Applicant's Environmental Report – Operating License Renewal Stage Prairie Island Nuclear Generating Plant Nuclear Management Company, LLC

Units 1 and 2
Docket Nos. 50-282 and 50-306
License Nos. DPR-42 and DPR-60

April 2008

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ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AEC	U.S. Atomic Energy Commission
AMC	Association of Minnesota Counties
AQCR	Air Quality Control Region
AWEA	American Wind Energy Association
BMP	Best management practices
Btu	British thermal unit
CAIR	Clean Air Interstate Rule
CDS	Comprehensive Demonstration Study
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIP	Conservation Improvement Plan
CON	Certificate of Need
CRT	cathode ray tube
CSA	Combined Statistical Area
CSFCC	California Stationary Fuel Cell Collaborative
CT	combustion turbine
CWA	Clean Water Act
CWIS	Cooling Water Intake System
DAW	dry active waste
DECON	decontamination and dismantlement
DOE	U.S. Department of Energy
DOT	Department of Transportation
DSM	demand-side management
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
EIA	Energy Information Administration
EIS	Environmental Impact Statement
ER	Environmental Report
ESWQD	Environmental Services Water Quality Department
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FES	Final Environmental Statement
FWS	U.S. Fish and Wildlife Service
GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants
GIS	Geographic Information System
GPD	gallon per day

gpm	gallon per minute
GWh	gigawatt-hours
IEEE	Institute of Electrical and Electronics Engineers
HAZCOM	Hazard Communication
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDR	Henningson, Durham, and Richardson, Inc.
HRSG	heat recovery steam generator
IGCC	integrated gasification combined-cycle
IPA	Integrated Plant Assessment
ISFSI	Independent Spent Fuel Storage Installation
IVM	integrated vegetation management
JPM	John P. Madgett Station
kV	kilovolt
LOCA	loss-of-coolant accident
LOS	level of service
MAPP	Mid-Continent Area Power Pool
MDA	Minnesota Department of Administration
MDC	Minnesota Department of Commerce
MEQB	Minnesota Environmental Quality Board
mg/L	milligram per liter
MGY	million gallons per year
MISO	Midwest Independent System Operators
MiSA	Micropolitan Statistical Area
MN DNR	Minnesota Department of Natural Resources
Mn/DOT	Minnesota Department of Transportation
MOU	Memorandum of Understanding
MOU	Minnesota Ornithologists' Union
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MSA	Metropolitan Statistical Area
msl	mean sea level
MTU	metric ton of uranium
MW	megawatt
MWd	megawatt-days
MWe	megawatts-electrical
MWt	megawatts-thermal
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NESC®	National Electrical Safety Code®

NMC	Nuclear Management Company
NMFS	National Marine Fisheries Service
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NREL	National Renewable Energy Laboratory
NSP	Northern States Power
NSPCM	Northern States Power Company-Minnesota
OLER	Environmental Report – Operating License Stage
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PIIC	Prairie Island Indian Community
PINGP	Prairie Island Nuclear Generating Plant
PM	Particulate Matter
psi	pound per square inch
RCRA	Resource Conservation and Recovery Act of 1976
RDF	refuse-derived fuel
ROI	Region of Influence
ROW	right-of-way
SAFSTOR	Safe storage of the stabilized and defueled facility
SAMA	Severe Accident Mitigation Alternatives
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMITTR	surveillance, monitoring, inspections, testing, trending, and recordkeeping
SO_2	sulfur dioxide
SO_x	oxides of sulfur
TtNUS	Tetra Tech NUS, Inc.
UM	University of Minnesota
USACE	U.S. Army Corps of Engineers
USAR	Updated Safety Analysis Report
USCB	U.S. Census Bureau
USDOI	U.S. Department of Interior
USDOJ	U.S. Department of Justice
USAR	Updated Safety Analysis Report
USGS	U.S. Geological Survey
WDA	Wisconsin Department of Administration
WIDNR	Wisconsin Department of Natural Resources
WIPSC	Wisconsin Public Service Commission

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION AND BACKGROUND

NRC

"Each application must include a supplement to the environmental report that complies with the requirements of Subpart A of 10 CFR 51." 10 CFR 54.23

"…The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and, where authorized, Federal (other than NRC) decisionmakers…" (NRC 1996a, Section 1.3; NRC 1996b, Page 28472).

"…The NRC's NEPA decision standard for license renewal would require the NRC to determine whether the environmental impacts of license renewal are so great that preserving the option of license renewal for future decisionmakers would be unreasonable." (NRC 1996b, Page 28471)

The U.S. Nuclear Regulatory Commission (NRC) licenses the operation of domestic nuclear power plants in accordance with the Atomic Energy Act of 1954, as amended, and NRC implementing regulations. Nuclear Management Company (NMC) operates Prairie Island Nuclear Generating Plant (PINGP) Units 1 and 2, pursuant to NRC Operating Licenses DPR-42 and DPR-60. The license for PINGP Unit 1 will expire August 9, 2013, and the license for PINGP Unit 2 will expire October 29, 2014 (NRC 2000a).

NMC has prepared this environmental report (ER) in conjunction with its application to NRC to renew the PINGP operating licenses, in accordance with the following NRC regulations:

- Title 10, Energy, Code of Federal Regulations (CFR), Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, Section 51.53, Postconstruction Environmental Reports, Subsection 51.53(c), Operating License Renewal Stage [10 CFR 51.53(c)].
- Title 10, Energy, CFR, Part 54, Requirements for Renewal of Operating Licenses for Nuclear Power Plants, Section 54.23, Contents of Application-Environmental Information (10 CFR 54.23).

1.2 STATEMENT OF PURPOSE AND NEED

NMC adopts for this ER the following NRC general definition of purpose and need for the proposed action, as stated in NRC's *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437 (NRC 1996a, Section 1.3; NRC 1996b, page 28472):

> The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and, where authorized, Federal (other than NRC) decision makers.

The proposed action would provide the option to operate PINGP Unit 1 and PINGP Unit 2 for an additional 20 years.

1.3 ENVIRONMENTAL REPORT SCOPE AND METHODOLOGY

NRC regulations for domestic licensing of nuclear power plants require environmental review of applications to renew operating licenses. The 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*. In determining what information to include in the PINGP ER, NMC has relied on NRC regulations and the following supporting documents that provide additional insight into the regulatory requirements:

- NRC supplemental information in the *Federal Register* (NRC 1996b, NRC 1996c, NRC 1996d, and NRC 1999a)
- Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS) (NRC 1996a and 1999b)
- Regulatory Analysis for Amendments to Regulations for the Environmental Review for Renewal of Nuclear Power Plant Operating Licenses (NRC 1996e)
- Public Comments on the Proposed 10 CFR Part 51 Rule for Renewal of Nuclear Power Plant Operating Licenses and Supporting Documents: Review of Concerns and NRC Staff Response (NRC 1996f)

NMC also obtained general guidance regarding format and content of the ER from the following NRC documents:

- Supplement 1 to NRC Regulatory Guide 4.2, *Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses* (NRC 2000b)
- Supplement 1 to NUREG-1555*, Standard Review Plans for Environmental Reviews for Nuclear Power Plants (Operating License Renewal)* (NRC 1999c)

Table 1-1 indicates where the ER responds to each requirement of 10 CFR 51.53(c). In subsequent chapters of this ER, each section is prefaced by a boxed quote of the regulatory language and applicable supporting document language.

1.4 PRAIRIE ISLAND NUCLEAR GENERATING PLANT LICENSEE AND OWNERSHIP

PINGP is owned by Northern States Power Company (NSP), which is a wholly owned utility operating subsidiary of Xcel Energy Inc. (Xcel Energy). As the plant's owner, NSP has the exclusive right to the energy generated by PINGP. NMC, which is wholly owned subsidiary of Xcel Energy, operates and maintains PINGP on behalf of NSP. NSP is licensed by NRC to own PINGP, while NMC is licensed to use and operate the facility (65 FR 98, pp. 31935-36).

The *Nuclear Power Plant Operating Service Agreement* (NPPOSA) between NSP and NMC established NMC as the sole operator of PINGP and defines the owner-operator relationship. The NPPOSA provides for owner services and assistance to NMC for safe, economic, and efficient operation of PINGP. Implementation of the NPPOSA is achieved by continuance of functional relationships among owner/operator organizations regarding environmental matters. These functional relationships provide for close coordination among corporate and plant staff for efficient and effective environmental management (NSP 1999). NMC and its employees are obligated to comply with all corporate policies listed in Exhibit D of the NPPOSA, including Xcel Energy's Code of Conduct and Environmental Policy (Xcel Energy 2006).

TABLE 1-1
ENVIRONMENTAL REPORT RESPONSES TO LICENSE RENEWAL ENVIRONMENTAL REGULATORY REQUIREMENTS

Regulatory Requirement		Responsive ER Section(s)
10 CFR 51.53(c)(1)		Entire Document
10 CFR 51.53(c)(2), Sentences 1 and 2	3.0	The Proposed Action
	3.2	Refurbishment Activities
	3.3	Programs and Activities for Managing the Effects of Aging
10 CFR 51.53(c)(2), Sentence 3	7.3	Environmental Impacts of Alternatives
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(1)	4.0	Environmental Consequences of the Proposed Action and Mitigating Actions
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(2)	6.3	Unavoidable Adverse Impacts
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(3)	7.0	Alternatives to the Proposed Action
	8.0	Comparison of Environmental Impacts of License Renewal with the Alternatives
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(4)	6.5	Short-Term Use Versus Long-Term Productivity of the Environment
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(5)	6.4	Irreversible and Irretrievable Resource Commitments
10 CFR 51.53(c)(2) and 10 CFR 51.45(c)	4.0	Environmental Consequences of the Proposed Action and Mitigating Actions
	6.2	Mitigation
	7.3	Environmental Impacts of Alternatives
	8.0	Comparison of Environmental Impacts of License Renewal with the Alternatives
10 CFR 51.53(c)(2) and 10 CFR 51.45(d)	9.0	Status of Compliance
10 CFR 51.53(c)(2) and 10 CFR 51.45(e)	4.0	Environmental Consequences of the Proposed Action and Mitigating Actions
	6.3	Unavoidable Adverse Impacts
10 CFR 51.53(c)(3)(ii)(A)	4.2	Surface Water and Groundwater Use Conflicts
	4.2.1	Impact on Mississippi River Flows and Water Levels
	4.2.2	Indirect Impacts from Surface Water Use
10 CFR 51.53(c)(3)(ii)(B)	4.3	Entrainment of Fish and Shellfish in Early Life Stages
	4.4	Impingement of Fish and Shellfish
	4.5	Heat Shock
10 CFR 51.53(c)(3)(ii)(C)	4.2.3	Groundwater Use Conflicts (Plants Using >100 gpm of Groundwater)
	4.2.4	Groundwater Use Conflicts (Plants Using Ranney Wells)
10 CFR 51.53(c)(3)(ii)(D)	4.2.5	Degradation of Groundwater Quality

TABLE 1-1 (CONTINUED)
ENVIRONMENTAL REPORT RESPONSES TO LICENSE RENEWAL ENVIRONMENTAL REGULATORY REQUIREMENTS

Regulatory Requirement	Responsive ER Section(s)	
10 CFR 51.53(c)(3)(ii)(E)	4.6	Impacts of Refurbishment on Terrestrial Resources
	4.7	Threatened and Endangered Species
10 CFR 51.53(c)(3)(ii)(F)	4.8	Air Quality During Refurbishment (Non-Attainment or Maintenance Areas)
10 CFR 51.53(c)(3)(ii)(G)	4.9	Impact on Public Health of Microbiological Organisms
10 CFR 51.53(c)(3)(ii)(H)	4.10	Electromagnetic Field – Acute Effects
10 CFR 51.53(c)(3)(ii)(I)	4.11	Housing
	4.12	Public Utilities: Public Water Supply Availability
	4.13	Education Impacts from Refurbishment
	4.14	Offsite Land Use
10 CFR 51.53(c)(3)(ii)(J)	4.15	Transportation
10 CFR 51.53(c)(3)(ii)(K)	4.16	Historic and Archaeological Resources
10 CFR 51.53(c)(3)(ii)(L)	4.17	Severe Accident Mitigation Alternatives
10 CFR 51.53(c)(3)(iii)	4.0	Environmental Consequences of the Proposed Action and Mitigating Actions
	6.2	Mitigation
10 CFR 51.53(c)(3)(iv)	5.0	Assessment of New and Significant Information
10 CFR 51, Appendix B, Table B-1, Footnote 6	2.5.3	Minority and Low-Income Populations

CFR = Code Of Federal Regulations

1.5 REFERENCES

NRC (U.S. Nuclear Regulatory Commission). 1996a. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Office of Nuclear Regulatory Research. Washington, DC. May.

