. These plumes are based on hypothetical incidents at the plant which would release identifiable plumes.

Comment 18-2

Text and a table have been added to Chapter 1, Section 4.13 providing a summary of estimated annual radiological releases in curies (see Table 4-11).

Scientific notation, also known as standard form or as exponential notation, is a way of writing numbers that accommodates values too large or small to be conveniently written in standard decimal notation. Most calculators and many computer programs present very large and very small results in scientific notation. Because superscripted exponents like 10^7 cannot always be conveniently represented on computers, typewriters, and calculators, an alternative format is often used: the letter "E" or "e" represents "times ten raised to the power," thus replacing the " x 10" ".

Comment 18-3

Background radiation, independent of medical procedures and radon in homes, has remained fairly stable over the last 40 years. Medical procedures that create radiation exposure have increased for most all members of the U.S. population, e.g., CT scans, x-rays. The National Council on Radiation Protection (NCRP) in a report issued in Spring 2009 (NRCP 160), estimates that average exposure in the United States has increase to approximately 630 mrem/yr. due primarily to increased use of medical imaging technology. Radon exposure in homes has increased slightly due to changes in home construction, i.e., less air movement through energy-efficient homes, and improved monitoring.

Commenter 18- North American Water Office

18-4 4. The DEIS does not calculate the health risk exposure from the solid wastes that are collected, processed, packaged and temporarily stored prior to shipping (p. 84).

18-5 5. The recent Code Yellow violation (February 10, 2009, NRC Finding) of standards for levels of radiation allowable in transportation of such radioactive solid waste materials from Prairie Island was "more than five times, but less than ten times" the allowable limit of 200 millirems/per hour, and instead was determined to be 1630 millirems/per hour. There is no mention of this violation in the DEIS.

18-6 6. The dispossession of radioactive solid materials affords a pathway of exposure and must be considered within the DEIS. Affects of exposure to this radiation cannot be determined to be insignificant just because the waste is shipped elsewhere, and no rational is provided as to why shipping the waste off-site justifies a finding that heath risks due to these wastes will be insignificant.

18-7 7. The DEIS does not calculate totals for the number of cancers and deaths from all sources of radioactive exposures and uses every means to minimize and obfuscate from the public those that will be sickened and die from the project. These cancers and deaths are numerous, as the following chart taken from various pages of the DEIS, demonstrates.

Source	new cancer	death
Ch 1		
Tritium in well water p.84	1	1
Gaseous radioactive wastes p.81	1	1
To the Mississippi River p.82	1	1
Solid wastes p.84	?	?
Ch 2		
ISFSI skyshine public p.26	2.8	1
ISFSI skyshine workers p.27	0.9	0.45
Plant operations workers p.27	0.32	0.16
98 casks Local p.35	0.16	0.08
Cask Failure TN-40 p. 32	0.005	0.003

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Responses

Comment 18-3 (continued)
Average exposure to the U.S. population drawn from two NRCP reports is summarized here:

Source of Exposure	1987 (NCRP 93)	2006 (NCRP 160)
Cosmic and Cosmogenic	28	33
Ingestion	40	29
Terrestrial	28	21
Radon	200	228
Total Background	**300**	**311**

These reports indicate little or no change in backgound radiation. If medical procedures and home radon exposure are removed as radiation exposures, background radiation, based on 1987 data, is approximately 107 mrem (360 – 253 = 107 mrem; NCRP 93). Background radiation around Prairie Island in 2008, as measured by MDH thermoluminescent dosimeters, was approximately 108 mrem/yr. This indicates that there has been no significant change in background radiation over the last 20 years.

Comment 18-4
The potential health risks from solid radioactive wastes processed at the PINGP are insignificant and thus are not addressed in the EIS. Solid radioactive wastes are collected, processed, and stored according to NRC regulations. These regulations ensure protection of plant personnel and the environment. In contrast to controlled releases of gaseous and liquid effluents to the environment, there are no controlled releases to the environment of solid wastes. All wastes are sent to a licensed low-level waste facility. There is minimal exposure and potential health risk to the general public from solid wastes, as they are low-level wastes, their handling occurs within the plant, and they are disposed of in an appropriate waste facility (see response to Comment 18-6 discussing potential impacts to the general public from the disposal of solid wastes).

Comment 18-5
Violation of NRC regulations concerning transport of radioactive materials is an important matter. However, this violation is not relevant to the proposed projects examined in the EIS. The violation does not change the potential non-radiological or radiological impacts of the projects or alternatives to the projects. The preliminary yellow (substantial safety significance) finding was reduced to a white (low to moderate safety significance) finding by the NRC on May 6, 2009.

Commenter 18- North American Water Office

Cask Failure TN-40HT p.32	0.005	0.002
Transport Federal Repository p.35/6	0.005	0.003
Other abnormal releases and incidents	?	?

18-8 8. Many of the pathways of exposure are far in excess of the 1 in 100,000 (p.26, p27, p. 35) so called "Acceptable level of risk" as cited Chapter 1 on page 77 of the DEIS.

18-9 9. The original 1973 Environment Statement, by comparison, discusses the potential for at least 29 or 30 accidents and reactor component failures (Table VI-2 p VI-4) and assigns a radiation dosage for such events. The current DEIS provides only 13 scenarios, none of which include multiple tube rupture within the steam generators themselves, for example, or any other component failures in this aging nuclear plant.

This omission is particularly egregious as there was an undetected gaseous leak from the waste gas system in 2007 that lasted for six months, as well as an additional abnormal release due to failure in the steam generator relief valve.

A simple review of the Annual Radioactive Effluent Release Reports for the PINGP depicts a mounting assortment of breaking reactor parts and unscheduled multiple radioactive releases. Such a review was not completed by the Responsible Unit of Government.

18-10 10. The North American Water Office incorporates the comments filed by The Prairie Island Study Group as a whole.

18-11 11. The historic psychological, spiritual, cultural, health and safety abuses heaped upon the Prairie Island Mdewakanton Dakota Community in relationship to nuclear operations is a matter of public record including legislation, litigation, rulemaking, a corporate shareholder resolution, news media which called the project environmental racism in 1994, anthropological and archeological educational research, and is grossly mischaracterized by the DEIS as an economic benefit to a marginalized community (Chapter 1, p. 57).

18-12 12. If a catastrophic worst case scenario occurs at Prairie Island and all 450 residents are exposed as theorized (Ch.2 p.33), the DEIS only considers a scenario that may damage a few cask seals and is described as no significant threat to the Dakota Community. The worst-case scenario is described as fractions of a person, not even one additional cancer or death. The DEIS fails to mention, however, a very real threat, which is a terroristic

Responses

Comment 18-6
Low-level radioactive wastes (solid wastes) generated by the PINGP are shipped off-site for disposal at a federally licensed low-level waste facility. The transfer of low-level radioactive waste to such facilities is governed by the federal Low Level Radioactive Waste Policy Act (LLRW). The NRC, or states that have assumed NRC responsibilities with respect to low-level radioactive waste, license these facilities. This EIS assumes the proper and long-term functioning of disposal facilities such that exposure to the general public from low-level radioactive wastes is insignificant. This assumption is appropriate as the wastes in question are reaching their federally-determined proper locations in a timely manner. The low-level radioactive waste facilities provide exclusion from the environment similar to what a timely, properly functioning Yucca Mountain would provide for spent nuclear fuel.

Comment 18-7
See response to Comment 16-25 which addresses the same concerns.

Comment 18-8
Three radiological exposure pathways in the EIS are projected to increase the risk of cancer incidence by more than 1 in 100,000 – (1) risks to plant personnel from on-going plant operations (Chapter 1, Section 4.13), (2) risks to plant personnel from the proposed dry cask storage expansion (Chapter 2, Section 5.2), and (3) risks to the general public from the cumulative impact of 98 casks on the ISFSI pad (Chapter 2, Section 5.4).

Comment 18-9
See response to Comment 3-1 which addresses the same concerns.

Comment 18-10
See responses to Commenter 16.

Comment 18-11
Text has been added in Chapter 2, Section 8.0 describing unavoidable impacts of the proposed dry cask storage expansion. Text has been added in Chapter 2, Sections 5.4 and 7.3 describing potential environmental justice concerns related to the Prairie Island Indian Community.

Commenter 18- North American Water Office

18-12 attack for example using anti-tank ground warfare (ATGW) weapons on the spent fuel pool, with its exposed exterior wall outside of containment and not hardened, or a cascading steam tube rupture event. In addition the same ATGW would completely penetrate a dry cask not just cause the seal to be broken. Such an attack could mean evacuation and abandonment of who ever survived such a catastrophe.

18-13 13. The DEIS does not consider dispersed renewable alternatives that can combine wind with biofuels or other renewable generation for dispatch purposes, and that could be strategically located in communities and not require additional transmission lines. There are Minnesota Public Utilities Commission studies that document at least 600 MW of dispersed generation, in increments of 10 to 40 MW, are possible without any new transmission. The DEIS completely ignores the least cost least harm to the people of Minnesota and the environment (Chapter 2. p. 54).

Conclusion

The DEIS does not fulfill its intended purpose, which is to inform the public and decision-makers about costs, benefits, and consequences of the proposed activity. Instead it attempts to manufacture consent for the proposed activities by excluding obvious costs, liabilities, and alternative, viable electric utility management options. If public interests are to be served, this DEIS must be rejected in is entirety, and the Agency ordered to start over at the beginning.

Sincerely,

Lea Foushee

Lea Foushee

4

Responses

Comment 18-12

Potential impacts due to terrorist attacks (e.g., using armaments to attack nuclear plant facilities) are discussed in Chapter 2, Section 5.3. The NRC has provided guidance to licensees regarding security requirement against terrorism, specifically to address concerns raised by events of September 11, 2001.

The NRC has evaluated the vulnerability of spent fuel pools (e.g., Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, NUREG-1738, February 2001). Analyses indicate that spent fuel pools are difficult to damage, and that if damage does occur potential releases are slower to begin than previously estimated. Impacts from potential releases are expected to be mitigated by emergency response measures. There are differences of opinion as to the hazards posed by spent fuel pools and their relative susceptibility to terrorist attacks. These differences concern primarily (1) the probability of spent fuel damage occurring (terrorist attack, sabotage), (2) the estimated radiation release should damage occur, and (3) the estimated consequences of such a release (see, NRC Review of Paper on Reducing Hazards From Stored Spent Nuclear Fuel, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/reducing-hazards-spent-fuel.html).

See response to Comment 3-1 which addresses potential incidents related to on-going operations at the PINGP (e.g., steam generator tube rupture).

The hypothetical worst-case cask confinement failure scenario discussed in Chapter 2, Section 5.3 assumes that half of the casks on the ISFSI pad (49) suffer confinement failure due to impact by a commercial airliner. The scenario assumes that Krypton gas (Kr-85), the only nuclide in the fuel assemblies in a gaseous state, is released instantaneously from the casks and is not mitigated in any way. This scenario likely bounds impacts from a hypothetical terrorist attack using anti-tank armaments. First, such weapons, if they could be obtained and successfully employed against the casks in the Prairie Island ISFSI, would likely impact a few casks at most. That is, use of the weapons would create an emergency response that would likely limit damage to far fewer than 49 casks. Second, the worst-case scenario assumes immediate and unmitigated release of gaseous radionuclides. Weapons could not affect a release faster than "immediate."

Commenter 18- North American Water Office

Responses

Comment 18-12 (continued)
There are substantial uncertainties in estimating the risk and impacts of cask confinement failure for multiple casks, regardless of the initiating event. Fire resulting from airliner impact or armaments would hamper emergency response measures. As noted in the EIS, plant personnel and emergency responders would experience health impacts greater than those estimated for the general public (Chapter 2, Section 5.3).

Comment 18-13
Renewable resource technologies that could serve as an alternative to continued operation of the PINGP are discussed in Chapter 2, Sections 7.2 and 7.3. Text in Chapter 2, Section 7.3 has been modified and supplemented to note that dispersed renewable generation does not necessarily require new transmission facilities. Text in Chapter 2, Section 7.3 has been modified and supplemented to include economic analysis by the Department of Commerce, Office of Energy Security, Energy Regulation and Planning (ERP) unit, comparing continued operation of the PINGP with alternatives under a variety of costs and externality scenarios.

The OES-ERP cover letter to the Dispersed Renewable Generation Study cited by the commenter notes that dispersed generation (DG), individually and in aggregate, can have substantial impacts on the grid overall. However, 600 MW of DG is not sufficient to be a feasible alternative to the PINGP on either a capacity or energy basis.

Commenter 19- Minnesota Pollution Control Agency

Minnesota Pollution Control Agency
520 Lafayette Road North | St. Paul, MN 55155-4194 | 651-296-6300 | 800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us

May 8, 2009

Mr. Bill Storm
Minnesota Department of Commerce
85 7th Place, Suite 500
St. Paul, MN 55101-2198

RE: Xcel Energy Prairie Island Nuclear Generating Plant
Draft Environmental Impact Statement for Proposed Extended Power Uprate Project and Request for Additional Dry Cask Storage

Dear Mr. Storm:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the proposed extended power uprate (EPU) project and request for additional dry cask storage for Xcel Energy's Prairie Island Nuclear Generating Plant (PINGP). Regarding matters for which the MPCA has regulatory responsibility and other interests, MPCA staff has the following comments on the DEIS.