NRC (U.S. Nuclear Regulatory Commission). 1996b. "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses." *Federal Register.* Vol. 61, No. 109. (June 5, 1996): 28467-97.

NRC (U.S. Nuclear Regulatory Commission). 1996c. "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Correction." *Federal Register.* Vol. 61, No. 147. (July 30, 1996): 39555-6.

NRC (U.S. Nuclear Regulatory Commission). 1996d. "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses." *Federal Register.* Vol. 61, No. 244. (December 18, 1996): 66537-54.

NRC (U.S. Nuclear Regulatory Commission). 1996e. *Regulatory Analysis for Amendments to Regulations for the Environmental Review for Renewal of Nuclear Power Plant Operating Licenses.* NUREG-1440. Office of Nuclear Regulatory Research. Washington, DC. May.

NRC (U.S. Nuclear Regulatory Commission). 1996f. *Public Comments on the Proposed 10 CFR Part 51 Rule for Renewal of Nuclear Power Plant Operating Licenses and Supporting Documents: Review of Concerns and NRC Staff Response.* Volumes 1 and 2. NUREG-1529. Office of Nuclear Regulatory Research. Washington, DC. May.

NRC (U.S. Nuclear Regulatory Commission). 1999a. "Changes to Requirements for Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Final Rule." *Federal Register.* Vol. 64, No. 171. (September 3, 1999): 48496-507.

NRC (U.S. Nuclear Regulatory Commission). 1999b. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS).* Section 6.3, "Transportation" and Table 9-1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants." NUREG-1437. Volume 1, Addendum 1. Office of Nuclear Reactor Regulation. Washington, DC. August.

NRC (U.S. Nuclear Regulatory Commission). 1999c. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal.* NUREG-1555*,* Supplement 1. Washington, D.C. October.

NRC (U.S. Nuclear Regulatory Commission). 2000a. *Northern States Power Company and Nuclear Management Company, LLC; Docket No. 50-263; Prairie Island Nuclear Generating Plant, Units No. 1 and 2; Facility Operating License, Amendments 153 and 144*. August.

NRC (U.S. Nuclear Regulatory Commission). 2000b. *Supplement 1 to NRC Regulatory Guide 4.2, Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses*. Office of Regulatory Research. Washington D.C. September.

NSP (Northern States Power Company). 1999. "Nuclear Power Plant Operating Service Agreement Between Northern States Power Company and Nuclear Management Company for the Prairie Island Nuclear Generating Plant." November.

Xcel Energy. 2006. "Xcel Energy Code of Conduct." August 22.

2.0 SITE AND ENVIRONMENTAL INTERFACES

2.1 GENERAL SITE DESCRIPTION

Prairie Island Nuclear Generating Plant (PINGP) is located on the west bank of the Mississippi River in Section 4 and 5, T113N, R15W, in Goodhue County within the city limits of Red Wing, Minnesota, at 92° 37.9′ west longitude and 44° 37.3′ north latitude (Figure 2.1-1). The City of Hastings is located approximately 13 miles northwest (upstream) of the plant. Minneapolis is located approximately 39 miles northwest and St. Paul is located approximately 32 miles northwest of the plant. At the plant location, the Mississippi River serves as the state boundary between Minnesota and Wisconsin. PINGP is located on the western shore of Sturgeon Lake, a backwater area located one mile upstream from the U.S. Army Corps of Engineers (USACE) Lock and Dam 3 (Figure 2.1-2). The Vermillion River lies just west of PINGP and flows into the Mississippi River approximately two miles downstream of Lock and Dam 3. Several federally-owned recreation areas and wildlife refuges are located within 50 miles of PINGP (Figure 2.1-1). The Winona District of the Upper Mississippi River Wildlife and Fish Refuge begins at the mouth of the Chippewa River and ends approximately 50 river miles downstream (FWS 2006a). The Mississippi National River and Recreation Area stretches 72 miles from the southern border of Dakota County up the Mississippi River, through Minneapolis-St. Paul, ending at the western border of Anoka County (NPS 2006a). The Minnesota Valley National Wildlife Refuge stretches 34 miles along the Minnesota River (FWS 2006b). The St. Croix National Scenic Riverway includes 154 miles of the St. Croix River from Gordon, Wisconsin to its confluence with the Mississippi River (NPS 2006b).

Prairie Island Nuclear Generating Plant

2.1.1 REGIONAL FEATURES AND GENERAL FEATURES IN THE 6-MILE VICINITY

Goodhue County, in which the site is located, and the adjacent counties of Dakota and Pierce (in Wisconsin) are predominantly rural. Principal crops include soybeans, corn, oats, hay, and some cannery crops. The nearest dairy farm is located more than two miles southwest of the site. Beyond the site boundary and within a one-mile radius of the plant, there are approximately 20 to 30 residences or summer cottages. The closest occupied offsite residence is approximately 3,000 feet north-northwest of the plant (NMC 2007).

2.1.2 PINGP SITE FEATURES

The PINGP site comprises approximately 578 acres of land, owned in fee by Northern States Power (NMC 2007). Prior to construction of PINGP, the land was agricultural (AEC 1973). Figure 2.1-3 shows the property boundary and 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 (NMC 2007). An agreement has been made 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 (Welk 1972, Cox 1972).

Directly north of NSP property lies the Prairie Island Indian Reservation. The Prairie Island Indian Community is a Federally Recognized Indian Tribe organized under the Indian Reorganization Act (25 USC 476). The Prairie Island Indian Community owns and operates the Treasure Island Resort and Casino, which 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 (Minnesota Indian Affairs Council 2006).

The plant’s Emergency Plan and the State of Minnesota Local Government Emergency Response Plans for Nuclear Power Plants include notification plans for the Treasure Island Resort and Casino, and the Tribal Community, in the event of a nuclear plant radiological emergency (NMC 2007).

Section 3.1 describes key features of the plant, including reactor and containment systems, cooling water systems, and transmission facilities.

2.2 HYDROLOGY

2.2.1 UPPER MISSISSIPPI RIVER BASIN

The Mississippi River, with its headwaters located in the north woods of Minnesota, is the longest and largest river in North America. The River flows 3,705 kilometers (2,302 miles) from its source, Lake Itasca, to the Gulf of Mexico and drains all or parts of 31 states. The River and the forests and wetlands along its banks support various diverse ecosystems. For reference purposes, the United States Geological Survey (USGS) has broken the Mississippi River into six sub-basins known as the Upper Mississippi River, Lower Mississippi River, Arkansas Red-White River, Ohio River, Missouri River, and Tennessee River Subbasins (EPA 2006a).

The Upper Mississippi River Basin drains approximately 189,000 square miles including large portions of Minnesota, Wisconsin, Iowa, Illinois, and Missouri. Small portions of Indiana, Michigan, and South Dakota are also within the basin. The basin is drained by 30,700 miles of streams. The average annual discharge of the Upper Mississippi River increases from 9,180 cubic feet per second (cfs) near St. Paul, Minnesota to 204,800 cfs at Thebes, Illinois. There are 12 major tributaries to the Upper Mississippi River Basin, including the Missouri, Illinois, Wisconsin, and Iowa Rivers. There are more than 3,000 reservoirs within the basin. More than 30 million people live within the basin, with nearly 30 percent of the population living in urban areas such as Minneapolis-St. Paul, Minnesota; St. Louis, Missouri; Chicago, Illinois; the Quad Cities, Illinois and Iowa; Des Moines, Iowa; La Crosse, Wisconsin; and Peoria, Illinois (EPA 2006a).

PINGP is located in the Rush-Vermillion Watershed, which includes portions of Dakota, Goodhue, Scott, Wabasha, and Washington counties in Minnesota and Buffalo, Pepin, Pierce, and St. Croix counties in Wisconsin (EPA 2008). The character of the Mississippi River in the vicinity of the PINGP site is shaped by the USACE lock and dam system (BALMM 2001). The Mississippi River is dammed at a point about one mile downstream from the PINGP site by Lock and Dam 3 (NMC 2007). Lock and Dam 3 is located at river mile 796.9 (USACE 2004a).The Vermillion River and the Cannon River enter the main stream of the Mississippi River below Lock and Dam 3 (NMC 2007). Lock and Dam 2 and Lock and Dam 4 are located upstream and downstream of Lock and Dam 3 at river miles 815.2 and 752.8, respectively (USACE 2004a). The locks and dams create slack-water pools for navigation during periods of low and moderate water levels. For each pool there is a primary control point where a predetermined or normal water elevation is maintained for navigation (USACE 2004a). Normal pool level upstream from Lock and Dam 3 is 674.5 feet (NMC 2007). There are no withdrawals of river water for city water supply for at least 300 miles downstream from the site (NMC 2007). Minor withdrawals of river water for irrigation purposes occur, the nearest being the City of Red Wing which withdraws water for landscaping (MN DNR 2005a).

2.2.1.1 United States Geological Survey Gaging Stations

The closest U.S. Geological Survey (USGS) gaging stations located upstream and downstream of the PINGP site are listed in Table 2.2-1. The USGS operates gaging

stations at Prescott (13 miles upstream of the PINGP site) and Winona (73 miles downstream of the site). These stations provide a continuous record of stream flow since 1928 (USGS 2006).

2.2.1.2 Mississippi River Flow Statistics at USGS Stations

Based on data from Water Years 1928 to 2005, the annual mean flow values of the Mississippi River at the nearest USGS upstream and downstream gaging stations (Prescott and Winona stations) are shown in Table 2.2-2.

2.2.1.3 Lock and Dam 3 Discharge Statistics

Flow in the PINGP section of the Mississippi is controlled by the USACE Lock and Dam 3, which creates a pool level extending upstream to Lock and Dam 2. During the initial rise in pool level, Sturgeon Lake was created by the backwater flooding of low lying areas in the flood plain adjacent to the Mississippi River. The lock and dam was created by the USACE as part of a navigation project (AEC 1973, pp. II-32 to II- 42). The river discharge through Lock and Dam 3 is indicated in Table 2.2-3. Discharge from Lock and Dam 3 is typically highest in spring and early summer.

2.2.1.4 Consumptive Surface Water Use

Over seven billion gallons of water are withdrawn from surface water sources each day in the 60 counties that border the navigable Upper Mississippi River (EPA 2006a). Over 80 percent of this water is used as cooling water for energy production and thus returned to rivers and streams. There are 29 power plants that use water from the 1,300-mile long Upper Mississippi River. The Upper Mississippi River provides water to 23 public water suppliers serving a combined population of approximately 2.8 million people. Approximately 278 facilities discharge wastewater to the Upper Mississippi River, including industrial facilities and municipal sewage treatment plants (EPA 2006a).

2.2.2 ALLUVIAL AQUIFERS

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 site 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 (NMC 2007, Appendix E).

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 (Cowdery 1999, p. 9).

2.2.3 DEEP AQUIFERS

Important aquifers in the vicinity of the PINGP site include the Jordan Sandstone and the Dresbach formation of which the primary water producing unit is the Mount Simon formation. Separating the Jordon Sandstone aquifer from the Dresbach formation are the St. Lawrence and Franconia formations (NMC 2007, Appendix E).

The Jordan Sandstone, which is an important aquifer in areas away from the river, outcrops on the bluffs adjacent to the Mississippi River. Underlying the Jordan Sandstone are the St. Lawrence and Franconia formations, which are not considered important water-producing formations (NSP 1972). The Franconia sandstone formation is the uppermost bedrock underlying the alluvial overburden (alluvial aquifer) at the site. The Franconia formation's thickness at the site is believed to be much less than 180 feet which is the formation's total measured thickness. The Dresbach formation is believed to be over 100 feet in thickness, and consists of sandstone, siltstone, and shale. Test borings at the site revealed the following formations (NMC 2007, Appendix E):

Elevation in feet	Description
690-665	Predominantly loose granular soils which exhibit relatively low strength and moderately high compressibility characteristics. These soils consist of loose to fine-grained medium-grained sands.
665-645	Predominantly medium-dense to dense granular soils exhibiting moderate strength and compressibility characteristics. The soils consist of brown fine to medium sands containing varying amounts of coarse sand and gravel. This zone contains interspersed, discontinuous layers of loose granular soils. These soils are located below the groundwater table and are denser than the overlying sands.
645-515	Predominantly dense to very dense, fine- to medium-grained granular soils containing interspersed discontinuous zones of coarse-grained sands, gravels and cobbles. Generally, the lower 10 to 30 feet of this zone contains many cobbles and boulders. These soils exhibit moderately high strength and relatively low compressibility characteristics. These soils are saturated and are somewhat denser than the overlying sands.
515 to the depths penetrated by the borings	Paleozoic sandstone of the Franconia formation. The sandstone encountered in the borings consist predominantly of a gray fine- and medium-grained quartz sandstone containing loose and cemented zones.

2.2.4 GROUNDWATER LEVEL

The groundwater table in the vicinity of PINGP is generally within 5 to 20 feet of ground surface and slopes to the southwest (NMC 2007). Under normal flow conditions the head of the Mississippi River is higher than the Vermillion River maintaining a flow from

the Mississippi River/Pool 3 toward the Vermillion River, which enters the Mississippi River below Lock and Dam 3. However, during high rainfall events, the groundwater flow across the site to the southwest can flatten and result in a mounding situation where the alluvial aquifer flows radially from Prairie Island (Cowdery 1999).

2.2.5 CONSUMPTIVE GROUNDWATER USE

The wells at PINGP are installed within the overburden materials (alluvial aquifer) consisting of sand and gravel alluvial soils which range from 158 to 185 feet thick. Groundwater levels in the alluvial aquifer are directly influenced by the Mississippi River and vary with river fluctuations. The depth to groundwater varies from 5 to 20 feet across the island (NMC 2007, Appendix E).

The Prairie Island Indian Reservation public water supply withdraws water from the Eau Claire/Mount Simon aquifer (part of the Dresbach formation) and has replaced most of the once-used individual wells on the reservation (Cowdery 1999, p. 8). One of the closest wells to PINGP is a deep well (595 feet deep) located in the bedrock aquifers at Lock and Dam 3. The nearest groundwater consumption of important magnitude is in the Town of Red Wing six miles downstream (NMC 2007, Section 2.4.4). The Dresbach formation, which underlies the Franconia formation, produces water primarily from its basal member, the Mount Simon formation, carries large amounts of water, and is the source for several of the wells in the Red Wing area. The community derives its water from four deep wells (400 to 730 feet deep) which penetrate sandstone aquifers of the Mount Simon and into the underlying Hinkley formation and yield approximately 1,400 gallons per minute (gpm) (NMC 2007, Appendix E). Neither of these aquifer units is directly fed by the Mississippi River (NSP 1972).

Several industries in the Red Wing area also use groundwater and derive their supplies principally from the bedrock aquifers. Total well production from the bedrock at Red Wing probably exceeds 3,000 gpm, and fairly large quantities may also be extracted from the alluvium for certain industrial uses. Communities further downstream from the plant site that obtain their water from wells in bedrock are Lake City, 25 river miles downstream, and Wabasha, 37 miles downstream (NMC 2007, Section 2.4.4).

PINGP withdraws groundwater for potable and industrial use from six wells installed within the alluvial aquifer (Figure 3.1-1). Five of these wells have permits from the Minnesota Department of Natural Resources (MN DNR) (NSP 2006). A permit is not required for the sixth well because its flows are below the 10,000 gallons per day (GPD) or 1,000,000 gallons per year thresholds set by MN DNR. The 5 permitted wells (Table 2.2-4) produced an average of 91 gpm, over the 2000 - 2005 period. The production rate for the unpermitted well was 1 gpm based on PINGP's site data for 2005 (Bergland 2006). Therefore, the total average groundwater pumping rate for the six site wells for the period from 2000 through 2005 was 92 gpm. However, during this period, the highest average pumping rate for the six wells was 118 gpm which occurred during 2005. The lowest average pumping rate for the six wells was 77 gpm, which occurred in 2000 and 2002.

2.3 BIOLOGICAL RESOURCES

2.3.1 AQUATIC AND RIPARIAN ECOLOGICAL COMMUNITIES

Until the early 1970s, when the Clean Water Act and its implementing regulations produced significant improvement in water quality across the U.S., the Mississippi River below the Twin Cities was a degraded ecosystem. The Twin Cities area was the source of many pollutants, ranging from inadequately treated sewage to animal wastes (from area stockyards and slaughterhouses) to industrial pollutants to urban stormwater runoff. The Minnesota River, which joins the Mississippi River at Fort Snelling, also contributed to the Mississippi River's water quality problems. The Minnesota River flows through an agricultural region, and has carried sediment and animal wastes downstream into the Mississippi since the native prairie was converted into cropland. In more recent times, nutrients (nitrogen and phosphorus from fertilizers) from the Minnesota River have created severe water quality problems downstream in the Mississippi River (MRBDC 2001).

2.3.1.1 Aquatic Communities

2.3.1.1.1 Preoperational Monitoring (1969-1971)

During the pre-operational monitoring period (1969-1971), the aquatic communities of the Mississippi River (Pool 3) and Sturgeon Lake reflected the river's degraded condition. Although reasonably diverse, aquatic communities from top (fish) to bottom (phytoplankton) of the food chain were dominated by pollution-tolerant groups associated with polluted and eutrophic (nutrient-enriched) waters. These included well-known bioindicators of pollution such as blue-green algae (now generally referred to as blue-green "cyanobacteria"), tubificid worms, and common carp.

Mississippi River phytoplankton in the Prairie Island area were monitored in 1970 and 1971 by Northern States Power (NSP) to determine pre-operational species composition, densities, and distribution (AEC 1973). Phytoplankton densities were high immediately above Lock and Dam 3 and in Sturgeon Lake. Diatom production peaked in spring and fall, with genera associated with eutrophic waters dominating collections. In early summer, green algae were prevalent, and eutrophic species dominated. In late summer, Cyanophytes (blue-green algae) were prevalent, and intense blue-green algae blooms were sometimes observed. Pollution-tolerant Cyanophytes such as Anabena were common in late summer.

Zooplankton collections in 1970-1971 were dominated by rotifers and microcrustaceans (cladocerans and copepods). Rotifers were common from July through November, with members of the genera Keratella (July-November), Branchionus (July-October), and Trichocerca (July, August, October) predominant (AEC 1973). The cladocerans Daphnia and Bosmina and the copepod Cyclops were the most important microcrustaceans in summer. Daphnia became more prevalent in the fall, and was the most abundant genus in October. Zooplankton were not monitored from December through June.

The benthic macroinvertebrates of the Prairie Island area in 1970 and 1971 were mostly pollution-tolerant forms, indicative of degraded water quality (AEC 1973). Midges and oligochaetes dominated benthos collections. Tubificid worms, often associated with organic pollution, were common across the study area. Several caddisfly and mayfly species, generally regarded as pollution-intolerant, were found just above Lock and Dam 3, reflecting the fact that "most of the Twin Cities' effluvia are decomposed and diluted by the time they reach the general region of the Plant" (AEC 1973, page II-67). The combination of organic pollution and high silt levels had reduced shellfish to a "few small beds" in the area. The FES (AEC 1973) did not identify these shellfish, referring to them only as "clams."

In 1970 and 1971, the lower Pool 3 fish community was composed primarily of "rough fish" [e.g., common carp (*Cyprinus carpio*), freshwater drum (*Aplodinotus grunniens*), redhorse (*Moxostoma* spp.), and gizzard shad (*Dorosoma cepedianum*)] (AEC 1973). Two-thirds of fish collected in 1970 and 1971 were rough fish. Black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), white bass (*Morone americana*), and sunfish were the most important game fish. Walleye (*Stizostedion vitreum*) and sauger (*Stizostedion canadense*) were uncommon in lower Pool 3 in 1970 and 1971, but the "swift-water habitat" immediately below Lock and Dam 3 held larger concentrations of walleye, sauger, and white bass. The area below Lock and Dam 3 was also identified as a major spawning and rearing area for sauger and walleye (AEC 1973).

2.3.1.1.2 Operational Monitoring (1970s)

The Prairie Island Nuclear Generating Plant 316(a) Demonstration (HDR 1978) contains useful information on the water quality and fish populations of the Mississippi River immediately up-river of Lock and Dam 3 in the early years of PINGP operation. The 316(a) demonstration describes Pool 3 as "more of a lacustrine than a riverine habitat, characterized by low turbidity throughout most of the year" (HDR 1978, page III-27). It notes that this section of the Mississippi River is slightly eutrophic, with higher-than-background levels of metals and relatively high levels of toxicants including phenols and cyanide. The 316(a) demonstration observes that water quality in Pool 3 is greatly influenced by upstream inputs. Large quantities of treated sewage enter the river from the Metropolitan Wastewater Treatment Plant (MWTP) near St. Paul, and the Minnesota River contributes sediments and agricultural-related constituents (fertilizer, pesticides, herbicides). Flow from the St. Croix River, which is relatively pristine, tends to dilute the inputs from the St. Paul area and the Minnesota River. The authors of the 316(a) study conclude that the reach of the river adjacent to PINGP is a "recovery zone" where the biota benefit, to some degree, from upstream nutrient inputs and dissolved oxygen levels are high enough to support a variety of aquatic organisms.

The 316(a) demonstration summarizes fish sampling over the 1973-1976 period. Areas sampled were North Lake, Sturgeon Lake, and the main river channel. A total of 45,005 fish were collected over the 1973-1976 period using a variety of collection methods. Collections were dominated by a relatively small number of species. Four species – gizzard shad (20.8 percent of total), white bass (15.6 percent of total), freshwater drum

(12.8 percent of total), and common carp (11.1 percent of total) - made up 60 percent of all fish collected. Other species commonly collected were emerald shiner (*Notropis atherinoides*; 5.3 percent), sauger (3.9 percent), shorthead redhorse (*Moxostoma macrolepidotum*; 3.8 percent), bluegill (*Lepomis macrochirus*; 3.6 percent), black crappie (2.8 percent), channel catfish (*Ictalurus punctatus*; 2.2 percent), and white crappie (2.1 percent).

2.3.1.1.3 Operational Monitoring (1980s to present)

Xcel Energy continued to monitor fish populations in the vicinity of PINGP after the plant's 316(a) and 316(b) studies were completed to gauge the effectiveness of the intake and discharge modifications (see Sections 3.1.3 and 4.3) in reducing entrainment, impingement, and cold shock impacts. In recent years, the objective of fisheries monitoring has shifted from identifying impacts of PINGP operation to more generally assessing the status of the fishery in the vicinity of PINGP (Xcel Energy 2007). Fish were originally monitored using a variety of gear types: electrofishing, seining, gill-netting, trap-netting, and trawling. After 1988, electrofishing was the only sampling method employed for monitoring fish populations. Monitoring occurs monthly from May through October of each year in accordance with the NPDES permit. Four established sampling areas are located within a section of the Mississippi River that extends from 3.6 miles upstream of PINGP to 10.8 miles below the plant.