National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit

19-1 PINGP holds an individual NPDES/SDS Permit from the MPCA (MN0004006), which regulates the discharge of wastewater from plant operations to the Mississippi River. References in the DEIS to this permit characterize it as the "NPDES permit" (e.g., under **Chapter 1, Section 2.4 Other Permits, Wastewater Discharge Permit**); please correct future references to this in the final EIS. Also, for clarification, the issuance date for the facility's current NPDES/SDS Permit was September 23, 2005. The permit was modified twice in 2006 – on January 23, and again on June 30.

- **Chapter 1, Section 4.2 Biological Resources, Aquatic Communities**
  19-2 In this section, the DEIS indicates that the MPCA has listed the portion of the Mississippi River between the St. Croix and Chippewa Rivers in Wisconsin as impaired waters for 2006 for aquatic consumption, due to the presence of mercury and polynuclear chlorinated biphenyls (PCBs), and for aquatic life due to turbidity. The current (2008) 303d List of Impaired Waters identifies these impairments, as well as an impairment for aquatic consumption due to Perfluorooctane Sulfonate (PFOS) in fish tissue. The final EIS should reference the most current impairment list, and should identify the PFOS impairment. The current List of Impaired Waters may be found on the MPCA's Web site at: http://www.pca.state.mn.us/water/tmdl/tmdl-303dlist.html.

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Responses

Comment 19-1
The requested correction has been made to Chapter 1, Section 2.4-*Other Permits.*

Chapter 19-2
The requested correction has been made to Chapter 1, Section 4.2-*Aquatic Communities.*

Commenter 19- Minnesota Pollution Control Agency

Mr. Bill Storm
Page 2

19-3 The *Impingement and Entrainment* portion of this section details water appropriation limits in the facility's current individual NPDES/SDS Permit. These limitations restrict the volume of cooling water that is drawn from the Mississippi River during the April 15 to June 30 period. The DEIS does not make note of the fact that the permit allows the facility to exceed these volumes in order to maintain an 85°F condenser inlet temperature, provided that flow is minimized and cooling towers are operated to the maximum practicable extent. The final EIS should specifically address the fact that the facility is currently authorized to exceed the flow restrictions in order to maintain their ability to meet thermal limitations, and should discuss any potential increase in the frequency of such exceedances resulting from the EPU.

- **Chapter 1, Section 4.11 Water Resources, Surface Water**
  19-4 The ***Water Discharge: Temperature*** portion of this section details the temperature limitations found in the facility's individual NPDES/SDS Permit. The DEIS indicates in this section that operation of the cooling system in open-cycle mode could result in a temperature increase in the discharge of up to 3°F, and that existing thermal effluent limitations would be met either through increased use of cooling towers or by de-rating the plant. The final EIS should, in general, provide additional details regarding the thermal modeling that has been used to determine potential temperature increases at the discharge and the point of compliance at Lock and Dam No. 3, and the facility's ability to meet the current effluent limitations following the EPU. This information will be required in order to reissue the NPDES/SDS Permit when the current permit expires in 2010.

Questions regarding PINGP's NPDES/SDS Permit should be directed to Brandon Smith at 651-757-2740.

<u>NPDES/SDS Construction Stormwater Permit</u>

19-5 Please note that, based on the description of the construction of the new storage pads for the dry cask storage expansion (**Chapter 2, Section 4.3 Water Resources**), it appears Xcel Energy/ PINPG will need to obtain coverage under the general NPDES/SDS Construction Stormwater Permit from the MPCA. Coverage under the general Construction Stormwater Permit is required if a total project will disturb one acre or more of land. Please note that because the project is within one mile of, and discharges stormwater to, an impaired water, it is subject to additional best management practice requirements during construction, under the Construction Stormwater Permit. Questions regarding Construction Stormwater Permit requirements should be directed to Larry Zdon at 651-757-2839.

<u>Air Emission Permit</u>

19-6 PINGP holds an Air Emission Permit from the MPCA (04900030-004) which regulates non-radiological air emissions, such as nitrogen oxides, sulfur dioxide, and carbon monoxide, from 13 diesel-fired engines that are used for emergency purposes and one distillate-oil fired boiler used for plant steam. Based on the information provided in the EIS, the proposed EPU and dry cask storage expansion do not include changes to these emission sources or addition of new emission sources and, therefore, no changes to the PINGP Air Emission Permit are necessary.

Questions regarding the PINGP Air Emission Permit should be directed to Steven Pak at 651-757-2633.

Responses

Comment 19-3

During the spring period of the year from april 1 to June 30, Xcel Energy is allowed to temporarily exceed the PINGP appropriation limits to maintain the condenser inlet temperature provided they minimize the time of exceedance to the maximum extent practicable and operate cooling towers to the maximum extent practicable (see Section 8 of CON Application).

Comment 19-4

The power uprate increases the amount of steam that must be condensed in the main condenser. The increased steam flow and associated heat load affect the thermal performance of the main condenser resulting in greater Circulating Water temperature. Heat balance calculations were performed for the main condenser with the increased heat load at Extended Power Uprate conditions to evaluate the effect on the temperature of water discharged from the main condenser to the plant's discharge canal. The calculation was based on the new licensed core thermal power plus 7 MW thermal to account for the net effect on heat to the turbine cycle of reactor coolant pump heat, letdown/charging, and thermal transmission losses from the steam generators, etc. All of the additional thermal power, which is not converted into electrical energy, was conservatively assumed to be rejected to the Circulating Water system in the steam surface condenser.

The following four tables present the results of the calculations. A calculation for each condenser at 100% and 90% circulating water flows is reported. The condenser backpressure estimate at 90% Circulating Water flow utilizes equal condenser heat load, therefore conservatively maximizing condenser A backpressure.

Table 1 - Condenser A – Current Licensed Thermal Power (CLTP) to Extended Power Uprate (EPU) Conditions with 100% Circulating Water (CW) Flow

Parameter	Units	CLTP	EPU
Maximum Condenser Backpressure at 87°F CW Inlet	Inches Mercury Absolute	3.61	3.94
Maximum Pressure Imbalance Between Condenser Shells	Inches Mercury Absolute	0.71	0.83
CW Flow Rate	Gallons per Minute	294,000	294,000
CW Temperature	Degrees Faranheit	11.2	12.2

Commenter 19- Minnesota Pollution Control Agency

Mr. Bill Storm
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19-6 **Hazardous Waste Generator License**
PINGP holds a Hazardous Waste Generator License from the MPCA (MND049537780). They are registered as a small quantity generator (generating between 220-2200 pounds per month of hazardous waste). In 2008, PINGP generated 6,679 pounds of hazardous waste, mainly consisting of paint-related material, metals and PCBs. Based on the information provided in the EIS, it does not appear that the proposed EPU and dry cask storage expansion would necessitate any changes to PINGP's Hazardous Waste Generator License. Questions regarding hazardous waste licensing should be directed to Kathy Gedde at 651-757-2382

We look forward to receiving your responses to our comments. Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the project for the purpose of pending or future permit action(s) by the MPCA. Ultimately it is the responsibility of the project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions, please contact me at 651-757-2181.

Sincerely,

for Craig Affeldt
Supervisor
Environmental Review Unit
Environmental Review and Feedlot Section
Regional Division

CA:mbo

cc: Steve Pak, MPCA
Brandon Smith, MPCA
Kathy Gedde, MPCA
Larry Zdon, MPCA
Jessica Ebertz, MPCA
Karen Kromar, MPCA

Responses

Comment 19-4 (continued)

Table 2 - Condenser B – Current Licensed Thermal Power (CLTP) to Extended Power Uprate (EPU) Conditions with 100% Circulating Water (CW) Flow

Parameter	Units	CLTP	EPU
Maximum Condenser Backpressure at 87°F CW Inlet	Inches Mercury Absolute	2.90	3.11
Maximum Pressure Imbalance Between Condenser Shells	Inches Mercury Absolute	0.71	0.83
CW Flow Rate	Gallons per Minute	294,000	294,000
CW Temperature	Degrees Faranheit	14.6	16.0

Table 3 - Condenser A – Current Licensed Thermal Power (CLTP) to Extended Power Uprate (EPU) Conditions with 90% Circulating Water (CW) Flow

Parameter	Units	CLTP	EPU
Maximum Condenser Backpressure at 87°F CW Inlet	Inches Mercury Absolute	4.12	4.54
Maximum Pressure Imbalance Between Condenser Shells	Inches Mercury Absolute	1.32	1.54
CW Flow Rate	Gallons per Minute	264,600	264,400
CW Temperature	Degrees Faranheit	14.4	15.7

Table 4 - Condenser B – Current Licensed Thermal Power (CLTP) to Extended Power Uprate (EPU) Conditions with 90% Circulating Water (CW) Flow

Parameter	Units	CLTP	EPU
Maximum Condenser Backpressure at 87°F CW Inlet	Inches Mercury Absolute	2.80	3.00
Maximum Pressure Imbalance Between Condenser Shells	Inches Mercury Absolute	1.32	1.54
CW Flow Rate	Gallons per Minute	264,600	264,600
CW Temperature	Degrees Faranheit	14.3	15.6

Commenter 19- Minnesota Pollution Control Agency

Responses

Comment 19-4 (continued)
The temperature rise for circulating water for current (CLTP) and future (EPU) conditions is as follows per Tables 1 through 4 (typical for either unit):

- At 100% CW flow and the current licensed thermal power the temperature rise is 25.8 deg F (11.2 from Table 1 plus 14.6 from Table 2).
- At 100% CW flow and the higher licensed thermal power with EPU the temperature rise is 28.2 deg F (12.2 from Table 1 plus 16.0 from Table 2)
- The increase in CW temperature at 100% CW flow from EPU is then 28.2 minus 25.8 or 2.4 degrees F.

- At 90% CW flow and the current licensed thermal power the temperature rise is 28.7 deg F (14.4 from Table 3 plus 14.3 from Table 4).
- At 100% CW flow and the higher licensed thermal power with EPU the temperature rise is 31.3 deg F (15.7 from Table 3 plus 15.6 from Table 4)
- The increase in CW temperature at 90% CW flow from EPU is then 31.3 minus 28.7 or 2.6 degrees F.

- For a range of 90 to 100% of design CW flow, the increase in discharge temperature associated with EPU is 2.4 to 2.6 degrees F which was rounded up to 3 degrees F as a bounding value in the CON application and resulting Draft Environmental Impact Statement.

Evaluation of Compliance with Current NPDES Permit Thermal Limits at EPU Conditions

An evaluation was completed to assess the impact of plant operations at EPU conditions on compliance with the current thermal discharge limits contained in the NPDES permit. Monitoring and control of thermal discharge is considered for two periods of time throughout each annual cycle. The first is between the 'spring trigger' and the 'fall trigger', generally between the months of April and November. The 'spring trigger' occurs on April 1 or when the daily average river temperature exceeds 43 degrees F for five consecutive days, whichever occurs first. The 'fall trigger' occurs in the fall when the river temperature falls below 43 degrees F for five consecutive days. Between the spring and fall triggers, thermal discharge to the river is monitored and controlled by the observed temperatures at the Lock and Dam No. 3 monitoring station. The temperature rise at this station is limited by the following permit requirements:

Commenter 19- Minnesota Pollution Control Agency

Responses

Comment 19-4 (continued)

- The temperature rise above the ambient river temperature shall remain less than 5 degrees F, based on a monthly average of the daily maximum temperature rises.
- The temperature shall remain less than 86 degrees F, daily average, under all circumstances (excluding a declared 'Electrical Energy Emergency').
- If the daily average temperature exceeds 78 degrees F for two consecutive days, the mechanical draft cooling towers shall be operated to the maximum extent practical.

Between the fall and spring triggers (December through March), the daily average temperature at the Lock and Dam No. 3 monitoring station shall remain below 43 degrees F. If the observed temperature exceeds 43 degrees F for two consecutive days, the Minnesota Department of Natural Resources shall be notified and tower operation or alternative measures may become necessary, as determined by the State.

A thermal performance model was developed to simulate plant performance and downstream river conditions during the period from April 1 through November. A thermal performance model was not developed for the period from December through March because even if it is assumed that the full 3 degree increase that was conservatively calculated (see discussion above) at the condenser discharge into the discharge canal was seen at Lock and Dam No. 3, it would not result in the plant exceeding the 43 degree temperature limit and at most might require utilizing the cooling towers for a few more days in April and November. This was confirmed by identifying the historical spring and fall trigger points from a plot of the available river temperature measurements (2004 data not available) at the monitoring point at Lock and Dam No. 3 from January 2001 through December 2006.

For the period between the spring trigger and fall trigger from April 1 through November the results of thermal modeling were compared against the 5 degree F temperature rise limit and the 86 degree F daily average temperature limit. The evaluation results for the years 2002, 2003, 2005 and 2006 are presented below. (Availability of all required input data (local river temp, wet bulb temp, etc.) prevented 2004 from being modeled.)