The total number of species caught each year over the 1988-2006 period has remained relatively constant, ranging from 34 – 41 species. Relative abundance of eight representative (common) species is monitored. These species are carp, white bass, freshwater drum, sauger, black crappie, shorthead redhorse, walleye, and gizzard shad. These eight species make up 69 to 82 percent of all fish caught each year. Relative abundance of most species has been consistent over the 17-year period. For example, white bass relative abundance ranged from 10 to 20 percent over the 1988-2004 period; freshwater drum ranged from 8 to 19 percent, shorthead redhorse ranged from 8 to 17 percent. Carp and gizzard shad abundance were more variable, presumably because reproductive success in these species depends on adequate water levels in backwater areas. The species with more consistent measures of abundance between years tend to be species that spawn in deeper water (main channel) habitats or tributary streams.

2.3.1.1.4 Water Quality and Fish Consumption Advisories

The Minnesota Pollution Control Agency (MPCA) is required, under Section 303(d) of the Clean Water Act, to identify waterbodies for which effluent limitations are not stringent enough to satisfy water quality standards (MPCA 2006). Every two years, in even-numbered years, MPCA publishes its List of Impaired Waters, identifying streams, lakes, and impoundments that are impaired for one or more pollutants and therefore do not meet one or more water quality standards. The segment of the Mississippi River to which PINGP discharges (St. Croix River to Chippewa River) appears on the 2006 list as impaired in four categories: Aquatic Consumption – Mercury (Fish Consumption Advisory), Aquatic Consumption – Mercury (in Water Column), Aquatic Consumption – PCB (Fish Consumption Advisory), and Aquatic Life – Turbidity (MPCA 2006). Based

on contaminant concentrations in fish collected by the Minnesota Department of Natural Resources, the Minnesota Department of Health (MDH) in 2006 published Site-Specific Fish Consumption Guidelines for the General Public and for Children (under age 15) and Women Who Are or May Become Pregnant. For Pool 3 of the Mississippi River, MDH recommends limiting consumption of common game fish (e.g., bluegill, white and black crappie, largemouth bass, smallmouth bass, walleye, sauger) and most rough fish (e.g., carp, freshwater drum, smallmouth buffalo) (MDH 2006). MDH lists 13 fish species with mercury levels, 9 fish species with PCB levels, and 5 fish species with perfluoro-octane sulfonate levels high enough to warrant limiting consumption.

2.3.1.1.5 Conclusions

Mississippi River aquatic communities upstream of Lock and Dam 3 have been monitored since 1970 to determine if PINGP operation was having an effect on distribution, abundance, and overall health of aquatic biota. Since the mid-1970s, fish have been the focus of monitoring and study. 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 PINGP show a high degree of stability. Fish populations in the vicinity of PINGP today look similar to 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. The MPCA findings and MDH fish consumption guidelines suggest that although Upper Mississippi River fish populations appear to be stable, fish are carrying substantial body burdens of pollutants.

2.3.1.2 Riparian Communities

Riparian habitats are areas adjacent to rivers and streams that contain elements of both terrestrial and aquatic habitats. The riparian zone begins at the high water line and extends to those portions of the terrestrial landscape that directly influence aquatic communities (by stabilizing the streambank, by providing shade or organic/inorganic inputs to the stream, by providing habitat for semi-aquatic animals or terrestrial stages of animals, such as insects, that may live near the stream as adults and in the stream as larvae). Normally the entire floodplain is considered “riparian” because it may be partially inundated when river flows are high and completely inundated during floods (Knutson and Naef 1997).

Although they generally represent a small percentage of the total land area in a given region, riparian habitats are extremely productive and provide a high degree of plant and animal diversity because they support both wetland and upland species. In the western plains and many parts of the Midwest, where forested areas are uncommon, riparian zones provide cover and travel corridors for many important game species, such as white-tailed deer and wild turkey. In intensively farmed areas of the Midwest, riparian zones are important migration corridors for migratory songbirds. Riparian zones are critical to protecting water quality, as they function as the “last line of

defense" in intercepting surface runoff that contains eroded soil, nutrients (from fertilizers), and contaminants that could degrade water quality and aquatic habitats.

Riparian zones along small streams are normally narrow strips of brush or forestland, while riparian zones along larger streams and rivers may encompass bottomland forests, swamps, marshes, and lakes. Pool 3 of the Upper Mississippi River, on which PINGP is located, is associated with a broad floodplain that ranges from 0.75 mile wide (immediately downstream of Lock and Dam 2) to 3 miles wide (in the area of PINGP). For the most part, the Wisconsin side of the river (in the area of Pool 3) is characterized by steep bluffs, and the riparian zone is limited. The Minnesota side of the river is characterized by a broad floodplain that offers a mosaic of aquatic and terrestrial habitats, ranging from lakes to sloughs to marshes to forestland to grassland. Virtually the entire Pool 3 floodplain and associated riparian habitats lie in Minnesota. The discussion that follows therefore focuses on the Minnesota side of the river and Pool 3.

Pool 3 is approximately 18 miles long, stretching from Lock and Dam 2 to Lock and Dam 3, and has an area of approximately 22,500 acres. The Pool 3 floodplain encompasses developed areas, forested areas, agricultural areas, wetland areas, and a number of ponds and lakes. It also includes the floodplain of the Vermillion River, which parallels the Mississippi River for almost the entire length of Pool 3. Developed areas include part of the town of Hastings, Minnesota, which occupies a portion of the floodplain immediately downstream of Lock and Dam 2, the Prairie Island Indian Community, and PINGP, which are approximately 1.5 mile and 1 mile, respectively, upstream of Lock and Dam 3.

Downstream of Hastings to the headwaters of North Lake, a distance of approximately 10 miles, the floodplain is mostly floodplain forest and shallow marshes, with some pockets of agricultural land. From the headwaters of North Lake south to PINGP, the higher ground of the floodplain is dominated by agricultural land and upland forest. Lower-lying areas around North Lake include shallow marshes, areas with rooted aquatic plants, and wet meadows. Populus (predominantly cottonwood, *Populus deltoides*) communities are found in many places along the north shores of North Lake and Sturgeon Lake. The long strip of land that serves as the north shores of North Lake and Sturgeon Lake is actually the west bank of the Mississippi River.

The area north (upriver) of PINGP (between PINGP and the Prairie Island Indian Community) is primarily upland forest. The area immediately south and west of PINGP is lowland forest. Beyond the strip of lowland forest west of the PINGP lie several lakes, Goose Lake being the most notable, and the Vermillion River bottoms. The area immediately downriver of PINGP, west of the discharge canal, is mostly wooded (cottonwoods and willows), but there is also a small parcel of agricultural land in this area. The area across the river from PINGP is the only significant part of the Pool 3 floodplain that lies in Wisconsin. A complex of deep-water marshes and lakes, Marsh Lake being the largest, occupies this portion of Pool 3. The U.S. Army Corps of Engineers published an EIS in late 2006 that dealt, in part, with plans to rehabilitate the embankments that separate Marsh Lake from Pool 3 (USACE 2006a). In the EIS, the

Corps proposed strengthening the Marsh Lake embankments to prevent a possible failure that could create a scour channel around Lock and Dam 3 and cause a rapid, accidental drawdown of Pool 3.

2.3.2 CRITICAL AND IMPORTANT TERRESTRIAL HABITATS

2.3.2.1 Regional Setting

The PINGP site is located on the west bank of the Mississippi River (Figure 2.1-3). Prior to purchase of the site, most of the property was used for farming (AEC 1973). Prairie Island, upon which PINGP is located, is a low island terrace in the Mississippi River floodplain. The island is separated from other parts of the lowland by the Vermillion River on the west and by the Mississippi River on the east. Land use surrounding PINGP is mixture of farmlands, wooded areas, water bodies, and rural communities. The Prairie Island Indian Community is located immediately north of the PINGP site. The Treasure Island Resort and Casino is located within the Prairie Island Indian Community approximately one mile from the plant.

2.3.2.2 PINGP Site

The topography of the PINGP site is level to slightly rolling, and elevations range from about 690 to 700 feet above mean sea level (msl). The PINGP site encompasses approximately 578 acres (NMC 2007). Approximately 240 acres of the PINGP 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 (AEC 1973). After plant construction was completed, the remaining 180 acres of disturbed land were landscaped (AEC 1973) 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 (Figure 2.1-3). Upland areas tend to be dominated by burr oak (*Quercus macrocarpa*), red oak (*Q. rubra*), 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, green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), box elder (*Acer negundo*), river birch (*Betula nigra*), and willows (*Salix* spp.) (AEC 1973).

Wooded areas in the northern portion of the site consist of small isolated tracts (Figure 2.1-3). These areas provide habitat for small mammals such as raccoons (*Procyon lotor*) and gray squirrels (*Sciurus carolinensis*), and especially for birds such as wood warblers, thrushes, woodpeckers, kinglets, and hawks (AEC 1973). The southern portion of the site provides more contiguous wooded habitat, where wooded areas extend to the edges of sloughs along the Mississippi and Vermillion Rivers. These areas provide habitat for the same wildlife as do the upland areas, plus species that are more associated with floodplains and wetlands. Wildlife that use the sloughs and lakes include amphibians such as salamanders and frogs, ducks such as the mallard (*Anas platyrhynchos*), American wigeon (*A. americana*), common goldeneye (*Bucephala clangula*), bufflehead (*B. albeola*), ruddy duck (*Oxyura jamaicensis*), and

Northern pintail (*Anas acuta*), and wading birds such as the great egret (*Ardea alba*), great blue heron (*A. herodias*), and green heron (*Butorides virescens*) (AEC 1973). Wildlife species found in the forested and the open grassy portions of the PINGP site are those typically found in similar habitats of southeastern Minnesota.

2.3.2.3 Transmission Corridors

Section 3.1.6 describes the routes of the transmission lines that were built to connect PINGP to the transmission system. The principal land-use types traversed by the transmission corridors are agriculture, forest, and residential. The transmission corridors are maintained to keep vegetation heights low enough to prevent interference with the transmission lines in accordance with established procedures described in Section 3.1.6.

Near PINGP, the PINGP-to-Red Rock transmission corridor crosses the Vermillion River Bottoms Gores Pool Wildlife Management Area (a portion of the Mississippi National River and Recreation Area) and the Lost Valley Scientific and Natural Area, and may cross the Cottage Grove Ravine Regional Park in Washington County. The PINGP-to-Blue Lake transmission corridor crosses the Minnesota Valley National Wildlife Refuge in northwestern Dakota County and the Savage Fen Scientific and Natural Area. There are other wildlife refuges along the Mississippi River in the vicinity of PINGP but the transmission corridors do not cross these or any other state or federal wildlife refuges, wildlife management areas, or parks. There are no areas designated by the U.S. Fish and Wildlife Service as “critical habitat” at PINGP or in the associated transmission corridors.

2.3.3 THREATENED OR ENDANGERED SPECIES

Table 2.3-1 indicates protected animal and plant species that are known to occur in Minnesota counties within which PINGP and associated transmission lines are located. These include species that are federally-listed or state-listed as endangered or threatened, species proposed for federal listing, candidates for federal listing, and species state-listed as species of special concern. The transmission lines are located in Goodhue, Dakota, Washington, and Scott counties. Special-status species shown in Table 2.3-1 as occurring in these counties were taken from county records maintained by the U.S. Fish and Wildlife Service (FWS 2007a) and the Natural Heritage and Nongame Research Program of the Minnesota Department of Natural Resources (MN DNR 2007a; 2007b).

Because operation of PINGP could potentially affect aquatic populations in the Mississippi River up and downstream of the plant, NMC has also included special-status aquatic species known or believed to occur in Pierce County, Wisconsin, which extends upstream and downstream of the PINGP site. These include species designated Endangered, Threatened, and Species of Concern by the Wisconsin Department of Natural Resources (WDNR 2007). Since operation of PINGP and its transmission system is not likely to affect terrestrial species in Wisconsin, these species were not included in Table 2.3-1.

Most of the species shown in Table 2.3-1 have been recorded as "known to occur" by the MN DNR within one mile of either PINGP (MN DNR 2007a) or the transmission lines (MN DNR 2007b).

Four species (two mussels and two plants) in Table 2.3-1 are federally-listed as endangered or threatened and two mussels are candidates for federal listing. These are discussed below. The peregrine falcon (*Falco peregrinus*), paddlefish (*Polyodon spathula*), and Higgins eye pearlymussel (*Lampsilis higginsii*) are the only state- or federally-listed species known to occur at or in the vicinity of PINGP; these are also discussed below.

2.3.3.1 Fauna

A nest box designed for peregrine falcons, state-listed as threatened, was placed on the Unit 1 containment dome at PINGP in 1994. A pair of peregrine falcons has nested in the nest box annually since 1997, and 31 falcons have fledged from the nest since 1997. Peregrine falcons at PINGP typically arrive in the vicinity in March, the eggs hatch in May, and the young fledge in July.

The PINGP FES (AEC 1973) stated that the only known endangered species near the site was the bald eagle (*Haliaeetus leucocephalus*). The bald eagle was removed from the federal list of threatened and endangered species effective August 8, 2007 (FWS 2007b). At the federal level, the bald eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (FWS 2007b). Bald eagles occur in a wide variety of habitats, but proximity of their nests to water (as foraging habitat) is important, and preferred nesting habitat consists of a high amount of water-to-land edge where their aquatic prey is concentrated. Thus, bald eagles are generally restricted to coastal areas, lakes, and rivers. They prey on fish and other aquatic prey near the surface but will eat dead fish or other carrion, as well as birds, mammals, and occasionally reptiles (Stalmaster 1987). Bald eagles are year-round residents along the Mississippi River in southeastern Minnesota. No eagle nests are known to exist on PINGP property, but there are at least two nests nearby. One nest is located in the Vermillion River bottoms just south of the PINGP site, and one nest is located approximately two miles upstream of Lock and Dam 3 on the eastern side of the Mississippi River (USACE 2006a) At least two studies have documented bald eagle use of the Mississippi River near PINGP as a wintering area. Faanes (1975) and Kühl (1981) found the PINGP area to be used by up to five eagles concurrently, with highest use when other portions of the river were frozen over. Bald eagles are regularly observed in lower Pool 3 and upper Pool 4 during winter when open water is present due to thermal discharge from PINGP (USACE 2006a).

The PINGP FES (AEC 1973) stated that trumpeter swans (*Cygnus buccinator*), which are state-listed as threatened, might migrate through the PINGP area. The MN DNR (2007b) 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 state-threatened paddlefish was once common in the Mississippi River from Lake Pepin downstream, and was found occasionally as far upstream as St. Anthony Falls, near Minneapolis (Schmidt 2005). The species' numbers and range were reduced by water pollution, stream alteration (dredging, dam construction), and overfishing in the early part of the 20th century (Phillips, Schmid, and Underhill 1982). Paddlefish spend most of their time in large rivers and river lakes, but ascend tributary streams to spawn in the spring of the year, when water is high. They grow rapidly, feeding mostly on zooplankton, and reach 5 feet in length and up to 200 pounds in weight. Paddlefish are still found in Lake Pepin and the Chippewa River, which flows into Lake Pepin from Wisconsin. Biologists have speculated that the Lock and Dam 3 downstream of PINGP serves to isolate paddlefish populations in the St. Croix River and Lake Pepin/Chippewa River. This "population bottleneck" restricts gene flow in the river and could (indirectly) limit growth and reproductive success, and even reduce resistance to disease of paddlefish in the Upper Mississippi. Paddlefish were once common in Sturgeon Lake, adjacent to PINGP, but sedimentation from channel maintenance activities reduced the lake's depth, rendering it less suitable for the species (Schmidt 2004, 2005). Northern States Power and Xcel Energy biologists conducting fish population studies in the PINGP vicinity over the last several decades have occasionally collected individual paddlefish, most recently on July 17, 2007 (Giese 2007).

Two federally endangered mollusks and two mollusks that are candidates for federal listing have been recorded in counties crossed by PINGP-associated transmission lines (Table 2.3-1). Threats to these mollusks include river impoundment, dredging/ channelization, contaminants and more recently, the invasion of their habitats by exotic zebra mussels (*Dreissena polymorpha*). Impoundments limit movements of mussels, often resulting in small geographically and genetically isolated populations. With the exception of the Higgins eye pearlymussel (see below), none of these has been recorded in the area adjacent to PINGP.

The Higgins eye pearlymussel is listed as endangered by FWS and MN DNR. It is a small to medium-sized freshwater mussel with a rounded to slightly elongate smooth shell, up to 4 inches in length. It is found in larger rivers in areas of deep water and moderate currents. It has lost approximately 50 percent of its historical range (FWS 2004a). It is currently found in the upper Mississippi River between LaCrosse, Wisconsin, and Muscatine, Iowa and in two Mississippi River tributaries, the St. Croix and the Wisconsin rivers (Miller and Payne 2007). Of those counties containing PINGP facilities and transmission lines, it has been recorded in Dakota and Goodhue counties (FWS 2007a). Mussel surveys conducted in Pools 3 and 4 in 1986, 1999, 2000, and 2003 did not reveal any Higgins' eye pearlymussels in the area around Lock and Dam 3 (USACE 2006a). 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 (USACE 2004b; USACE 2006a). The Sturgeon Lake relocation site, where 195 sub-adult *L. higginsii* were placed in July 2003 (Mussel Coordination Team 2005), is approximately 0.5 mile up-river of the PINGP Intake Screenhouse. Critical habitat has not been designated for the Higgins eye pearlymussel.

The winged mapleleaf (*Quadrula fragosa*) is listed as endangered by FWS and MN DNR. It is a medium-sized mussel with an ovate shell reaching 4 inches in length, and is found in stream/river riffles with clean gravel, sand or rubble in clear high water quality (FWS 2004b). Previously found in 13 states, it is now limited to the St. Croix River between Minnesota and Wisconsin and three rivers in Missouri and Arkansas. A 20-km stretch of the St. Croix River between Minnesota and Wisconsin contains the only winged mapleleaf population known to be reproducing (Vaughn 1997, FWS 2004b). Of those counties containing PINGP facilities and transmission lines, it is found only in Washington County (FWS 2007a). Critical habitat has not been designated for the winged mapleleaf.

The spectaclecase (*Cumberlandia monodonta*) is listed as a candidate species by FWS and threatened by MN DNR. It is a large mussel whose greatly elongated shell can reach 9 inches in length. The spectaclecase tends to be found in aggregations. It is a habitat specialist, found in riverine microhabitats that are sheltered from the main force of the current. It is currently found in 20 streams in 10 states. In Minnesota, it is located in the Mississippi and St. Croix rivers and Rush Creek (Butler 2002a). Of those counties containing PINGP facilities and transmission lines, it is found only in Washington County (FWS 2007a).

The sheepnose (*Plethobasus cyphyus*) is listed as a candidate species by FWS and endangered by MN DNR. It is a medium-sized mussel with an elongate ovate shell reaching 5.5 inches in length. It inhabits large streams and rivers, especially shallow shoal habitat with moderate to swift current. However, it is sometimes found in deep runs in larger rivers. Although still found in 14 states, it is no longer found in two-thirds of its historical range (Butler 2002b). Of those counties containing PINGP facilities and transmission lines, it is found only in Washington County (FWS 2007a).

2.3.3.2 Flora

The dwarf trout lily (*Erythronium propullans*) is listed as endangered by both FWS and MN DNR. This forest wildflower is found only in three southeastern Minnesota counties (Goodhue, Rice, and Steele). It is most commonly found on north-facing wooded slopes and floodplains of drainages of the Straight, Cannon, Little Cannon and North Fork rivers and Prairie Creek. It is a spring ephemeral, adapted to flower and grow before the deciduous trees develop their leaves and is distinguishable from other trout lilies by its underground vegetative runner (FWS 2006c).

The prairie bush clover (*Lespedeza leptostachya*) is classified as threatened by FWS and MN DNR. This legume occurs only in the tallgrass prairie region of Minnesota, Wisconsin, Iowa, and Illinois and is currently found today at fewer than 40 sites (FWS 2000). Within Minnesota, it is known to occur in 12 counties (FWS 2007a), two of which (Dakota and Goodhue) are crossed by PINGP-associated transmission lines.

2.4 METEOROLOGY AND AIR QUALITY

The climate of the site region is basically continental and influenced by the general storms which move eastward along the northern tier of the United States. The geographical location results in frequent changes in weather systems as polar and tropical air masses alternate. Rainfall averages about 25 inches per year, with 65 percent falling in the months of May through September. Maximum rainfall during 24 hours was 10.0 inches in July 1987. Snowfall averages about 44 inches per year, with a maximum of 19.9 inches in 24 hours in January 1982 (NMC 2007).

The U. S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six common pollutants: nitrogen dioxide, sulfur dioxide, carbon monoxide, lead, ozone, and particulate matter (PM_{10} and $PM_{2.5}$). The EPA has designated all areas of the United States as having air quality better ("attainment") or worse ("non-attainment") than the NAAQS. Areas that have been re-designated to attainment from nonattainment are called maintenance areas. To be re-designated, an area must both meet air quality standards and have a 10-year plan for continuing to meet and maintain air quality standards and other requirements of the Clean Air Act.

PINGP is located in Goodhue County, Minnesota, which is part of the Southeast Minnesota-La Crosse (Wisconsin) Interstate Air Quality Control Region (AQCR) (40 CFR 81.66). The AQCR is in attainment or maintenance for all criteria pollutants, as are all counties in Minnesota. The only maintenance area within the Southeast Minnesota-La Crosse (Wisconsin) AQCR is Olmsted County, which is a maintenance area for sulfur dioxide and PM10 (40 CFR 81.324).

Other maintenance areas within Minnesota include multiple counties in the Minneapolis-St. Paul Intrastate AQCR (for carbon monoxide and sulfur dioxide), Dakota County (also in the Minneapolis St.-Paul Intrastate AQCR (for lead), Ramsey County (Minneapolis-St. Paul Intrastate AQCR) for PM_{10}, and St. Louis County in the Duluth (Minnesota)-Superior (Wisconsin) Interstate Air AQCR (for carbon monoxide) (40 CFR 81.324). The closest nonattainment areas (for ozone) are in eastern Wisconsin, bordering Lake Michigan (40 CFR 81.350).

Minnesota is one of the states covered by the Clean Air Interstate Rule (CAIR), designed to reduce air pollution that moves across state boundaries. The CAIR, issued March 10, 2005, will permanently cap emissions of sulfur dioxide and nitrogen oxides in the eastern United States when fully implemented (EPA 2006b). The CAIR is projected to reduce Minnesota's sulfur dioxide and nitrogen oxide emissions by 36 and 59 percent, respectively, by 2015. Currently, Minnesota sources significantly contribute to fine particle pollution in Illinois and Indiana (EPA 2006c).

EPA has also established the Regional Haze Rule, which calls for state and federal agencies to work together to improve visibility in 156 national parks and wilderness areas (EPA 2006d). Two of these areas, referred to as Class I Federal Areas, are located in Minnesota and include the Boundary Waters Canoe Area (U.S. Forest Service) and Voyageurs National Park (National Park Service). Both are located on the

northern border of Minnesota. However, the closest Class I Federal Area to PINGP is Rainbow Lake, located within Chequamegon-Nicolet National Forest (U.S. Forest Service) in Bayfield County, Wisconsin, approximately 140 miles north-northeast of PINGP (EPA 2006e).