Commenter 19- Minnesota Pollution Control Agency

Responses

Comment 19-4 (continued)

Projected Maximum Monthly Plant Delta-T Values at Lock and Dam No. 3 and Month of Occurrence

Year	Maximum Monthly Plant Delta-T for Current Operating Conditions	Maximum Monthly Plant Delta-T for EPU Operating Conditions	Increase in Delta-T from Current to EPU Conditions
2002	2.21 F (November)	2.33 F (November)	0.02 F
2003	4.75 F (November)	4.80 F (November)	0.05 F
2005*	0.67 F (July)	0.69 F (July)	0.02 F
2006	4.90 F (November)	4.95 F (November)	0.05 F

Projected Number of Days Downstream River Temperature Exceeds NPDES 86 F Limit

Year	Number of Days Limit Would be Exceeded for Current Operating Conditions	Number of Days Limit Would be Exceeded for EPU Operating Conditions	Increase in Number of Days Limit Would be Exceeded from Current to EPU Conditions
2002	0	0	0
2003	0	0	0
2005**	0	0	0
2006	2	2	0

The conclusion drawn from the thermal modeling was that under extended power uprate conditions, the 5 degree F temperature rise limit should not be exceeded and that the frequency of exceeding the 86 degree F downstream river temperature limit would not increase.

* Simulation only performed for April 1 through August 10 and September 28 through October 2 due to input data limitations. Maximum monthly plant Delta-T values are based on the months of April through July only, as complete data for months of August through October was not available.

** Simulation only performed for April 1 through August 10 and September 28 through October 2 due to input data limitations.

Commenter 19- Minnesota Pollution Control Agency

Responses

Comment 19-5
Text in Chapter 2, Section 4.3 has been modified to reflect the likely need for a construction stormwater permit.

Comment 19-6
Thank you for your comment. It has been noted and included in the record for the EIS.

Commenter 20- Minnesota Department of Natural Resources

Minnesota Department of Natural Resources
500 Lafayette Road • St. Paul, MN • 55155-40

May 8, 2009

Bill Storm
Minnesota Department of Commerce
85 7th Place East, Suite 500
St. Paul, MN 55101-2198

RE: Xcel Energy Prairie Island Nuclear Generating Plant Proposed Uprate and Dry Cask Storage Draft Environmental Impact Statement
PUC Site Permit Docket Number: E002/GS-08-690

Dear Mr. Storm:

The Minnesota Department of Natural Resources (DNR) has reviewed the Prairie Island Nuclear Generating Plant (PINGP) Draft Environmental Impact Statement (DEIS.) We offer the following comments.

Water Use

20-1 On page 90, Section 5.0, the DEIS states, "water consumption will remain approximately 1 percent of the lowest annual mean." The annual mean includes high flows. DNR is less concerned about surface water appropriation during high flows. A more meaningful measure would be the percentage of some low flow value, such as Q90. DNR recommends the Final EIS compare the rate of appropriation as a percentage of the Q90 at Lock and Dam No. 3

20-2 Also, DNR requests clarification of the term "consumption" as used in the statement from Section 5.0, page 90. Does this term reflect the amount evaporated, or the rate of appropriation? Minnesota Rules, part 6115.0630, subpart 7 defines the term "consumption" as "water withdrawn and not directly returned to the same waters as the source for immediate further use in the area." The Final EIS should define how the term "consumption" is used in this context.

Thermal Footprint

20-3 The reach of the Mississippi River downstream from the PINGP thermal mixing zone is one of the most popular large river fisheries in Minnesota, and supports high levels of use by resident and nonresident anglers. As interstate water, it constitutes a valuable fishery resource for the state of Wisconsin as well. In addition to providing an important coolwater fishery, the river provides critical habitat for a number of state threatened and endangered mussel species at this location. As such, the DNR has considerable interests and responsibilities for managing and protecting these aquatic resources. We are concerned that the effects of the increased thermal discharge, acting in concert with changing summer climate regimes, might unsustainably increase the stress to sensitive aquatic organisms during periods of low stream flow with conditions of high temperatures and humidity. The State's currently permitted water quality temperature maximum of 86 degrees F. is already a stressful condition for coolwater species, and NPDES permit conditions allow for limited exceedences of this standard. The 3 degree F. increase in the cooling water discharge volumes will extend the periods of high temperatures approaching the maximum, and could contribute to the frequency of exceedence. DNR is also concerned that a change in the river's thermal regime could have negative impacts on winter ice cover on Lake Pepin, affecting angler

Responses

Comment 20-1

Water Use. The draft EIS referenced 1) the average flow (18,380 cfs) in which the predicted maximum evaporative loss of 43 cfs would be approximaely 0.23 percent of the total river flow, and 2) the lowest annual mean flow (4,367 cfs) in which evaporative loss would be approximately 1.0 percent.

The lowest annual mean is defined as the average, for a number of years, of the annual lowest daily flows. This is determined by selecting the lowest daily flow (average over 24 hours) for each year of record, summing those values and then dividing the total by the number of years of record.

Q90 is a statistically derived number based on historial flow data for a particular reach or section of river/stream; Q90 stream flow means the flow is at least this high 90 percent of the time. Typically Q90 is used to estimate the flow that would be exceeded 90 percent of the time over either a 7-day period or a 30-day period.

The assessment of the potential thermal impacts did assess the impact under historical low flow and elevated water temperature conditions. The assessment conducted by Sargent and Lundy used river data from the drought/low flow summer of 2006. The lowest river flow during the summer 2006 was 2400 cubic feet per second (cfs) through Lock and Dam #3.

By comparison, the low flow during the 1988 and 1976 droughts through the same lock and dam was 2400 cfs and 1900 cfs, respectively. The 43 cfs maximum evaporative loss represents approximately 1.8 percent and 2.3 percent of total flow at the 1988 and 1976 low flow levels.

Comment 20-2

Under the surface water appropriation permit issued by DNR, Prairie Island may withdraw up to 235,000 million gallons per year from the Mississippi River. Consumption refers to amount of water that is lost to evaporation between the time it is withdrawn from the river and returned to the river.

Comment 20-3

The text in Chapter 1, Section 4.11-*Lake Pepin Ice Cover* has been modified to reflect the DNR's concerns.

Commenter 20- Minnesota Department of Natural Resources

Mr. Storm
05/08/09
Page 2

accessibility to the resource and safety concerns. Because of these factors, we have requested the provision of additional cooling capacity, to be deployed seasonally on an as-needed basis, to protect the aquatic communities of the Mississippi river.

20-4 While the DEIS appropriately references the 1987 study conducted by H.G. Stefan on PINGP's effect on residual heat input to Lake Pepin, the study did not contemplate a 10 percent increase in thermal loading. Stefan concluded that the ice cover on Lake Pepin was not affected "very adversely," that a detailed analysis was beyond the scope of the study, and that further analysis of that point is necessary. Stefan's observation on ice cover was based on review of ice thickness data collected by Northern States Power (NSP) from 1981 to 1986. However, the most upstream of the five measured transects was 5 miles downstream from the head of Lake Pepin. Therefore, Stefan's conclusion and the NSP data do not represent conditions for the upper quarter (5 miles) of the lake. This reach is shallower and does not allow for the sinking plume of the denser, warmer water. Visual observations conducted by NSP in 1982 at Greene Point, 2 miles downstream from the head of the lake, indicated the lake was totally ice covered to the head of the lake when observed on January 5 & 19 and February 8. This was the year prior to discontinuing the use of cooling towers in the winter. Our field staff observations and U.S. Corps of Engineer ice thickness monitoring show that open water conditions are now typical for the upper 2-3 miles and common for mile 3-5 of the Minnesota side of the lake.

DNR recommends, as a condition of the site permit, Xcel Energy initiate a study that updates the Stefan study, reviews recent U.S. Army Corps of Engineers data and Landsat imagery, and evaluates the need for additional modeling and monitoring of the effects that a thermal change may have on ice cover. DNR is willing to coordinate with Xcel, and other interested agencies, on developing the methodology of such a study, and will provide review and evaluation of the results.

Thank you for the opportunity to provide comments on the Draft EIS. Please contact me with any questions regarding this letter.

Sincerely,

Matt Langan

Matt Langan, Environmental Planner
Environmental Review Unit
Division of Ecological Resources
(651) 259-5115

c: Joe Kurcinka, Tim Schlagenhaft, Wayne Barstad, Jack Enblom, Bill Huber, Kevin Stauffer, Scot Johnson

Responses

Comment 20-4

The text in Chapter 1, Section 4.2-*Cold Shock* and Chapter 1, Section 4.11-*Water Discharge Temperature* has been modified to reflect the DNR's concerns in these areas.

The text in chapter 1, Section 4.11-*Lake Pepin Ice Cover* has been modified to reflect these concerns.

Commenter 21- Joan Marshman

From: Joan Marshman
To: Bill Storm; Joan Marshman;
Date: Friday, May 08, 2009 1:40:15 PM

Bill,

21-1 Of all the concerns that I have regarding the draft EIS are the issues listed in Chapter Two of the Environmental Impact Statement Scoping Worksheet. Actually, all of the Task Force's Scoping Worksheet must be addressed and included in the draft EIS. I wish to add to my statement that I support the Task Force's Worksheet and want it's contents acted upon in the draft EIS.

Sincerely,

Joan K. Marshman
Florence Township Supervisor
Goodhue County, Minnesota

Responses

Comment 21-1
The OES Director, having reviewed the scoping comments received during the comment period, the Summary of Work of the ATF, and the recommendations of staff, signed the Scoping Decision on November 14, 2008.

Commenter 22- Katie Himanga

Responses

Katie Himanga
1114 Valley View Road, Lake City, Minnesota 55041

May 7, 2009

William Cole Storm
Minnesota Department of Commerce
85 7th Place, Suite 500
St. Paul, Minnesota 55101-2198

RE: Public Comment on Draft Environmental Impact Statement
Xcel Energy's Prairie Island Nuclear Generating Plant
Extended Power Uprate and Additional Dry Cask Storage Projects
PUC Docket Number: E002/CN-08-509 (Certificate of Need-Extended Power Uprate)
PUC Docket Number: E002/CN-08-510 (Certificate of Need-Additional Dry Cask Storage)
PUC Docket Number: E002/GS-08-690 (Site Permit-Extended Power Uprate)

Dear Mr. Storm:

I served on the Advisory Task Force appointed to work with the Office of Energy Security (OES) on the scope of the environmental review for the Prairie Island Nuclear Generating Plant (PINGP) project. In addition I served as mayor of the City of Lake City in 2005-2008 and am a natural resources professional. Upon review of the Draft Environmental Impact Statement (EIS), I find it to be inadequate in addressing task force concerns. Incomplete or omitted information points to an overall lack of thoroughness, and the need to expand the review to reflect consideration of the natural resources surrounding the power plant. What follows are my comments related to the natural resource components of the EIS.

The advisory task force made specific requests related to Xcel's proposed project. These, along with proposed OES treatment of task force comments, are contained in Advisory Task Force Summary of Work, Appendix E – EIS Scoping Work Sheets with OES Treatment, November 15, 2008.

Lake Pepin, the Mississippi River, and its tributaries are interacting components of the world's third largest river system. The thermal plume of water discharge has potential to impact vertebrate and invertebrate organisms, parasites, ice cover, and the distribution of sediment in the river bed and in Lake Pepin.

The communities of Red Wing, Frontenac, Lake City, and Wabasha in Minnesota and Hager City, Maiden Rock, Stockholm, Pepin and Nelson in Wisconsin rely heavily on the Mississippi River and Lake Pepin for a secure future. The potential negative

Commenter 22- Katie Himanga

impacts that result from the expansion of operations at the PINGP warrant the establishment of baselines of aquatic and plant health as well as the development and implementation of a monitoring system to detect adverse impacts before they become critical.

Draft EIS Document Contributors

22-1 Nobody representing natural resources interests is listed in the document as a preparer – contributor (page ii). This despite the Minnesota Department of Natural Resources (MDNR) comment that, "This reach of the Mississippi River is a very high priority for DNR because of the intrinsic natural resource values of the surrounding area, the high recreational use, and the high profile walleye/sauger sport fishery that exists here (MDNR Comment Letter on the PINGP Scope, October 7, 2008.)

Environmental Setting

Although identified as a matter to be addressed in the EIS, a section describing Environmental Setting is omitted from the Draft EIS (EIS Chapter 1 Appendix A, II. Matters To Be Addressed In The EIS, 4.0 Environmental Setting). Rather, a May 1973 document is cited in Chapter 1, page 46, 4.0 Human and Environmental Impacts, and some information is sprinkled throughout the document.

22-2 This is a critical omission. For informed review and interpretation of the EIS its reader needs a complete description of Environmental Setting. Text of the 1973 document should be included in this EIS or provided as a supplement. A 36 year old document is probably in need of updating.

Since 1973, a lot of information has emerged about additional environmental stressors stemming from climate change. Climate change may exacerbate the impacts of the PINGP. This correlation needs to be addressed. Monitoring and mitigation strategies need to be optomized.

The Draft EIS lacks baseline information related to air, water, and some other natural resources and does not include a discussion of the interaction of the various resources (Appendix E – Chapter 1 – Comment 18). Baseline information for these items needs to be acquired and a plan for a system of monitoring developed and implemented if the PINGP projects are allowed.

22-3 The advisory task force asked that three specific letters be included in the EIS by reference. Two were excluded: Wisconsin Department of Natural Resources letters to the US Nuclear Regulatory Commission dated September 8, 2008, and to the Minnesota Pollution Control Agency letter dated April 3, 2000 (Appendix E – Chapter 2 – Comment 16). The April 3, 2000 letter includes an informative graphic that illustrates the PINGP thermal plume on June 5, 1998 (Figure 2).

Responses

Comment 22-1
Thank you for your comment. It has been noted and included in the record for the EIS.

Comment 22-2
The description of the environmental setting of the proposed project has been incorporated into the discussions in Chapter 1, Section 4.0-*Human and Environmental Impacts.*

Comment 22-3
Comments received during both the scoping process and the EIS review process from other regulatory agencies (i.e., DNR, MPCA, etc.) are contained within the public record for this docket. Certain portions of the EIS text have been modified to incorporate the concerns of these agencies (see response to Commenters 19 and 20).

See response to Comment 18-1 which addresses the suggestion of a radiological emissions plume.

Commenter 22- Katie Himanga

22-3 National Weather Service information about wind patterns and US Army Corps of Engineers/USGS historic and ongoing data on Lake Pepin ice cover are absent from the EIS (Appendix E – Chapter 1, Comments 21 and 22). Also requested by the task force, but missing from the Draft EIS, are references to National Weather Serivce, US Army Corps of Engineers, USGS historic and onging data on flooding and drought in the Upper Mississippi River watershed (Appendix E – Chapter 1 – Comment 23).

The Draft EIS lacks maps showing the plume extensions of PINGP discharges into surface water, groundwater and air. The task force asked that the current extent of thermal and radioactive discharges into the environment be documented as a baseline for ongoing study and analysis of impacts (Appendix E – Chapter 2 – Comment 17). Emissions plumes should be documented to the extent they exist in an ecosystem, based on science, without artificial geographic or distance limits.

Aquatic Communities

22-4 Fish population benchmark. The 1970s appears to be the baseline selected for EIS conclusions about fish populations. ("Fish populations in the vicinity of Prairie Island today look remarkably like fish populations in the 1970s," Chapter 1, page 47, 4.2 Biological Resources – Aquatic Communities). The basis for using the 1970s as a comparison is not supported in the EIS. Given the environmental condition of the river due to pollution from upriver sources, the 1970s may not be an appropriate benchmark for fish. The Minnesota Department of Natural Resources should determine the best practical baseline to use for comparisons.

22-5 Lake Pepin impairment. Lake Pepin, into which the Mississippi River flows at Red Wing, was listed by the Minnesota Pollution Control Agency as impaired for aquatic recreation due to nutrient/eutrophication biological indicators (i.e. phosphorus) in 2004. A TMDL study is scheduled for completion in 2009 (MPCA Inventory of Impaired Waters). This impairment and the effect of the proposed operation of the PINGP on the impaired water should be included in the EIS. Warm water discharged from the PINGP may exacerbate the problem of Lake Pepin eutrophication.

22-6 Dechlorination process impacts. No mitigation alternatives are offered in the EIS to address the problem of chlorine entering the river: "The dechlorination process does impact the fish populations in the Mississippi River" and will continue periodically (Chapter 1, page 48-49, 4.0 Biological Resources – Thermophillic Organisms and Pathogens).

Surface Water – Thermal Discharge

22-7 The Draft EIS does not provide satisfactory evidence that the best available technology for water dispersion modeling and analysis will be used to assess the natural ecosystem and cultural impacts of thermal discharge. A plan for mitigating adverse

Responses

Comment 22-4
See response to Comment 7-2 which addresses the same concern.

Comment 22-5
See response to Comment 19-2 which addresses the same concern.

Comment 22-6
See response to Comment 7-3 which addresses the same concern. The PINGP operations require a number of wastewater discharges, which are regulated by the state of Minnesota through the facility's Nation Pollution Dischrage Elimination System/State Disposal System (NPDES/SDS) permit. The present NPDES permit for the plant, permit number MN0004006, was issued September 23, 2005, and expires August 31, 2010 (MPCA 2006b). The permit was modified twice in 2006, on January 23, and again on June 30. This permit authorized intakes and discharges and imposes limits and/ or monitoring/reporting requirements for the discharges.

Discharge temperatures will be maintained within current NPDES permit (MPCA NPDES/SDS Permit Number MN0004006) limits by increasing the use of cooling towers, which can operate in various modes or, if necessary, by derating the plant to meet permit requirements for water appropriations and thermal discharge.

Commenter 22- Katie Himanga

impacts is absent. The EIS should provide for the best available technology to model the thermal discharge and a plan for monitoring.

22-8 The EIS leaves the reader thinking that operation of the PINGP has no impact on ice cover on Lake Pepin. This contradicts statements made by MDNR. "Thermal discharge from PINGP results in areas of variable and unpredictable ice cover on Lake Pepin. This results in some reductions in accessibility to certain areas of the lake and increases concern for safety overall" MDNR requested that Xcel provide a companion discussion of expanded cooling tower capacity that addresses the additional increment of thermal load to the river. A dry cooling tower was suggested: "This will prevent further deterioration of ice cover on Lake Pepin" (MDNR Comment Letter on the PINGP Scope, October 7, 2008). The EIS needs to respond to the concerns and suggestions of the Minnesota Department of Natural Resources.

The EIS does not provide adequate information about the cumulative impacts to surface waters related to the PINGP use of river water and its thermal discharge increases. It does not provide for independent verification of the effects of thermal impacts on fish, plants and other organisms, and Mississippi River and Lake Pepin ecology. It needs to provide for these items.

* * * * *

Thank you for consideration of these comments. I hope the Final EIS will address the natural resource issues I mention and will require the establishment of baseline information, ongoing monitoring and analysis, and mitigation of adverse impacts.

Respectfully submitted,

/s/ Katie Himanga

Responses

Comment 22-8
See response to Comment 20-3 which addresses the same concern.

Commenter 23- Kristen Eide-Tollefson

To: Bill Cole Storm, Project Manager
Office of Environmental Security, Energy Facilities Permitting

Re: Comments to the DEIS for Xcel Energy Prairie Island Nuclear Generating Plant (PINGP) Extended Power Uprate Project and Additional Dry Cask Storage at Prairie Island

Burden of development: An attempt to comment on the DEIS, draws the reader into the challenge of creating such a document. Yet it is not the reader's, but the state agencies' duty to provide a basis for decision-makers; to provide information, research, analysis and a foundation for decision making; to identify, assess and evaluate the socio-economic and environmental factors that apply to the proposed project. 116D.02 and 116D.03 outlines the duties of all agencies under the state's environmental policy:
https://www.revisor.leg.state.mn.us/statutes/?id=116D.03&year=2000
https://www.revisor.leg.state.mn.us/statutes/?id=116D.03&year=2000

This is not to say that this is not a daunting task. But if an administrative agency is not motivated by the fulfillment of its public interest mandates, and instead puts its energy and intelligence into a bare compliance with rule in the name of governmental "efficiency, "service to the public good will be limited and distorted. At the same time, it is the duty of the state legislature and the citizenry it represents to provide adequate resources for the execution of these mandates, and to participate in the environmental rights and responsibilities outlined in MERA and 116D. It is important to keep in mind that this is what commentators on the DEIS are proposing to do. We see ourselves as necessary partners with government in the protection of the state's resource, and fulfillment of environmental policy.

23-1 The 'economy' of this document and process, which appears to be one of the prime values of its preparation, is potentially very 'costly' to the public interest, the state and its citizens. Since the scoping process diligently scoped 'out' of the document any items that the staff found outside its ability to address, or outside the scope of its authority – there would seem to be no reason for the DEIS not to engage substantively in the items and issues that remained. It is puzzling that the list of preparers did not include or even cite other key state agencies.

PUC Advisory Task Force Report: OES had the benefit of being assisted in identifying issues to be considered in the EIS, by the able execution of a brief, but intense Advisory Task Force. This task force of citizens, local government officials, environmental and citizen organizations – in just 3 sessions, produced an extensive report, using the scoping framework provided by OES.

23-2 Unfortunately, ot is not evident from the content or approach, from the observations or insights of the document – that this effort ever took place. OES had every opportunity to 'scope' specific socio-economic, psychological, and environmental perspectives of the communities. But virtually none of the information that was provided to OES has yet been addressed in the DEIS. And so the document appears dismissive of both the effort and the citizen's report. This is disappointing for a number of reasons.

23-3 **State and public interest:** The DEIS document appears hamstrung, in matters of intense concern to the communities, the state and its citizens. The DEIS primarily uses the proposer's environmental report as a basis, and provides virtually no regulatory counterbalance to the proposer's intentions and interests. The document does not provide even a basis for "independent" conclusions. The DEIS could still choose, a path that summarizes not just the proposer's document, but the plethora of "next generation" initiatives in which the OES itself is involved – to create a document that will assist not only PUC, but the legislature and even the utility in evaluating pending re-investments in nuclear power.

Responses

Comment 23-1
The list of preparers for the EIS includes an additional state agency, the Minnesota Department of Health. The list of preparers is not a list of assistance or consultation. Department of Commerce, Office of Energy Security staff relied on assistance from state agencies that are not listed as "preparers." For example, assistance from the Minnesota Department of Natural Resources (DNR) concerning Lake Pepin ice cover is noted on the Minnesota Public Utilities Commission's website: http://energyfacilities.puc.state.mn.us/resource.html?Id=19932. The DNR, however, is not listed as a "preparer" of the EIS.

Comment 23-2
Thank you for your comment. It has been noted and included in the record for this EIS. See response to Comment 21-1 which addresses the same concern.

Comment 23-3
Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 23- Kristen Eide-Tollefson

The failure of the DEIS to engage in an independent analysis of the issues, alternatives and mitigations, leaves the public or parties with the entire burden of developing additional perspectives. The ability of the public and parties to do so, is severly limited by the fact that the state provides for no intervenor compensation, and there is not funding available in the public arena to support the ability of the public, or even public interest groups, to develop the kind of information and analysis that it would take to provide to PUC – a foundation for deliberation on the balance of social, economic and environmental factors – in implementation of state policy – that are their primary duties. Thus, again, the 'economy' of this document and process, which appears to be one of the prime values of its preparation, is potentially very 'costly' to the public interest, the citizens of the state, and the integrity of the decision making process.

For the record, the key issues identified by the Task Force report include (but are not limited to) the following:

1) Lack of information accessible to the public about the shape, characteristics, release and dispersal pattern of emissions plumes, air and water, from ongoing operations;

2) Concern for short and long term effects of increased temperature stresses of the uprate on:
a) the river ecology (see task force report)
b) the aging reactor;
c) pool storage – increased heat puts stresses on an already overburdened and old pool facility.
d) dry cask storage - current engineering studies have not yet determined the effects of this increased heat on longer term dry cask storage containment.
e) the qualities of ice, fish populations and other factors that are key to the tourist and recreational economies of the area.

3) The socio-economic and psychological effects of continued operations – or its alternatives. Particularly upon the primary responsibilities of the local governments, and tribal government for the health, welfare and safety of their citizens. The DEIS does not reflect, or even acknowledge the enormous commitment of resources that the communities have made through the years to the regulatory process; to cooperation in emergency planning, monitoring and care of natural resources etc. There must be assurance of mutual support and cooperation from Xcel.

4) Above all, that there is no plan for the waste from the plant beyond storage in casks and facility designed for temporary storage on the banks of the Ms River, and in close proximity to the PI Indian Community, Red Wing and other down and cross-the-river communities. Responsible nuclear waste management requires adequate funding, maintenance and monitoring for the duration of the projected storage period, which is now – more than ever – uncertain, indefinate – unknown. Xcel proposes to continue the 'temporary storage' charade. They have no plans for upgrading the facility, or covering the facility to manage or minimize exposure to the factors found in the YM EIS no-action analysis to be the primary factors in deterioration of containment materials – precipitation and freeze-thaw cycles.

23-4 **A new alignment of concerns:** For the first time in history, the communities are aligned around these common concerns, irregardless of the outcome of the proceeding. One of the most meaningful mitigations that the state could provide in this proceeding, is to require that an ongoing body be formed for a collaborative, iterative management of the risks, uncertainties, concerns and plans for the PINGP and the Independent Spent Fuel Storage Installation, and its replacements. It is imperative, and required by federal statute that Xcel provide complete assurance of funding, maintenance and management of the waste from the PINGP for the duration of its "interim" storage at PI and in the state of MN.

Responses

Comment 23-4

Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 23- Kristen Eide-Tollefson

Please review the Advisory Task Force report.
http://energyfacilities.puc.state.mn.us/resource.html?Id=19788. This document is only the latest iteration of a decades long record of community and environmental concerns, of commitment of state legislative, regulatory, and natural resources to the "nuclear option". Then ask, how are these concerns reflected, addressed in the DEIS? As a sample, please compare the comments in the Advisory Task Force report with the treatment of "Sociological Impacts", page 56, part II.