2.5 DEMOGRAPHY

2.5.1 GENERAL DEMOGRAPHY

The Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS) presents a population characterization method that is based on two factors: "sparseness" and "proximity" (NRC 1996). "Sparseness" measures population density and city size within 20 miles of a site and categorizes the demographic information as follows:

Demographic Categories Based on Sparseness

Sparseness		Category
Most sparse	1.	Less than 40 persons per square mile and no community with 25,000 or more persons within 20 miles
	2.	40 to 60 persons per square mile and no community with 25,000 or more persons within 20 miles
	3.	60 to 120 persons per square mile or less than 60 persons per square mile with at least one community with 25,000 or more persons within 20 miles
Least sparse	4.	Greater than or equal to 120 persons per square mile within 20 miles

Source: NRC 1996.

"Proximity" measures population density and city size within 50 miles and categorizes the demographic information as follows:

Demographic Categories Based on Proximity

Proximity		Category
Not in close proximity	1.	No city with 100,000 or more persons and less than 50 persons per square mile within 50 miles
	2.	No city with 100,000 or more persons and between 50 and 190 persons per square mile within 50 miles
	3.	One or more cities with 100,000 or more persons and less than 190 persons per square mile within 50 miles
In close proximity	4.	Greater than or equal to 190 persons per square mile within 50 miles

Source: NRC 1996.

The GEIS then uses the following matrix to rank the population category as low, medium, or high.

GEIS Sparseness and Proximity Matrix

Sparseness \ Proximity	1	2	3	4
1	1.1	1.2	1.3	1.4
2	2.1	2.2	2.3	2.4
3	3.1	3.2	3.3	3.4
4	4.1	4.2	4.3	4.4

Low Population Area | Medium Population Area | High Population Area

Source: NRC 1996.

NMC used 2000 census data from the U.S. Census Bureau (USCB) with geographic information system software (ArcGIS®) to determine most demographic characteristics in the PINGP vicinity. The calculations determined that 107,131 people live within 20 miles of PINGP, producing a population density of 85 persons per square mile (TtNUS 2006a). Applying the GEIS sparseness measures, results in the less sparse category, Category 3 (60 to 120 persons per square mile or less than 60 persons per square mile with at least one community with 25,000 or more persons within 20 miles).

To determine the proximity category, NMC determined that 2,733,326 people live within 50 miles of PINGP, which equates to a population density of 349 persons per square mile (TtNUS 2006a). Applying the GEIS proximity measures, PINGP is classified as Category 4 (greater than or equal to 190 persons per square mile within 50 miles). Therefore, according to the GEIS sparseness and proximity matrix, PINGP ranks of sparseness, Category 3, and proximity, Category 4, result in the conclusion that PINGP is located in a high population area.

All or parts of 25 counties and a number of Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas (MiSAs) are located within 50 miles of PINGP (Figure 2.1-1). PINGP is located in the Red Wing, MN MiSA, which is part of the Minneapolis-St. Paul-St. Cloud, MN-WI Combined Statistical Area (CSA). The Red Wing, MN MiSA and the Minneapolis-St. Paul-St. Cloud, MN-WI CSA had 2000 populations of 44,127 and 3,271,888, respectively (USCB 2003).

Red Wing (approximately 3 miles southeast) is the population center nearest PINGP, with a 2000 population of 16,116 (USCB 2000a). 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 2000a).

From 1990 to 2000, the population of the Red Wing, MN MiSA increased from 40,690 to 44,127, 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 (USCB 2003).

Because approximately 83 percent of employees at PINGP reside in Goodhue and Dakota Counties, MN and Pierce County, WI, they are the counties with the greatest potential to be socioeconomically affected by license renewal at PINGP (see Section 3.4). Table 2.5-1 shows population counts and growth rates for these three counties. Values for the States of Minnesota and Wisconsin are provided for comparison. The table is based on USCB data for 1980 through 2000 and Minnesota and Wisconsin Department of Administration data for 2010 through 2030.

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.

2.5.2 TRANSIENT POPULATIONS

Small daily and seasonal fluctuations in the regional population occur due to the number of recreational facilities within the 50-mile region as described in Section 2.1.1. The Twin Cities Metro Region received over 18 million person-visits during a one year period (June 2005 through May 2006). Within the Twin Cities Metro Region, there are 3,153 campground sites in 39 campgrounds available for public use (Davidson Peterson-Associates 2007a). Several counties within the 50-mile region are located in Minnesota's southern region, which received 7.7 million person-visits from June 2005 through May 2006. There are 10,561 campground sites in 158 campgrounds throughout the southern region (Davidson-Peterson Associates 2007b). In general, Wisconsin counties within the 50-mile radius ranked in the bottom half of all Wisconsin counties in 2006 tourism expenditures. Pierce and Pepin counties were two of the least visited counties in Wisconsin (Davidson-Peterson Associates 2007c).

Temporary housing for seasonal, recreational, or occasional use in the region of influence (ROI) is low compared with state percentages. Temporary housing in Dakota and Goodhue counties accounts for 0.3 and 1.8 percent of total housing, compared with the Minnesota percentage of 5.1. Temporary housing in Pierce County accounts for 1.3 percent of total housing compared with Wisconsin's temporary housing percentage of 6.1 (USCB 2000b).

Migrant farm workers also represent a portion of the transient population within the 50-mile radius. Within the ROI, nine farms in Dakota County, 12 farms in Goodhue County, and 10 farms in Pierce County employ migrant labor (USDA 2004a, 2004b).

2.5.3 MINORITY AND LOW-INCOME POPULATIONS

NRC performed environmental justice analyses for previous license renewal applications and concluded that a 50-mile radius could reasonably be expected to contain potential environmental impact sites and that the state was appropriate as the geographic area for comparative analysis. NMC has adopted this approach for identifying the PINGP minority and low-income populations that could be affected by PINGP operations.

NMC used 2000 census data from the USCB with geographic information system software (ArcGIS®) to determine the minority characteristics by block group. NMC included a block group if any part of its area lay within 50 miles of PINGP. The 50-mile radius includes 2,197 block groups (TtNUS 2006a) (Table 2.5-2).

2.5.3.1 Minority Populations

The NRC Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues defines a "minority" population as: American Indian or Alaskan Native; Asian; Native Hawaiian or other Pacific Islander; Black Races, and Hispanic Ethnicity (NRC 2004). Additionally, NRC's guidance requires that (1) all other single minorities are to be treated as one population and analyzed, (2) multi-racial populations are to be analyzed, and (3) the aggregate of all minority populations are to be treated as one population and analyzed. The guidance indicates that a minority population exists if either of the following two conditions exists:

- The minority population in the census block group or environmental impact site exceeds 50 percent.

- The minority population percentage of the environmental impact area is significantly greater (typically at least 20 percentage points) than the minority population percentage in the geographic area chosen for comparative analysis.

For each of the 2,197 block groups within the 50-mile radius, NMC calculated the percent of the block group's population represented by each minority. If any block group minority percentage exceeded 50 percent, then the block group was identified as containing a minority population. NMC selected the entire State of Minnesota as the geographic area for comparative analysis for block groups located within Minnesota, and calculated the percentages of each minority category in the State. NMC selected the entire State of Wisconsin as the geographic area for comparative analysis for block groups located within Wisconsin, and calculated the percentages of each minority category in the State. If any block group percentage exceeded the corresponding State percentage by more than 20 percentage points, then a minority population was determined to exist (TtNUS 2006a).

Census data for Minnesota characterizes 1.14 percent of the population as American Indian or Alaskan Native; 2.94 percent Asian; 0.04 percent Native Hawaiian or other Pacific Islander; 3.55 percent Black races; 1.36 percent all other single minorities; 1.71 percent multi-racial; 10.73 percent aggregate of minority races; and 2.96 percent Hispanic ethnicity. Census data for Wisconsin characterizes 0.89 percent of the population as American Indian or Alaskan Native; 1.68 percent Asian; 0.03 percent Native Hawaiian or other Pacific Islander; 5.75 percent Black races; 1.60 percent all other single minorities; 1.26 percent multi-racial; 11.21 percent aggregate of minority races; and 3.64 percent Hispanic ethnicity (TtNUS 2006a).

Table 2.5-2 presents the numbers of block groups in each county in the 50-mile radius that exceed the threshold for minority populations. Figures 2.5-1 through 2.5-7 locate the minority block groups within the 50-mile radius. As seen in the table and figures, there were no block groups identified in Wisconsin with significant minority populations.

- One hundred and thirty-one census block groups within the 50-mile radius have Black races populations that meet the NRC criteria for a minority population (Figure 2.5-1).

- Three census block groups within the 50-mile radius have American Indian or Alaska Native populations that meet the NRC criteria for a minority population. All three block groups are located in Hennepin County.

- Fifty-four census block groups within the 50-mile radius have Asian populations that meet the NRC criteria for a minority population.

- Eleven census block groups within the 50-mile radius have Other Race populations that meet the NRC criteria for a minority population.

- One census block group within the 50-mile radius has a Multi-Racial population that meets the NRC criteria for a minority population.

- Three-hundred and twelve census block groups within the 50-mile radius have Aggregate populations that meet the NRC criteria for a minority population.

- Fifty census block groups within the 50-mile radius have Hispanic populations that meet the NRC criteria for a minority population.

Adjacent to the PINGP site is the Prairie Island Indian Community, home to the descendants of the Mdewakanton Band of the Eastern Dakota, also known as the Mississippi or Minnesota Sioux (PIIC Undated). The Shakopee-Mdewakanton Sioux (Dakota) Indian Reservation, located in Scott County, also lies within the 50-mile radius. The locations of these reservations are shown on Figure 2.5-2. Except for the Prairie Island Indian Community, the census block groups containing minority populations are predominantly in the Minneapolis area and more than thirty miles from PINGP.

2.5.3.2 Low-Income Populations

NRC guidance defines low-income populations based on statistical poverty thresholds (NRC 2004) if either of the following two conditions are met:

- The low-income population in the census block group or the environmental impact site exceeds 50 percent.

- The percentage of households below the poverty level in an environmental impact area is significantly greater (typically at least 20 percentage points) than the low-income population percentage in the geographic area chosen for comparative analysis.

NMC divided USCB low-income households in each census block group by the total households for that block group to obtain the percentage of low-income households per block group. Using the State of Minnesota as the geographical area chosen for comparative analysis for block groups within Minnesota, NMC identified 7.91 percent of Minnesota as low-income households (TtNUS 2006a). Using the State of Wisconsin as the geographical area chosen for comparative analysis for block groups within Wisconsin, NMC identified 8.38 percent of Wisconsin as low-income households (TtNUS 2006a). Table 2.5-2 identifies the low-income block groups in the region of interest, based on NRC's two criteria. Figure 2.5-8 locates the low-income block groups.

Eighty-nine census block groups within the 50-mile radius have low-income households that meet the NRC criteria for a low-income population. The census block groups containing low-income populations are predominantly in the Minneapolis/St. Paul area and are all over thirty miles from PINGP.

2.6 AREA ECONOMIC BASE

To discuss economic information pertinent to the License Renewal process, NMC will focus on Goodhue and Dakota counties, Minnesota and Pierce County, Wisconsin. Approximately 83 percent of PINGP's workforce resides in these counties (see Section 3.4), which lie within the Minneapolis-St. Paul-St. Cloud, MN-WI CSA. With a year 2000 population of 3,271,888, this CSA experienced an increase in population of 16.4 percent between 1990 and 2000 (USCB 2003).

2.6.1 LABOR FORCE AND EMPLOYMENT OPPORTUNITIES

In 2006, Goodhue and Dakota counties had estimated labor forces of 25,217 and 232,232 persons, respectively. Since 2000, the labor force in Goodhue County has remained essentially unchanged, increasing by less than one percent. However, Dakota County, which is closer to the Minneapolis-St. Paul metropolitan area, has experienced an increase of seven percent in the labor force since 2000. Pierce County, Wisconsin had an estimated labor force of 23,809 in 2006, an increase of 3.9 percent from the labor force of 22,909 in 2000 (U.S. Department of Labor 2006).