What we hope for: As neighbors to the plant, we hope that the obvious deficiencies of the document's approach are that this is a 'draft'. The purpose of a draft EIS is not transparency to process, but to give the public an opportunity to comment on its adequacy. If there is no opportunity for the public to comment on the final EIS, then the paucity of independent research, review or analysis is of great concern. We can only hope that the issuance of the draft will facilitate the development of an EIS that better supports the state's decision making process.

"Independent Review": is the hallmark and benchmark of an EIS. While many might consider this proceeding a 'done deal', an 'independent' review of the significant socio-economic and environmental issues at stake has never been more critical. Xcel is seeking the granting of a certificate of need for a capacity uprate and additional dry cask storage to support relicensing the plant – at a moment in time, when the fate of the high level radioactive nuclear waste is more uncertain than ever.

The conviction that Judge Klein articulated in his several findings of fact and recommendations to the state's PUC has never been more relevant: that if there is no where for the waste to go...and no timeline for removal – then the waste cannot be considered temporary, and the decision must be based upon a full awareness of the potential, even likelihood of ad hoc permanent storage. The record for the ALJ Certificate of Need proceeding on the building of an Independent Spent Fuel Storage Installation at PI, that eventually brought the case to the legislature in 1994, was carefully filed, cross referenced, indexed and preserved by Judge Klein, with the belief that it would needed again someday.

Like the first CoN for dry cask storage, this record, the ALJ and PUC deliberations will provide the basis for a landmark decision. The decision in both cases involves the commitment of resources that, from the perspective of the waste, could be irretrievable – for both state and utility. The decision to sink substantial new investments into "the nuclear option", is even more critical than in 1993, when we still had a federal plan for waste from the reactors, and a federal repository under development. There has never been a plan for waste from the relicensed reactors. And now there is not even a federal plan for permanent storage. After the failure of YM, we may not assume that the federal government will necessarily decide to pursue centralized storage. And we must consider, without YM, that the "no-action" alternative, is now in force.

This proceeding's evaluation of the environmental and economic factors associated with "the nuclear option" will:

- direct public investments towards or away from increased and continued dependence upon nuclear power,
- be the state's primary foundation for exercise of its authority and oversight over nuclear waste within the state's borders;
- guide the deliberation of the legislature;
- assure, or undermine, the long term security of the critical water resources – in terms of both supply and quality – of the Ms. River, and associated groundwater resources;
- assure or undermine the confidence of the public in nuclear operations & waste storage at PI.

Responses

Commenter 23- Kristen Eide-Tollefson

23-5 If comments in response to the DEIS, so indicate that the task may be too great for overburdened staff, charged with executing public process and environmental review for what may be the largest influx of energy infrastructure proposals in the state's history – we advocate that supplemental resources, in the form of outside EIS consultants be retained to assist staff in producing the final EIS. The fiscal resources that this might represent can be no excuse for failing to provide adequate, if not exemplary independent environmental review for this critical set of decisions. The consequences are too great. To the challenge of addressing this document, I will choose two critical items for my comment.

Part II. ALTERNATIVES - 6.4.
It is unclear how the DEIS* for Part II in its present form, would be used by decision-makers to evaluate the issues, the information, the reasonableness and adequacy of alternatives development, or the balance of environmental factors for dry cask storage. The evaluation of alternatives, and comparison of their impacts is a central feature and function of environmental review.

The state, with the rest of the nation, is in the midst of trying to implement one of the most ambitious undertakings of energy sector transformation in human history – in response to the dangers of global climate change. Yet rather than use this critical undertaking as a framework for evaluation or analysis, the DEIS ignores all that is going on at the state to move beyond "business as usual".

The approach of the DEIS has been generally to summarize the applicant's environmental report and conclusions, followed by a sentence or two of reflection and/or common sense observations. On occasion, the DEIS on provides a reference outside the materials provided by Xcel. This reference is then given in a footnote and the responsibility of research, analysis and evaluation of the topic at hand is then left to the reader.

On several occasions the EIS provides an interesting speculation, but in most cases carries it no further. It draws in no additional material (other than by reference or footnote), and most often concludes with a statement of uncertainty or inconclusiveness as though the preparers did not see their document as having any real purpose or authority. As a result the neutrality and generally uncertain stand of the document harms rather than supports the purposes of environmental review.

An example of helpful observations that <u>could become</u> the foundation of futher analysis are:

- For purposes of analysis here, reasonable alternatives include energy sources which by themselves, or in combination with other resources, could replace the electrical generating characteristics of the PINGP. [Bullet point for six "reasonable alternatives" follow]
- Potential human and environmental impacts of each of these scenarios could be reduced through demand side management or DSM.
- Thus renewable resource technologies would have a neutral or positive long-term employment impact compared to continued operation of the PINGP.

Excel's environmental report served for both the state's analysis and the NRC analysis of their applications. NOTABLY, Xcel's "reasonable alternatives" listed, but did not analyze the very scenario that Xcel has repeatedly identified as the 'least cost' option to the "nuclear option", that is Wind-Gas.

This is because NRC does not accept, as reasonable, anything other than a one-source alternative. OES correctly states in the bullet point that combinations of resources could provide an alternative to either the uprate or continued operations at PI. In fact, it is now widely understood that combining installed

Responses

Comment 23-5
Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 23- Kristen Eide-Tollefson

traditional, with renewable resources and renewable with other renewable resources, is the most effective route to reducing environmental impacts of energy production.

Yet Xcel fails to analyze a wind-gas scenario, due to the NRC restriction. OES fails to develop the alternative, or require that Xcel do so. The DEIS outlines the bare assumptions of Xcel's analysis ("the scenario relies healivy on generation by LEWCMs...this technology has a relatively lower capacity factor and performs best when combined with another energy source..."), without providing ANY additional information, or guidance.

What is damaging about the omission of immediate opportunities in renewables and the failure to elaborate upon the plethora of DSM opportunities at hand, is that PUC is the body that is charged with directing public and state investments at a most critical time for our energy future.

This document needs to be a foundation for the economic and environmental factors to be evaluated in yet another historic deliberation on the "nuclear option" in MN. Relying solely or primarily on excerpts from Xcel's ER does a grave injustice to the efforts, investments of the state and proactive policy direction of the legislature. A major rationale of putting OES in charge of this review, is that the agency is privy to the policy, planning and implementation of a "next generation" energy system envisioned by the state. OES's full engagement is essential for at least two important reasons:

a) This document will be used by the legislature in its evaluation of the record and PUC decision;

23-6 b) No other party to this docket is in a position to develop alternatives, to fill the gaps, or balance the advocacy of Xcel's well known position on "the nuclear option".

Wind-Gas alternative must be fully developed: Gas from new sources was analyzed for Monticello. But the pre-hearing order for that proceeding, specified that gas from existing sources should be analyzed for strategic combining with wind. This was not done. And should be done here – using the resources of Xcel's gas fleet, which has been under review for upgrading. Strategically located wind-gas could easily replace the 164MW uprate, and has been analyzed by Xcel in its 2003 resource plan for the most economical replacement of PI.

- Why is OES not requiring Xcel to develop this alternative, or develop it itself? Comparing costs of using new and existing gas resource -- and the emerging MISO market to balance and optimize "wind on the wires"?
- Why is OES not giving the decision makers the latest information in how transmission, MISO markets and wind are being combined to alleviate if not eliminate the old bias against renewable alternatives, as "intermittent"?
- The "Natural Gas Combined Cycle Plant" alternative, fails to mention that there is a fully developed study that looks at the conversion of the PI steam plant from nuclear to gas fuel.This is a replacement plan that was ordered by the Commission to supplement the 1998 IRP.
- What is the potential for (even a partial) conversion of the plant to gas, to be combined with wind and freeing the location's transmission infrastructure to integrate more wind capacity, in evaluating options to the uprate, and/or to increasing waste storage at PI.

Responses

Comment 23-6

<u>EPU</u>
The April 22, 2009 *Direct Testimony of Dr. Steve Rakow* (Rakow Direct) in Docket No. E002/CN-08-509 states at page 18, lines 7-9:

> For the renewables mixed with non-renewables alternative, three additional wind (100 MW each) units and one combustion turbine unit are forced into Strategist in 2013.

As explained in the Rakow Direct at page 15, lines 7 to 17, the wind-natural gas alternative was evaluated under numerous contingencies:

> The contingency scenarios used are:
> - natural gas prices plus/minus 25 percent;
> - coal prices plus/minus 25 percent;
> - uranium prices plus/minus 25 percent;
> - expansion unit capital costs plus/minus 25 percent;
> - carbon dioxide (CO_2) prices at \$30 per ton;
> - CO_2 prices at \$4 per ton;
> - high energy and capacity requirements;
> - low energy and capacity requirements; and
> - low externality costs.

The Rakow Direct summarizes the cost results of the wind-natural gas alternative in the base case and in the contingency scenarios on page 19, lines 3-7:

> Compared to the EPU, the alternative of wind mixed with non-renewables is more expensive by between \$531 million and \$703 million in present value societal costs (PVSC), depending upon the specific scenario. Under base case conditions, the alternative of wind mixed with non-renewables alternative is more expensive than the EPU by about \$617 million PVSC. Thus, there are substantial cost advantages to the EPU.

Other impacts were also analyzed in the Rakow Direct. The pollution impacts are summarized at page 19, lines 16-20:

Commenter 23- Kristen Eide-Tollefson

Responses

Comment 23-6 (continued)

> Compared to the EPU, the alternatives of either wind mixed with non-renewables or biomass produce greater amounts of every pollutant that was tracked by Strategist. Thus, the proposed EPU would provide substantial emissions advantages. Note that Strategist does not track emission of radioactive particles.

Note that further information regarding differences in tons of pollutants emitted is provided in the Rakow Direct at OES Attachment (SRR-9). The energy source impacts are summarizes as page 20, lines 2-8:

> Energy production in a typical year (specifically, 2025)) was used to compare the resulting energy mix. Compared to the EPU, the alternative of wind mixed with non-renewables would reduce nuclear generation and replace it with more wind, natural gas, and additional coal energy. .... Considering the scenarios that I modeled, the only way to avoid incrases incoal-fired energy is to relicense PINGP.

Note that further information regarding differences in energy production by fuel type is provided in the Rakow Direct at OES Attachment (SRR-10). Finally, the impact on the overall expansion plan is summarized at page 20, lines 15-17:

> Compared to the EPU, the alternative of wind mixed with non-renewables would add three additional wind units.

PINGP Replacement

Text in Chapter 2, Section 7.3 has been modified and supplemented to include economic analysis by the Department of Commerce, Office of Energy Security, Energy Regulation and Planning (ERP) unit, comparing continued operation of the PINGP with alternatives under a variety of costs and externality scenarios. This analysis includes a wind-gas alternative.

OES ERP analysis considers the Midwest Independent Transmission System Operator (MISO) market to be an appropriate tool for short-term capacity and energy needs (e.g., outages, extreme weather), as opposed to long-term resource needs. Limits on transmission capacity (congestion, interconnection) reinforce the short-term nature of the MISO market. Accordingly, OES ERP did not rely upon on the MISO market as all or part of an alternative.

Commenter 23- Kristen Eide-Tollefson

The DEIS, despite its regulatory proximity to the extensive resources at OES, fails to update decision makers on numerous developments that transform old assumptions about the limitations of renewable options. Instead it simply repeats assumptions about intermittency and capacity of renewables, that are being rapidly left behind – as a result of studies and resource proceedings that OES itself is involved in. The state policy preference for renewables is embedded in the Certificate of Need statute and rule. OES as the RGU, not just the facilities planning staff, must take responsibility for the adequacy of the alternatives analysis. Or at least ensure that the resources and information are available for development.

23-7 The range of alternatives discussed in Section I, that include transmission, DG and other combined and renewable options should be discussed in Section II as well.

23-8 **Provide an update of the 1993 record on the "Phase-Out" alternative for PI:** One alternative that the Commission could consider – to minimize the amount of waste over and beyond that for which the federal government provided a plan – is a phased or staged replacement plan. This could be easily accomplished by updating the "Phase-Out" concept that was developed in an extensive record on the first PI Certificate of Need for Dry Cask Storage. The update would be constructed from current established and emerging technologies. Were the state or Xcel to develop such a phase out plan, the scenario would provide for a smooth transition, continued use of the PINGP location's infrastructure, and continuing of jobs and business for both utility and communities – which was its original purpose.

CUMULATIVE IMPACTS 5.4 – Statements and Conclusions, page 37:
Link to all historic documents: http://www.leg.state.mn.us/LRL/Issues/prairieIsland.asp

23-9 The DEIS 'considers' two 'reasonably foreseeable future projects': Continued operation of the PINGP,and use of the ISFSI to facilitate decommissioning. The document does not take up one of the key concerns articulated by the Prairie Island Indian Community (PIIC), and other Advisory Task Force members and documented in the task force's scoping report. As noted earlier, the unexamined potential for impacts from the combined effects of the uprate, the increased storage, and continued operations that is a key concern. Hotter fuel affects every dimension of the operational and waste cycle.

Because of the timing of the dockets, as PIIC has argued, there will not be an opportunity to test the combined effects of these connected actions. To repeat one of the key sets of issues identified in the task force report, and discussed in PIIC's comments:

Concern for short and long term effects of increased temperature stresses of the uprate on:
a) the river ecology (see task force report)
b) the aging reactor;
c) pool storage – increased heat puts stresses on an already overburdened and old pool facility.
d) dry cask storage - current engineering studies have not yet determined the effects of this increased heat on longer term dry cask storage containment.
e) the qualities of ice, fish populations and other factors that are key to the tourist and recreational economies of the area.

23-10 Of even greater concern are the assumptions and assertions that characterize the DEIS's "consideration" of the cumulative effects of at reactor waste storage, which will not be removed on any timeline that is either known or projected – by any body, including the federal government.

Responses

Comment 23-6 (continued)
Text has been added in Chapter 2, Section 7.2 to note that a natural gas plant at the Prairie Island site would not require new transmission facilities, and that such a conversion (repowering) of the PINGP has been studied.

Comment 23-7
Chapter 2, Section 7.2 incorporates the discussion of energy sources found in Chapter 1, Section 3.0. The Chapter 1 discussion provides a thorough overview of energy technologies and their merits. It is unnecessary and would be redundant to repeat this discussion in Chapter 2. The relative merits and projected operating and environmental characteristics of alternatives to the PINGP are discussed in Chapter 2, Section 7.2.

Comment 23-8
Chapter 2, Section 6.4 notes that EIS does not consider expansions of the Prairie Island ISFSI larger or smaller than that proposed by Xcel Energy (excepting a no-build alternative). It is possible that the Minnesota Public Utilities Commission (Commission) could authorize an ISFSI expansion less than that requested. Such a strategy could be used to lengthen the time over which alternatives to the PINGP would be deployed and the generation of the PINGP phased out. The size of the ISFSI expansion is fundamental to the requested Certificate of Need and a determination to be made by the Commission.

Comment 23-9
Cumulative impacts have been addressed in the EIS. Tables have been added to assist in visualizing cumulative radiological impacts to plant personnel and the general public (Chapter 1, Table 4-10; Chapter 2, Table 5A-2).

There are no combined temperature effects (effects of the EPU and ISFSI expansion that are additive) with respect to river ecology, ice, or related recreational activities. Potential effects of increased temperature on storage casks (e.g., TN-40HT cask) have been studied in the Safety Analysis Report for the ISFSI. Potential effects of increased temperature on reactor systems and the spent fuel pool are being examined by the NRC in its license renewal process

Commenter 23- Kristen Eide-Tollefson

The document (p. 334-35):

- "Assumes that regulator monitoring and maintenance continue as currently performed at the ISFSI, radiological impacts from the continued operation of the PI ISFSI for up to 200 years would be within NRC regualtory limits and would not be significant during normal operations."

The DEIS takes the most irrational of NRC premises and extends it over a period 2 to 3 times longer than the furthest reach of the NRC "Waste Confidence Decision", which it discusses at some length in the conclusion of this section. Furthermore these assumptions are in significant contradiction to the analysis and engineering studies that form the basis of the YM "no-action" alternative – which we must now assume to be in force. These references were provided in comments to OES.

- "Once the casks are loaaded, transported, and placed on the ISFSI pad, they are no longer handled. Barring the need to repair a cask seal or other possible damages (which scenario is not addressed at all), the casks are not handled or transported within the PINGP site. Thus, handling of the casks effectively ends within the first 50 years of the 200 year time frame"

23-10 The "consideration" goes on to use a simple mathematical multiplication of risks from a per year estimate, times 34 additional casks and 50 years, to conclude that there is no significant risk. This is, at best, not confidence building.

The potential for cask failure or worst case scenarios are dismissed with the usual concluding statement of uncertainty: "Because of the substantial uncertainties involved in making a worst-case scenario projection, there are likely differences of opinion regarding potential health impacts". (p. 33)

The primary concern of the communities, about the discrepancy between the design life of a 'temporary facility' and the indefinite duration of at reactor storage is addressed in the following way, at pg. 13. "The minimum design life for the TN-40 series of Transnuclear casks is 25 years. However, due ot the passive nature of the dry storage casks and the robustness of their components, it is anticipated that the ISFSI could physically be operated (whatever assurance that provides) for several hundred years".

The DEIS does not seek out either balanced or independent expertise, provides no policy insights or implications and simply dismisses or ignores the fundamental predicament in which we find ourselves with no federal storage plan, waste stranded at the reactor site, while NRC continues to relicense plants and proceed apace with licensure for new plants.

NRC Confidence and MN's authority:
The scoping document for the Monticello ISFSI proceeding, traces the intriguing history of Minnesota's role in the promulgation of the Nuclear Waste Confidence Decision. Suffice it to say, that from the first, Minnesota challenged NRC on its promise to remove waste from the reactor sites. When the reactors were first proposed, the plant was to removed the waste continually – approximately every 6 months. This never happened, and none of the many iterations of plans and promises on the part of the federal government has ever been fulfilled. Hence the promulgation of the "NRC Waste Confidence Decision.

In the face of this less than responsible and rational regulatory 'solution', the state's Radioactive Waste Management Act and the exercise of Minnesota's economic decision making authorities have been the key features of the oversight that Minnesota has been able to exercise over nuclear operations and wastes within its borders.

Responses

Comment 23-10
See response to Comment 4-2 which addresses the same concerns.

Commenter 23- Kristen Eide-Tollefson

116C.705: "The legislature finds that the disposal and transportation of high level radioactive waste is of vital concern to the health, safety, and welfare of the people of Minnesota, and to the economic and environmental resources of Minnesota. To ensure the health, safety, and welfare of the people, and to protect the air, land, water, and other natural resources in the state from pollution, impairment, or destruction, it is necessary for the state to regulate and control, under the laws of the United States, the exploration for high level radioactive waste disposal within the state of Minnesota. It is the intent of the legislature to exercise all legal authority for the purpose of regulating the disposal and transportation of high level radioactive waste."

This legislative intent was reinforced in an amicus brief from legislators, written to the court, on the decision that brought the decision on dry cask storage to the 1994 legislature. http://www.leg.state.mn.us/webcontent/lrl/issues/nuclear%20waste/amicusbrief.pdf Innumerable comments, testimonies and lobbying efforts through the years have sought to sustain these powers. It is therefore of enormous concern that the section on cumulative impacts in the DEIS, ends with the following assertion of conclusion and position:

23-11 "Confidence at the NRC that temporary, long term storage of dry casks at ISFSI's nationwide can be effected safely does not provide or supplant an independent decision by the State of Minnesota regarding the risks of long term storage of dry casks at the Prairie Island ISFSI. However, *discussion in this section*, based on analysis required by the NRC (Safety Analysis Report; which is not yet available for the relicensing proceeding), *and independent analysis* (EPRI risk assessment),*is congruent with the NRC's Waste Confidence Rule"*.

This alarming conclusion to the section on cumulative and radiological impacts, insofar as it makes sense, could be read to seriously undermine the state's record and independent view on this matter. It is in direct contradiction to the interests of the local communities, stated positions of the PIIC, and long time policy positions of the state. It appears to assert:
a) the reasonableness of the proposed extension (to 60 years, or indefinately) of the Waste Confidence decision timeline;
b) agreement of the DEIS's conclusions with the proposed ruling; and
c) that there is no fundamental incongruity between the state's authority and interests and the implications of this ruling.

I will depend upon the comments of the Prairie Island Indian Community to the proposed Revisions to the Waste Confidence Rule (Docket ID NRC-2008-0404) and the Waste Confidence Decision (Docket ID-2008-0482) to lay out the issues.
http://docs.google.com/gview?a=v&pid=gmail&attid=0.1&thid=1205e18c031c7a1a&mt=application%2Fpdf.
It is critical that the OES's Office of Federal Intervention, and the state's attorney general investigate the implications of the conclusion of the DEIS on this matter.

23-12 The DEIS must grapple, once and for all, with the fact that long term storage is not temporary storage, and a temporary storage facility is not adequate for long term storage. To fail to address this fundamental flaw, is to endanger many future generations and the water body that is the juggler vein of the nation. I wish to incorporate, in whole, by reference the PINGP Study Group Comments to the
23-13 DEIS, submitted on 5-08-09 by counsel, Paula Maccabee.
Most respectfully yours,
Kristen Eide-Tollefson

Responses

Comment 23-11
Text in Chapter 2, Section 5.4 has been modified to clarify that Minnesota's authority with respect to the management of spent nuclear fuel is independent of any analysis or guidance provided by the NRC.

Comment 23-12
See response to Comment 1-1 which addresses the same concerns

Comment 23-13
See responses to Commenter 16.

Commenter 24- Dennis Hatleli

From: hatrod39dlx
To: Bill.Storm@state.mn.us;
Subject: Comments on current Excel Energy proposal
Date: Tuesday, May 05, 2009 9:00:32 PM

Dear Mr. Storm.

How much credibility can we apply to an industry which has historically changed its tune many times on a number of critical issues. For example, in order to win public approval for building the first nuclear plants, the nuclear industry agreed to accept a specific schedule whereby these plants would be decommissioned at a predetermined time when aging would render them more susceptible to accidents. When that time arrived, however, these people reneged on their agreement, using their wealth and well-place politician(s) to keep these aging facilities in operation. Soon thereafter they sold the public on the idea of onsite dry-cask storage of nuclear waste with a promise that it would be only temporary and would soon be removed to a permanent storage site elsewhere. Now that the proposed facility at Yucca Mountain has been nixed, Excel Energy again changes its tune. Now they want to increase the output of the aging Prairie Island plant, and significantly increase the number of casks to be used for on-site storage of spent nuclear fuel.

24-1 Let's face it. The possibility of ever finding a permanent nuclear waste storage site is highly unlikely. No one wants anything stored near them which will remain lethal for thousands of years. Furthermore, even if a site were located, who would want to have the deadly waste transported through their home area on its way to such a facility. (Remember the furor in Rochester over the possibility of DM and E trains accidentally spilling materials which are millions of times less lethal than nuclear waste?) Therefore, the on-site storage which was sold to us as "temporary" seems well on its way to becoming permanent.

With nuclear waste storage facilities located on the upper Mississippi River, even one accidental spill would deal a mortal blow to the entirety of America's heartland. This is extremely disturbing for the millions of us who are forced to live, work, and raise our families downstream and downwind from aging nuclear power plants with ever-expanding nuclear waste dumps on site.

The same people who were ready and willing to ship their spent nuclear

Responses

Comment 24-1
Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 24- Dennis Hatleli

fuel to an area of seismic instability keep reassuring us that storage of this material is absolutely safe. That is a tremendously large claim for something that will remain lethal for thousands of years. Only fools would make such an assertion and, likewise, only fools would believe it. History is rife with examples of the folly of human arrogance and its consequences.

24-2 Allowing Excel Energy to once again get its way would be a monumental mistake. Instead, we need to focus on renewable energy sources together with the elimination of gluttonous energy consumption.

Sincerely,

Dennis Hatleli

Lake City, MN

Responses

Comment 24-2

Thank you for your comment. It has been noted and included in the record for this EIS.

Commenter 25- City of Red Wing

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May 8, 2009

<u>Via E-mail (bill.storm@state.mn.us)</u>
<u>and U.S. Mail</u>

Mr. William C. Storm
Minnesota Department of Commerce
Office of Energy Security
85 – 7th Place East
Suite 500
St. Paul, MN 55101

Re: Environmental Impact Statement In the Matter of the Application of Northern States Power Company d/b/a Xcel Energy for Certificates of Need for the Prairie Island Nuclear Generating Plant for an Extended Power Uprate and Additional Dry Cask Storage; MPUC Dockets: E-002/CN-08-509 and E-002/CN-08-510

Dear Mr. Storm:

The purpose of this letter is to provide the Department of Commerce, Office of Energy Security (the "DOC") with comments pertaining to the March 17, 2009, draft Environmental Impact Statement (the "DEIS") for the above-referenced matters. These comments are submitted on behalf of the City of Red Wing (the "City"). However, it should be noted that the City did participate in the Prairie Island Nuclear Generating Plant Study Group (the "Study Group") as well as the Advisory Task Force appointed to comment on the scope of environmental review necessitated by Xcel Energy's Applications for an Extend Power Uprate and Additional Dry Cask Storage (the "Applications"). It is my understanding that the Study Group will be submitting its own comments regarding the DEIS. The City supports the Study Group's comments and, to the extent they overlap with the comments set forth herein, the City incorporates the Study Group's comments as if those were its own.

<u>OVERVIEW</u>

The DEIS arises from the combined Dockets for the Certificates of Need Administrative Hearings that are currently pending before Judge Luis. The DEIS is separated into two parts: Chapter One, which addresses the Application for an Extended Power Uprate and Chapter Two, which addresses the Application for Additional Dry Cask Storage. As is noted in the DEIS, these Applications are in conjunction with the series of Applications that are pending or will be submitted by Xcel Energy to the Nuclear Regulatory

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Commission for, among other things, an extended license to operate the Prairie Island Nuclear Generating Plant (the "PINGP") for an additional 20 years, license to store additional spent fuel and to have the Power Uprate during the additional 20 years of the relicensing.