Local government was the largest employer in Goodhue County in 2005, followed by manufacturing and retail trade. Dakota County's largest employment sectors were retail trade, manufacturing, and health care and social assistance, in that order. In Pierce County, Wisconsin, state and local government was the county's largest industry sector in 2005, with retail trade ranking second, and health care and social assistance ranking third (BEA 2007). Major employers (greater than 300 employees) for Goodhue, Dakota, and Pierce counties are listed in Tables 2.6-1 through 2.6-3.

2.6.2 POTENTIAL FOR ECONOMIC GROWTH

Goodhue County is growing, particularly cities and townships along the two highway corridors, US Highways 61 and 52. The growth experienced along Highway 52 is not unique to Goodhue County; Dakota and Olmsted counties are experiencing similar growth. The three county area acts as a corridor between the Twin Cities Metro Area and Rochester. As the Twin Cities Metro Area continues to expand and commuting distances increase, more growth is expected in this region (Goodhue County Land Use Management 2004).

Dakota County has grown in the same manner as other areas surrounding Minneapolis and St. Paul, with areas closer to the urban core developing earlier and more densely; and areas further out developing more slowly and at lower densities. In general, the northwestern section of the county holds the overwhelming majority of dwelling units and businesses, with the southeastern portion still mainly open and agricultural in nature (Market Research Partners, Inc. 2002).

Pierce County population is projected to increase, but because a greater share of the population will be over 50 years old, total labor force growth will stall. The aging population will also impact the economy as the elderly demand changes in types of

goods and services provided in local communities (Wisconsin Department of Workforce Development 2004).

2.7 TAXES

This subsection focuses on Goodhue County because, other than a State General Tax, the property taxes for the PINGP site are paid only to taxing jurisdictions within Goodhue County.

NSP is assessed annual property taxes for the PINGP site by Goodhue County, the City of Red Wing, and School District 256. The Minnesota Department of Revenue (DOR) is in the process of possibly revising its current utility company valuation rule. According to a fiscal impact study prepared by the DOR and based on the latest draft of the revised rule, the amount of property tax revenue received by the city of Red Wing and Goodhue County would decrease by approximately $1.4 million and $1.2 million annually, respectively. In order to stabilize these communities for their anticipated loss of property tax revenue from NSP due to a rule change, NSP executed revenue stabilization agreements with Red Wing and Goodhue County representatives in November 2006 (City of Red Wing, Minnesota and NSP 2006). NSP is also assessed the State General Tax, however, it will not be analyzed here because the state's revenues are very large and NSP's payments represent an extremely small percentage of those revenues. Nuclear fuel is not taxed in the State of Minnesota and therefore is not included in the site's property tax assessment. Property taxes are paid directly to Goodhue County, which in turn distributes the money to the aforementioned taxing jurisdictions. Property taxes are the chief source of revenue for Minnesota counties, generally providing between 30 and 50 percent of their revenues (AMC 2002).

From 2001 through 2005, Goodhue County collected between $20.6 and $22.3 million annually in property tax revenues (see Table 2.7-1). Goodhue County property tax revenues fund, among other things, county operations, public safety, public works, cultural and recreational programs, human services, health services, roadway maintenance, economic development, and conservation programs (Hove 2006). Table 2.7-1 details the property tax payments made by the owners of PINGP for the same years. From 2001 to 2005, PINGP property tax payments represented 16.6 to 27.5 percent of Goodhue County's total property tax revenues.

From 2001 through 2006, the City of Red Wing collected between $8.9 and $11.6 million annually in property tax revenues (see Table 2.7-1). The City of Red Wing's property tax revenues fund city operations. Table 2.7-1 details the property tax payments made by the owners of PINGP for the same years. From 2001 to 2006, NSP property tax payments represented 52.3 to 36.4 percent of the City of Red Wing's total property tax revenues. Due to small PINGP payment decreases and increases in the City's total revenues collected, NSP's payment percentages are trending downward.

From 2002 through 2006, the School District 256 collected between $6.5 and $6.9 million annually in property tax revenues (see Table 2.7-1). From 2002 to 2006, PINGP property tax payments represented 28.5 to 38.0 percent of the School District 256's total property tax revenues. Prior to 2002, PINGP tax payments to School District 256 were significantly larger because the state-determined local school tax was included in School District 256 payments prior to year 2002. The 2001 Tax Law provided for major

changes in the source of school funding in Minnesota and replaced the state-determined local school tax with the State General Tax, a statewide property tax levied for taxes payable on commercial, industrial and seasonal properties. Taxes under the State General Tax are paid into the State General Fund and redistributed by a state-determined formula to school districts state-wide, in part, based on student numbers. The State General Tax is levied at a uniform rate within each county, and the levy rate is determined by the Commissioner of Revenue (Fredrikson & Byron 2001).

In Minnesota, public utilities are valued using cost and income approaches. Jurisdictional budgets are developed and taxes are levied to meet those budgets. Historically, annual property taxes have been gradually decreasing due to depreciation and the growth in Minnesota's residential and commercial tax bases. On the current facilities, NMC expects that trend to continue through the license renewal period. Additionally, state lawmakers are conducting hearings for a rule change that could possibly affect the way commercial entities depreciate their facilities. Currently, NSP is unable to depreciate PINGP to the fullest extent. Should the rule be changed, NSP may be able to employ the new depreciation methods to further reduce the plant's value. Offsetting this trend, however, would be any increase in PINGP's value caused by expansions or improvements to PINGP's facilities. For License Renewal, NMC plans refurbishment activities that will likely increase the plant's assessed value, resulting in a corresponding increase in the amount of NSP's property taxes to its taxing jurisdictions. Since PINGP tax impacts are already of large significance to taxing jurisdictions, as discussed in Section 4.14.2, the potential increase in the plant's assessed value would not alter the analysis of socioeconomic impacts in this report.

With respect to utility deregulation, the State of Minnesota has taken no steps in recent years. Therefore, the potential effects of deregulation are currently unknown. Should deregulation ever be enacted in Minnesota, this could affect utilities' tax payments to counties. However, any changes to PINGP property tax rates due to deregulation would be independent of license renewal.

2.8 SOCIAL SERVICES AND PUBLIC FACILITIES

2.8.1 PUBLIC WATER SUPPLY

As discussed in Section 3.4, 83 percent of employees at PINGP reside in Goodhue and Dakota Counties, MN and Pierce County, WI. Consequently, the discussion of public water supply systems will be limited to those three counties.

As discussed in Section 2.2.5, from 2000 through 2005 PINGP used an average of 92 gallons per minute (gpm) [48.4 million gallons per year] of groundwater from six onsite groundwater wells. The highest average production rate for this period was 118 gpm (62 million gallons per year) in 2005. Five of the site wells require permits from the MN DNR. The well that supplies domestic water to the administration building does not require a permit due to its low production rates (Table 2.2-4). The well that supplies water to the Training Center for domestic use (256074) is also used for the lawn irrigation system at the facility. Domestic use from 2000 through 2005 for the Training Center well was at a rate of 3 gpm (TtNUS 2006b). Two of the wells (Wells 256120 and 256121) have a combined maximum permitted yield of 50 million gallons per year (95 gpm) for power plant operations (MN DNR 2005a). For the period from 2000 through 2005, the wells' average production rates were 32 gpm (Well 256120) and 28 gpm (Well 256121). Two wells (402599 and 611076) supply industrial cooling water for the plant operations and average a total of 27 gpm for the period (TtNUS 2006b).

In the vicinity of PINGP and the surrounding region, the primary source of potable water is groundwater. Water sources also include surface water, such as rivers, lakes, and streams. Table 2.8-1 details municipal water suppliers in the three counties, their permitted capacities or maximum design yields, and their average daily production. As presented in Table 2.8-1, the reported total annual average withdrawal [17,742 million gallons per year (48.6 million gallons per day)] for Dakota, Goodhue, and Pierce Counties represents 8.4 percent of the total permitted/pump design capacity [210,570 million gallons per year (577 million gallons per day)] for wells that supply municipal water supplies in these three counties.

According to the Dakota County Environmental and Natural Resources Policy Plan (Dakota County 2005, p. 5), county planners are concerned about the impact projected population growth through 2025 in the county will have on the availability of groundwater as a water source and the possible impacts that over use of the resource could have on surface water resources (trout streams, fens) which are dependent on groundwater. The Dakota County planners are also concerned about the availability of an adequate water supply due to the potential impact of pollutants from agricultural and domestic sources on water resources (Dakota County 2005). Goodhue County's Comprehensive Local Water Management Plan attempts to balance the county's natural resources, environmental habits, and growth to obtain a long-term economic and ecological sustainability. The plan addresses erosion control and stormwater issues as the greatest concern to watershed impacts. Also, of considerable concern are how to balance growing cities, outdated structures, increasing impervious surfaces and unsustainable farming practices (Goodhue County 2005, p.2). Planning officials are

also concerned with contaminants getting into the groundwater systems because of the county's reliance on groundwater as a source of drinking water and its potential impact on surface water. Planning officials are concerned, as well, with agricultural and household contaminants getting into the groundwater systems because of the county's reliance on groundwater as a source of drinking water and its potential impact on surface water (Goodhue County 2004).

Approximately 70 percent of Wisconsin's private residents and most public water systems use groundwater for their water source. Approximately two billion gallons of water are estimated to be stored underground in Wisconsin. Because of this, Wisconsin implemented a program approved by the EPA in 1999 designed to develop capacity for these water systems. A capacity evaluation is required for all new water systems (State of Wisconsin 2000, p.12-14). Pierce County is currently developing data to prepare a comprehensive plan for the county.

2.8.2 TRANSPORTATION

Figure 2.8-1 presents the transportation system in Goodhue County within the vicinity of PINGP. Workers commuting to PINGP take one of the following routes. Workers living in southern and central portion of Dakota County take U.S. Highway (US) 61 east to the intersection of County Road 19, or continue to County Road 31 which connects with County Road 18, or simply continue east on US 61 to County Road 18. In either case, employees would proceed north on County Road 18 until the intersection of Sturgeon Lake Road. Once on Sturgeon Lake Road the directions are the same for all employees. Employees proceed east approximately ½ mile on Sturgeon Lake Road and then turn south on the plant access road and proceed to the PINGP entrance just past the intersection with Wakonade Drive. Wakonade Drive previously provided two way traffic from Sturgeon Lake Road to Lock and Dam 3. The road is currently limited to north-bound traffic only (out going) from the PINGP site. The PINGP access road provides two-way traffic access to Lock and Dam 3 via Wakonade Drive.

Employees living in the northeastern portion of Dakota County could travel southeast on County Road 18 into Goodhue County and then turn east onto Sturgeon Lake Road. Employees then would proceed as above. Employees living in the south and eastern portion of Dakota County could travel US 61 until the intersection of County Road 18. Once on County Road 18, employees could travel north until they turn east at the intersection of Sturgeon Lake Road. Once on Sturgeon Lake Road, employees would proceed as discussed above.

Pierce County, Wisconsin can be reached via US 63, which enters Goodhue County at Red Wing and then intersects with US 61. Commuters would proceed northwest until the intersection with County Road 18 and proceed as above. Pierce County employees can also cross the Mississippi River in the Prescott/Hastings vicinity via US 10 from Prescott through the southern portion of Washington County, Minnesota and connect with US 61 and proceed south through Hastings and then connect to State Road 316 southeast until the intersection with Goodhue County Road 68. Traffic would then proceed northeast to County Road 18 and proceed southeast until the intersection with

Sturgeon Lake Road. Potential employees could also travel on County Road 54 from its intersection with US 61 in Hastings and follow County Road 54 until its intersection with County Road 68. Employees would then proceed on County Road 68 east until the intersection with County Road 18 and proceed south as discussed above. Employees from Pierce County or from the Hastings area could also travel south and east from Hastings on US 61 until the intersection of County Road 18 and proceed north to Sturgeon Lake Road.