As is aptly pointed out by the comments of the Study Group, the purpose of the DEIS and ultimately the final Environmental Impact Statement (the "FEIS") is to advise the Administrative Law Judge, the Minnesota Public Utilities Commission, the Minnesota Legislature and other policy and decision makers on the environmental impacts of proposed Applications, appropriate alternatives and certain mitigation steps or efforts that can be taken relative to the same. See, *Minn. Stat. §116D.04 Subd. 2a (2008).* Under Section 116D.04 Subd. 2a, the environmental impact statement is to be prepared by the responsible governmental unit. The environmental impact statement is to be analytical and detailed and not simply "an encyclopedic document". *Id.* The DOC, by virtue of the consolidation of the Environmental Quality Board into the same, is the responsible governmental unit obligated to provide the Environmental Impact Statement for Xcel Energy's above-referenced Applications.

The DEIS presented fails these essential purposes. It lacks independent analysis, and glosses over the environmental, economic and other policy concerns that are raised by Xcel Energy's Applications. In place of analysis, the DEIS simply assumes that a great number of the facts presented by Xcel Energy in its Applications are accurate and complete. This failure of the DEIS deprives each decision maker at the various stages in which the Applications are to be analyzed of crucial facts needed by them to fulfill their role. As it is currently composed, the DEIS fits exactly into the category of what Section 116D.04 Sub. 2a describes it should not be: an encyclopedic document where the facts presented by the Applicant are simply deemed to be true and correct.

While these comments will provide specific language and analysis that should be contained in the FEIS, an overview examples of the lack of analysis, detail and evaluation of mitigation efforts are as follows:

1. The DEIS, and indeed the scoping decision, defers much analysis. It creates and relies on a preemption argument that is not supported either by case law or by statute. Indeed, the specific limitations set forth in the DEIS fails to recognize the rights and responsibilities of Minnesota policy makers relative to the health, safety, and welfare of its citizens. While ultimately, the same conclusion may be reached, it is imperative that the DOC, through the DEIS and FEIS, thoroughly review (and not just recite) the Application, identify the environmental, societal, and economic issues and engage in a robust discussion of them, their alternatives, and the necessary mitigation efforts relative to the same.

2. With respect to the storage issues, the DEIS identifies a potential 200 year period in which the spent fuel may be stored at the PINGP. Yet, there is no analysis on how that spent fuel is going to be monitored, maintained, and safeguarded during that period of

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time. While there is reference to a maintenance program relative to current spent fuel storage but there is nothing that identifies how this will fill the 200 year timeframe. There is no reference to the Yucca Mountain Environmental Impact Statement and its analysis of above-ground spent fuel storage systems and concrete pads upon which they are placed. There is no analysis of the TN40-HT Cask or its limited design life of 20 years and how that fits into the proposed 200 year timeframe.

3. There is a discussion of the Decommissioning Docket, the 60 year Waste Confidence Rule, and the 200 year period in which the spent fuel is anticipated to be stored at the facility. However, there is no analysis that ties these together. For example, there is no cost evaluation of the monitoring, inspection, and/or maintenance of spent fuel storage for either the 60 year period or the 200 year anticipated period. There is no analysis on whether the Decommissioning Docket has sufficient funds for this storage and/or how the same would tie-out to the 60 year Waste Confidence Rule or the 200 year storage facility. While there is acknowledgement that the Federal Government is responsible for the long-term storage of the spent fuel, there is no acknowledgement that Xcel Energy, until that time comes, is responsible for the safety and storage of the same.

4. The DEIS introduces a concept that is outside of the rules or statutes regarding spent fuel storage: temporary long-term storage. This term is not defined in any statute, rule, caselaw or otherwise. In fact, it is contrary to Xcel Energy's obligations relative to its Application whereby it must disclose whether the spent fuel is going to be temporary or permanent. See, *Rule 7855.0600C*. There is no discussion or analysis of what temporary long-term storage means and how the same fits within the construct of current Minnesota Statues and Rules.

5. Finally, and in fairness to the DOC since these issues were raised after the DEIS was published, the DEIS and the FEIS must include an analysis of the City's position relative to its ability to provide first responder services to any incident at the PINGP. The DEIS, on numerous occasions, cites to the Emergency Response Plans of Xcel Energy and the coordination of those through other response plans by the State of Minnesota and NRC. However, as the testimony of Roger Hand clearly indicates, under each of these plans, the City is the primary and first responder. If the City is unable to provide the adequate, necessary, and timely response as anticipated by those Emergency Response Plans, what will be the result? The FEIS must include an analysis of the City's position and the environmental and economic impacts of the same. In fact, the only prudent analysis by the DOC in analyzing the potential environmental impacts is to assume that the Emergency Response Plans will not provide an effective or timely response to any event at the PINGP and apply the same to both non-radiological and radiological events.

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ANALYSIS

With respect to the DEIS, the City has the following comments and suggested modifications to the DEIS. However, in making these suggestions, the City believes that the DEIS or FEIS should also reflect the overall general policy concerns set forth above and as set forth in the PINGP Study Group's DEIS comments.

25-1

1. In Chapter One, Section 4.13, Page 88, the DEIS identifies the Emergency Response Plans and how the same would be implemented in the event of a radiological release. It should be noted, that the Emergency Response Plans, do, in fact, address both radiological and non-radiological events at the PINGP. As such, the general description of the Emergency Response Plans should address this fact.

In addition, the DEIS or FEIS must address the alternative that the City and its fire, ambulance, and police departments may not be able to adequately respond to an event at the PINGP. The DEIS or FEIS should then evaluate the impact of this lack of appropriate response and how the same would be reflected in its analysis in the preceding 87 pages of Chapter One. The City's potential inability to respond appropriately precludes any assumption by the DOC that the Emergency Response Plans are going to be effective.

25-2

2. In Chapter Two, Section 3.2, Page 13, the DEIS introduces the concept of "temporary long-term storage of spent nuclear fuel." There is no explanation about what this term means or how this definition was reached. The term itself stands in contrast to the obligations of Xcel Energy, as the Applicant, to identify whether storage is temporary or permanent in its Application. It also stands in contrast to Minn. Stat. §116.83 Sub. 4, which indicates that permanent storage is supposed to occur in an out-of-state facility. The DEIS and the DOC must explain what this new concept means and how it relates to Xcel's Applications.

25-3

3. In Chapter Two, Section 3.2, Pages 12-13, the DEIS describes the monitoring, inspection, and maintenance for the Dry Casks. It further identifies that the design life for the TN-40 Series is 25 years. This analysis and the failure to include the other information that would allow for a more robust discussion on the effectiveness of the monitoring, inspection and maintenance plan is wholly deficient. First, the TN-40 is not the Cask that is going to be used. Rather, it is the TN-40HT Series, which has a design life of 20 years. Second, there is no analysis whatsoever of the concrete or other items that are to be used as part of the ISFISI. The DEIS specifically ignores that Yucca Mountain EIS, which sets the anticipated concrete life of an ISFISI at approximately 100 years. The DEIS also ignores a specific report referenced in the Yucca Mountain EIS regarding the life expectancy of concrete that is subject to the conditions normally associated with spent fuel storage systems. The life expectancy is also greatly impacted by the freeze-thaw cycle with St. Cloud, Minnesota specifically cited as the extreme end of this cycle. To effectively evaluate what steps can be and should be taken by Xcel Energy to mitigate against the degradation of the Casks and the concrete supporting them, a more appropriate monitoring inspection and

Responses

Comment 25-1

Text in Chapter 1, Section 4.13 has been modified to clarify that emergency response plans address radiological and non-radiological emergencies at the PINGP.

Text in Chapter 2, Section 5.4 has been modified to reflect the possibility that the City of Red Wing may not be able to adequately respond to an emergency at the PINGP. Text in Chapter 2, Sections 4.9, 5.3, and 5.4 has been modified to reflect the possibility that the City of Red Wing may not be able to adequately respond to an emergency at the Prairie Island ISFSI.

Text in Chapter 2, Section 5.4 has been modified and supplemented to discuss the need for institutional control in order for ISFSIs to function as designed and protect public health. This control includes functioning political-governmental entities.

Comment 25-2

The term, "temporary, long term storage," as used in the EIS to describe the storage of spent nuclear fuel at the ISFSI is not an attempt to characterize such storage with respect to Xcel Energy's application for a Certificate of Need or Minnesota Statutes. Rather, it is an attempt to describe for the general reader the situation which exists with respect to storage at the Prairie Island ISFSI. There is a federal obligation for removal of spent nuclear fuel at the ISFSI to a federal repository. Thus, storage at the ISFSI is temporary. For a number of reasons, there has been considerable delay in constructing and operating a federal repository (see Chapter 2, Sections 5 and 6). Thus, storage at the ISFSI is, or has the potential to be, long-term. In sum, it is temporary, long-term storage.

Comment 25-3

Text in Chapter 2, Section 5.4 has been modified and supplemented to include information from the Yucca Mountain EIS and discusses the need for institutional control in order for ISFSIs to function as designed and protect public health.

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maintenance system must be developed and evaluated. Indeed, it is the DEIS that sets out a 200 year period for this analysis but fails to explain or provide any support for its conclusion that the equipment and programs to maintain the same are sufficient to provide containment for that period of time.

25-4 4. In Chapter Two, Section 3.4, Page 15, under the analysis for "Funding for Decommissioning", the DEIS fails to identify how adequate funding is going to be provided for the 200 years. It is imperative that the DEIS detail the costs associated with the spent fuel. At a minimum, it would be prudent for the DEIS to analyze how Xcel Energy intends to meet, at a minimum, the financing necessary to inspect, monitor, and maintain the storage systems for the 200 year period or at least 60 years. The Decommissioning Fund, as noted in the DEIS, supposedly covers ISFIS operations but there is no analysis relative to the same. The DEIS must analyze this information.

25-5 5. In Chapter Two, Section 4.9, Page 22, the DEIS references the Emergency Response Plans Xcel Energy maintains for all activities at the PINGP site. In doing so, the DEIS simply assumes that the Emergency Response Plans will operate and that any incident will be appropriately addressed pursuant to the same. The DEIS analysis must be amended to include the alternative that the Emergency Response Plans may not operate as assumed. The City has provided testimony that it may not be able to meet its duties and unless its ability to respond to the same is addressed the response will be inadequate and/or ineffective.

25-6 6. Under Chapter Two, Section 4.10, Pages 22-23, the DEIS concludes that "the non-radiological impacts related to the expansion of the Prairie Island ISFISI are not significant." As previously pointed out, this conclusion, and any analysis backing the same, is deficient. There is an assumption that the equipment (casks and concrete) and the materials that comprise the same will last for 60 or 200 years, depending upon whether the DEIS follows the Waste Confidence Rule or its own assumptions. However, there is nothing to backup this conclusion. There is no analysis or regard for the design life of the cask that is proposed to be used, the limitations associated with the same, or any analysis on how long this casks has been in use. There is an assumption that the materials and all the welds, seals, and other joints will survive intact from all events whether that is time, weathering, deterioration, or other events. In short, the conclusions are unsubstantiated and the analysis must be supplemented if these conclusions are to be supported.

25-7 7. Under Chapter Two, Section 5.3, the DEIS walks through a number of different incidences that may result in a radiological release. This analysis covers natural phenomena, manmade phenomena, and either hypothetical cask confinement failures. Underlying each of these different proposed events, is the existence and effective operation of the Emergency Response Plan that mitigates or limits any release. The City has introduced evidence that it may not appropriately be able to respond to the Emergency Response Plans currently in place. Again, it should be noted that the City's fire, ambulance, and police are and shall be the first responders under any plan currently in place relative to the PINGP. Accordingly, the analysis under Section 5.3 must be modified to include a

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Comment 25-4
Costs for on-going ISFSI operations are discussed in Chapter 2, Section 3.4 (nuclear decommissioning trust fund). The Commission docket (E002/M-08-120) which addresses the decommissioning trust fund includes significant analysis by the Office of Energy Security, Energy Regulation and Planning (ERP) unit. Costs for on-going ISFSI operations are also discussed in Chapter 2, Section 5.4; the text has been supplemented to include costs estimates from the Yucca Mountain EIS and from the Office of Energy Security, ERP unit.

Comment 25-5
See response to Comment 25-1 which addresses the same concerns.

Comment 25-6
Section 4.0 of Chapter 2 of the EIS discusses potential non-radiological impacts resulting from the proposed ISFSI expansion. Section 4.10 discusses cumulative non-radiological impacts. Non-radiological degradation of ISFSI components (e.g., corrosion, weathering, cracking) has the potential to cause radiological impacts. These impacts are discussed in Chapter 2, Section 5.0.

Comment 25-7
See response to Comment 25-1 which addresses the same concerns.

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scenario where the presumption that the Emergency Response Plans will effectively operate is removed.

25-8 8. In Chapter Two, Section 5.4, Page 34, the concept of temporary long-term storage is again used. While there is a loose association between that term and 200 years, the DEIS must specifically setout if that is what it interprets that term to mean. If so, the DEIS must explain and identify how that was reached and what measures it is utilizing to conclude that the spent fuel storage systems currently used and/or proposed to be used by Xcel Energy are adequate.

25-9 9. In Chapter Two, Section 5.4, Page 34, under the heading "Normal Operations" the DEIS concludes that if regular monitoring and maintenance continues as currently performed, any risk of a radiological event will not be significant. Other than the pressure monitors, visual inspection, and painting with corrosive inhibiting coatings specified in Pages 12 and 13 of Chapter Two, there is no other description of monitoring, inspection, or maintenance. The current process described is completed on casks that have been in use for a mere 14 years. This is not even 10% of the lifetime that the DEIS projects for storage.

The DEIS fails to analyze how, for the remainder of 200 year period, this inspection, monitoring, and maintenance system will be effective. There is no analysis relative to aging or degradation of the systems and how these are to be handled or paid for. In short, the conclusion reached is illogical based on the time that the DEIS assumes spent fuel will be stored.

25-10 10. Under Chapter Two, Section 5.4, Pages 36-37, there is a stated and thereafter implied assumption that the "emergency planning measures remain effective into the future." The testimony from the City has clearly rebutted this assumption and the DEIS must be modified to reflect that the emergency planning measures will not remain as effective as the DOC assumes.

CONCLUSION

The DEIS fails is essential purpose. It does not provide a detailed analysis of the proposed Applications and their potential impact as well as the steps that could be taken to mitigate the same. Instead, it regurgitates large sections of Xcel Energy's Applications and does not critically analyze the same as it is obligated to do by statute and rule. The DEIS simply assumes that these facts are correct and, based on a number of other external reports, analysis, and actions, that there will be no significant impact if the Certificate of Needs as requested are granted. The DEIS must be modified so that the policymakers have an appropriate record to evaluate the environmental impact of the proposed Applications. With respect to the assumption that the Emergency Response Plans will be implemented and in place, the City's testimony clearly rebuts any presumption that this will be the case. Accordingly, the DEIS and the FEIS must be modified to reflect this rebuttal.

Responses

Comment 25-8
See response to Comment 25-2 which addresses some of the same concerns. Text has been added in Chapter 2, Section 5.4 which discusses the uncertainty of a federal repository and the use of a 200-year timeframe as an attempt to bound this uncertainty. Text in Chapter 2, Section 5.4 has been modified and supplemented to include scenarios from the Yucca Mountain EIS, including storage of spent nuclear fuel at ISFSIs for up to 10,000 years.

Comment 25-9
Text in Chapter 2, Section 5.4 has been modified and supplemented to include scenarios from the Yucca Mountain EIS, including storage of spent nuclear fuel at ISFSIs for up to 10,000 years. Monitoring and maintenance at the Prairie Island ISFSI would need to be effective in order for the ISFSI to function as designed. Among the measures that the Yucca Mountain EIS assumes necessary for effectiveness is replacement of the ISFSI every 100 years. Whether such a measure will be necessary for the Prairie Island ISFSI is uncertain. Text in Chapter 2, Section 5.4 has been added which discusses Yucca Mountain EIS assumptions and costs.

Comment 25-10
See response to Comment 25-1 which addresses the same concerns.

Commenter 25- City of Red Wing

Mr. William C. Storm
May 8, 2009
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With respect to the continued storage of spent fuel, there must be an effective analysis of the continued storage of the same during the timeframe that the DEIS itself has established. This must include a timeline of funding, and plan for the maintenance, inspection, repair and replacement, if necessary, of the casks and other support systems in and around the facilities that store the spent fuel. This information was specifically requested by the Advisory Task Force and must be included within the FEIS.

I thank you for your considerations in this matter.

Very truly yours,

MADIGAN, DAHL & HARLAN, P.A.

/s/ Thomas P. Harlan

Thomas P. Harlan

cc: Kay Kuhlman (via e-mail)
Marshall Hallock (via e-mail)

Responses

Commenter 26- Bruce McBeath

From: Bruce McBeath
To: Bill.Storm@state.mn.us;
Subject: EIS - PINGP Commentary
Date: Sunday, April 26, 2009 8:28:14 AM

Bill:

These comments are in response to the EIS you submitted to former task force members. Thank you for inviting addition commentary on your report.

26-1 I'm directing my comments to Section 4.5, specifically related to "Psychological Impacts Associated with Living Near a Nuclear Generating Plant." As a task force member who is a practicing clinical psychologist in the Red Wing area, I addressed my responses primarily to these concerns. At that time, I suggested that anxiety and related stress responses could be factors impacting children and families living near the nuclear plant and that some baseline data be developed that could be monitored over a period of time. Also, monitoring plant employee stress levels as a health and safety factor would appear of fundamental importance. There may be an on-going process at PINGP for doing that, but I am not aware that we, as a committee, received any information about it if such a process exists.

Your EIS report makes some mention of the more generalized impact on a community associated with living by a nuclear plant, but does not specifically address the concerns I (and others) raised earlier. There are baseline data on other health related areas, like radioactive emission testing, but no baseline data on significant psychological factors affecting children, families, and employees at PINGP. If it were not possible to discern these factors, we might understand this omission. Quantitative measures may be superficial and of little value here. But good qualitative tools are available to provide a "community psychological health" assessment that would highlight areas for further on-going monitoring and evaluation. Psychological factors are as "real" as physical factors are, and an adequate process for their routine consideration needs to be included in your report.

Concern about psychological impacts on the host community/communities from a larger, community-based, perspective have also not been addressed. In the study cited in your report("Living with Nuclear Power in Britain:A Mixed Methods Study"), the researchers identified and applied a mixed qualitative/quantitative process that surfaced

Responses

Comment 26-1
See response to Comment 4-3 which addresses the same concern.

Commenter 26- Bruce McBeath

significant themes related to how anxiety was experienced and managed by respondents living in the communities containing nuclear power stations. Significant for our purposes is their description of the relationship between anxiety and the level of "institutional trust"experienced by members of these communities. Sustaining transparency in the interactions between nuclear plant staff, government officials and the host communities appeared a primary factor in reducing anxiety. "Trust in the system" is itself an aggravating or mitigating psychological factor that requires monitoring and evaluation.

In summary, I propose that psychological factors affecting individuals and communities living near the PINGP can and should be identified and monitored. The increasing likelihood that dry cast storage will remain at Prairie Island into perpetuity only increases the need for effectively monitoring health and safety factors, and psychological factors rank equal among them.

Thank you,
Bruce McBeath

Responses

Commenter 27- Andru Peters

Andru Peters
1009 Safari Way
Lake City, MN
Tel: 651-345-3045
E-M: cadancinbear@yahoo.com

Public Hearing, Red Wing, MN
April 21, 2009

RE: EIS Xcel Energy Prairie Island Nuclear Generating Plant, March 17, 2009

REF #1: Chapter 4.0 Human & environmental Impacts; Sub 4.9 Transportation & Sub 4.11 Water Resources

REF #2: CFR 49 Transportation (1990); Part 171, Sub Chapter C – Hazardous Materials Regulations

Part 172, Subpart D marking, subpart E labeling, subpart F placard

Part 173, Subpart B Preparation of Hazardous materials for transportation; subpart I radioactive materials

I am a member of the Prairie Island Study Group and also a participating member of the Advisory Task Force Team.

The report is non specific as to whether interstate Traffic and/or intrastate traffic will be utilized in transporting hazardous materials – nuclear waste (spent fuel rods).

1. Interstate transportation (Yucca Mountain, NV) was a non-issue back in the late 1990's, both the state of California and Nevada would not allow transport of nuclear waste for either inter- or intrastate movements.
   NOTE: I participated in numerous discussions and advised motor carriers on hauling.

2. Para 171.2 states: no person may offer or accept a hazardous material for transportation in commerce unless the material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized per this sub chapter. . . .

27-1 3. I did not see any reference of complying with DOT standards or guidelines?

4. Para 171.3(3) states: Delivers, as designated on the entire manifest by the generator, the entire quantity of the waste received from the generator or transporter...

Responses

Comment 27-1

See response to Comment 2-1 which addresses the same concern.

Commenter 27- Andru Peters

EIS Comment
April 21, 2009
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5. Para 171.3(d) states: If a discharge of hazardous waste or other hazardous material occurs during transportation, and an official of a state or local government or a Federal agency. . . . . (there is notification protocol, EPA involvement
6. Para 171.12(e) states: Radioactive material being shipped must meet IAEA Regulations for safe transport of radioactive materials, as amended.
7. Part 1034 Routing of Traffic, specifically re-routing by rail or motor

27-2

8. By maps 300 casks + 300 casks movement within Minnesota. Originally for moving casks to Yucca Mountain. Question is the pad extension for up to 48, what will be proposed for the addition of the 99 casks being projected, above the current 48?
9. Unclear which counties are impacted – a contradiction exists. Maps do not show any counties along TH 61 from LaCrosse to Red Wing being in the transportation zone; BUT, the EIS declares TH 61 as a designated route? There is a contradiction between DOT & MnDOE on designated and approved routes?
10. Major routes identified and no visible documentation as to route approval? Maps show I-90 (LaCrosse to Albert Lea) & I-35 (Metro area to Albert Lea) corridor as preferred routes. Rail routes identified are CP line PI, Red wing to St. Paul, then St. Paul southwest towards Iowa order. There is NO EIS identification of the rail route parallel to TH 61 southbound along the Mississippi River.

27-3

11. For counties affected by transportation of nuclear waste, Goodhue, Wabasha & Winona counties are not identified as affected counties. This is a contradiction between Federal Agencies and MnDOE/Xcel?

27-4

12. For section 4.11 Water Resources, specifically Lake Pepin Ice Cover, Table 4-5 heading should be amended to read "post PI nuclear power plant placed in operation". Insert an additional table to show "pre PI nuclear power plant construction for the time period of 1940 – 1949. This table would be in the +/- date range of before and after plant operations.

Responses

Comment 27-2
See response to Comment 2-1 which addresses the same concern.

Comment 27-3
See response to Comment 2-1 which addresses the same concern.

Comment 27-4
The text in Chapter 1, section 4.11-*Lake Pepin Ice Cover* has been modified to expand the discussion on this issue.

Commenter 27- Andru Peters

EIS Comment
April 21, 2009
Page three

27-5 13. From personal experience living next to Lake Pepin, the compare and contrast using the pre & post dates for visual observation for winter months: Key premise is that the City of Lake City winter business has been significantly impacted by PI discharge of warmer waters into the Mississippi River which has reduced ice thickness.

	1940s	2000s
MnDOT declaring temporary Road	Yes	No
City snow plows crossing lake	Yes	No
Avg. daily number of autos crossing	60 - 100	0
Number of ice houses on the lake	250 - 350	15 – 40
Ice fishing contests	Yes, annually	No
Number of contest attendees	40 - 1000	0
WI citizens who can shop in LC	100	0
Number of vehicles breaking thru ice	1	5 - 7

At minimum it should be requested the water discharge temperature should be equal to the water temperature 10 miles downriver from the PI plant.

14. Ice thickness data should show a consistent significant thickness in which ice related business can be sustained with vehicles and people being able to use the ice for recreation and business purposes; which is the heart beat of a small rural river town.

15. In addition there used to be numerous ice boats that would traverse the lake in the 1940s – 1950s and today none can be found on the lake. Yes, hover crafts are used; WHY, ice not thick enough to hold the weight of autos, ice houses, and ice boats.

Thank you for considering these remarks in updating and modifying the EIS documents for Section 4.9 and 4.11 respectively.

Andru Peters
Lake City, MN

PIEISHearingApr2008

Responses

Comment 27-5
See response to Comment 12-1 which addresses the same concern.

Commenter 28- Minnesota Historical Society

Minnesota Historical Society
STATE HISTORIC PRESERVATION OFFICE

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May 7, 2009

Mr. Bill Storm
MN Dept. of Commerce
85 7th Place, Suite 500
St. Paul, MN 55101-2198

RE: PUC Docket Nos. E002/CN-08-509 & E002/GS-08-690
PUC Docket No. E002/CN-08-510
Xcel Energy Prairie Island Nuclear Generating Plant
Extended Power Uprate Project
Additional Dry Cask Storage
Red Wing, Goodhue County
SHPO Number: 2009-1383

Dear Mr. Storm:

Thank you for the opportunity to review and comment on the above project. It has been reviewed pursuant to the responsibilities given the Minnesota Historical Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

28-1 Based on our review of the project information, we conclude that there are no properties listed on the National or State Registers of Historic Places, and no known or suspected archaeological properties in the area that will be affected by this project.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36CFR800, Procedures of the Advisory Council on Historic Preservation for the protection of historic properties. If this project is considered for federal assistance, or requires a federal permit or license, it should be submitted to our office with reference to the assisting federal agency.

Please contact our Compliance Section at (651) 259-3455 if you have any questions regarding our review of this project.

Sincerely,

Britta L. Bloomberg
Deputy State Historic Preservation Officer

cc: Rae Lynn Asah
Brian Zelenak, Excel Enerygy
Prairie Island Indian Community

Minnesota Historical Society, 345 Kellogg Boulevard West, Saint Paul, Minnesota 55102.
651-259-3000 • 888-727-8386 • www.mnhs.org

Responses

Comment 28-1
Thank you for your comment. It has been noted and included in the record for this EIS.