In determining the significance levels of transportation impacts for license renewal, NRC uses the Transportation Research Board's level of service (LOS) definitions (NRC 1996). The Minnesota Department of Transportation makes LOS determinations for roadways involved in specific projects. However, there are no current LOS determinations for the roadways analyzed in this document (Bjornstad 2006). As LOS data is unavailable, annual average daily traffic (AADT) volumes are substituted along with Road/Highway capacity data. Table 2.8-2 lists the roadways PINGP workers would use, their Minnesota Department of Transportation (Mn/DOT) road classifications, the number of lanes, and traffic data. Table 2.8-2 data indicate that current AADTs are well below maximum capacities for the roads leading to PINGP.

2.9 LAND USE

2.9.1 GOODHUE COUNTY

Historical and Existing Land Use

Goodhue County is located southeast of the Minneapolis-St. Paul metropolitan area along the Minnesota-Wisconsin border, and northwest of the Rochester metropolitan area. The 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 2004).

Although Goodhue County remains largely undeveloped, the County's population has experienced some growth (Section 2.5.1) and state and local planning officials expect the county to grow another seven percent by 2010. The majority of residential, commercial, and industrial development has occurred along two highway corridors, US Highway 61 and US Highway 52. The majority of that growth has been attributed to the US Highway 52 corridor, which connects the Minneapolis-St. Paul metropolitan area with the Rochester metropolitan area. Regional planners estimate that, as the Minneapolis-St. Paul area continues to expand and commuting distances increase, more growth is expected in this region (Goodhue County 2004).

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

Future Land Use

In the Goodhue County Comprehensive Plan (Goodhue County Land Use Management 2004), planners have identified the following goals for future development in the County.

Land use, urban expansion, and growth zones goals:

- to preserve the natural environment
- to preserve agricultural land
- to promote growth in cities and rural multiple housing development
- to promote compatible land uses
- to recognize and respond proactively to internal and external growth pressures

- to promote balanced growth
- to preserve aggregate deposits (mining resources)

Housing and "livable communities" goals:

- to provide adequate housing for all life stages
- to provide a range of housing types for all income levels
- to maintain existing homes
- to build safe and supportive communities
- to offer a variety of transportation options to provide mobility for all citizens
- to provide citizens access to county and local services
- to create and preserve parkland and open space

2.9.2 DAKOTA COUNTY

Existing Land Use

Dakota County is located south of Minneapolis and St. Paul and covers approximately 371,200 acres. The Minnesota and Mississippi Rivers form its northern border and freeway bridges span the rivers to link Dakota County commuters to Minneapolis and St. Paul. Land use categories in Dakota County are as follows: agriculture and vacant (65 percent), single-family residential (9 percent), rural estate (2 percent), multi-family (1 percent), commercial (1 percent), industrial (1 percent), airport (1 percent), open water (5 percent), parks and recreation (4 percent), public (4 percent), and road right-of-ways (7 percent) (Dakota County 1999). The majority of the population is concentrated in the northern third of the County (Dakota County 1999). This once agricultural land has been transformed from farms to bedroom communities to a more diversified form of suburbia characterized by an increase in commercial and industrial development. The other two-thirds remain largely agricultural (Dakota County 1999).

Most of the population growth in Dakota County has taken place since World War II. County planners state that the majority of land use changes since then have been driven by advancements in transportation. As the cities of Minneapolis and St. Paul have grown, residential development has expanded to neighboring counties, such as Dakota County, and residents commute to the cities for employment (Dakota County 1999).

In the 1950s and 1960s, the County's development was dominated by large tract suburban developers. Suburban communities developed at this time were the River Hills subdivision in Burnsville, Cedar Grove subdivision in Eagan, South Grove

subdivision in Inver Grove Heights, Apple Valley subdivision in Apple Valley, and Valley Park subdivision in Lakeville (Dakota County 1999).

The 1970s and 1980s were characterized by infill development. Also, transportation improvements like the completion of Interstate 494, Interstate 35 East, and the Cedar Avenue Bridge accelerated the suburbanization process. Industrial parks were developed and large multi-family residential projects were constructed along Interstate 35 West, State Highway 13, and other transportation corridors (Dakota County 2005).

In the 1990s, Dakota County evolved from a bedroom community to a county with more diverse land use patterns. Employment rate growth surpassed the residential growth rate. Commercial and industrial land uses continued to expand. Employers moving to the area included West Publishing, Cray Research, Northwest Airlines, and Blue Cross Blue Shield (Dakota County 2005).

Currently, the northern cities in Dakota County are extensions of St. Paul's early suburbs. The suburban areas are where development has been more recent and include: Apple Valley, Burnsville, Eagan, Inver Grove Heights, Mendota Heights, Lillydale, Lakeville, Farmington, and Rosemont. Dakota County's townships have lower population densities, are dominated by agriculture, and most have zoning restrictions of one housing unit per 40 acres (Dakota County 2005).

Future Land Use

In general, land use decision-making occurs at the city and township level through zoning and the influence of land use planning at the regional level. County goals and policies include (Dakota County 2005):

- Measuring and evaluating development trends in Dakota County and the region.
- Preserving agricultural land and farming.
- Promoting land use patterns that value and sustain the natural environment.
- Supporting and encouraging orderly development.
- Encouraging land use patterns and community design that support pedestrian and transient-oriented development.

2.9.3 PIERCE COUNTY

Historic and Existing Land Use

Pierce County, covering 378,240 acres, is currently in the first phase (data collection) of developing a county-wide comprehensive plan (Pierce County Undated). Land development activities are guided by the County's municipalities through the use of local zoning and subdivision regulations until the County plan is complete.

Future Land Use

Pierce County planners report that, between 2002 and 2005, approximately 8 percent of the county's farmland was converted from agricultural to other uses. Planners estimate that, by 2025, the county may need to accommodate over 7,000 acres of new residential, commercial, and industrial land along with additional acreage needed for infrastructure, parks, community facilities, and similar uses (Pierce County Undated).

2.10 HISTORIC AND ARCHAEOLOGICAL RESOURCES

The Mississippi River and its tributaries have played an important role in the history of the region, both during prehistoric times and after the arrival of European explorers and settlers. Until the coming of the railroads in the 1860s, the Mississippi River was the main travel thoroughfare and the way most goods moved in and out of the region. This explains the high density of prehistoric and historic sites along the Upper Mississippi River and in the Red Wing and Prairie Island areas.

Prehistory

The first Indians moved into southern Minnesota 10,000 to 12,000 years ago when the glaciers receded and the forests and prairies reappeared. There is evidence of four major prehistoric cultural periods: Paleo-Indian (to 8,000 BC), Archaic (8,000 BC to 500 BC), Woodland (500 BC to 900 AD), and Mississippian (900 AD to arrival of Europeans) (Scullin 1996). When the French explorers and Voyageurs arrived in the 17th century, the area now known as Minnesota was dominated by two Indian tribes, the Dakota (later called Sioux by the French) and the Ojibway (sometimes referred to as Chippewa) (Willis 1914, State of Minnesota 2001).

History

The first European to explore the Upper Mississippi River region was Father Louis Hennepin, who was captured in 1680 near Milles Lacs by a Dakota war party and "discovered" Lake Pepin and St. Anthony Falls while a captive (Willis 1910). Another Frenchman, Nicholas Perrot, established a trading post in 1685 at Trempealau on the east bank of the Mississippi River, and a second trading post (Fort Saint-Antoine) in 1686 on Lake Pepin (Kneisler 1999). Frenchman Pierre Charles LeSeuer explored the region at the confluence of the Mississippi and Minnesota rivers, where Ft. Snelling was later established, and also built a trading post on Prairie Island around 1695 (AEC 1973).

The French under Rene Boucher established a fort (Fort Beauharnois) and mission on the Mississippi River at Frontenac around 1727 to trade furs with the Dakota people (MN DNR 2005b). The chapel at Fort Beauharnois, named the Mission of St. Michael the Archangel, may have been the first church in Minnesota. Fort Beauharnois and the Frontenac settlement were abandoned in 1763, when the Treaty of Paris ended the Seven Years' War (French and Indian War) and most of France's lands in the New World were divided between England and Spain. The Louisiana Purchase in 1803 largely ended the French presence in the U.S.

In 1819, a U.S. Army contingent began building Fort Snelling, which they completed in 1825 (Minnesota Historical Society 2006). For 30 years, Fort Snelling was the most important American outpost in the region, and a meeting place for officials of the U.S. government and representatives of the Dakota and Ojibway peoples. The American and Columbia fur companies built headquarters in the area, and their employees settled

at nearby Mendota with their families. Emigrants from the east and from Europe arrived, and formed the settlement that became the city of St. Paul.

Under a treaty signed at Mendota in 1851, Europeans were allowed to make their homes on the west bank of the Mississippi River (City of Red Wing 2003). Red Wing was incorporated as a city in 1857. The territory of Minnesota became the 32nd state in 1858.

Initial Construction and Operation of PINGP

The Final Environmental Statement related to the Prairie Island Nuclear Generating Plant (AEC 1973) identifies three sites with historical significance within a 6-mile radius of PINGP and lists five more historical sites in the "plant region" (within 35 miles). The three sites in the six-mile radius were the Bartron Site (less than one mile from PINGP), the Silvernale Site (4.5 miles from PINGP), and the Fort Sweeney site (6 miles from PINGP).

The Bartron Site is particularly noteworthy. As discussed in the Final Environmental Statement related to the Prairie Island Nuclear Generating Plant (AEC 1973, p. II-28), the AEC consulted with the State Archaeologist in the course of reviewing the NSP application for a construction permit. The AEC did so because previous archaeological surveys in the Mississippi River valley near Red Wing demonstrated that a large number of prehistoric sites were present, and that undisturbed portions of Prairie Island, in particular, contained "many undisturbed burial mounds and a large village habitation occupied by late prehistoric (Mississippian) peoples" (AEC 1973, p. II-28). The State Archaeologist subsequently uncovered parts of this village on the Prairie Island site. This village, later named the Bartron Site, was added to the National Register of Historic Places in 1970. Evidence suggests that the site was occupied for a relatively short time by people of the Oneota culture, who fished and hunted small game and were more reliant on wild plants (wild rice, acorns, plums) than cultivated plants (corn). The site was first surveyed by T.H. Lewis in 1885, but little formal archaeology has been undertaken at the Bartron Site. Archaeological excavation has uncovered various subsurface features, such as fire hearths, storage/refuse pits, and postmolds. Parts of two houses were found, and possibly a portion of a palisade. The Bartron Site is much like other 11th century villages in the Red Wing locality in the types of artifacts recovered, but with far less evidence of Middle Mississippian influence (Institute for Minnesota Archaeology 1999a). An Institute for Minnesota Archaeology report notes that the site is "not adequately dated" but probably dates to the period 1050-1300 A.D (Institute for Minnesota Archaeology 1999b).

Current Status

As of September 2006, the National Register of Historic Places listed 60 properties in Goodhue County (NPS 2006c). Thirty four of these are in Red Wing and may fall within a 6 mile radius of PINGP. The National Register also listed seven properties in Pierce County, Wisconsin, across the Mississippi River from PINGP. Two of these appear to fall within a 6-mile radius of PINGP.

As of September 2006, the Department of the Interior also listed five sites that have been determined eligible for listing (NPS 2006c) on the National Register of Historic Places in Goodhue County and two sites in Pierce County. At least three of the Goodhue County sites appear to lie within a 6-mile radius of PINGP.

Table 2.10-1 lists the National Register of Historic Places sites within the 6-mile radius of PINGP.

NMC conducted a cultural resource assessment in September 2007 to identify all previously recorded archaeological sites and architectural history properties, as well as previously conducted cultural resource investigations within the boundaries of PINGP. Reviews of records from the Minnesota State Historic Preservation Office and the Wisconsin Historic Preservation Database were performed to locate previously-identified archeological sites within one mile of PINGP.

According to the records on file at SHPO, four professional archaeological surveys and one testing project have been conducted within the study area to date. Within the boundaries of the PINGP, seven archaeological sites have been recorded (confirmed) (The 106 Group 2008).

Although not recorded as a professional investigation, Elden Johnson conducted salvage data recovery operations at three precontact sites in the PINGP study area in the late 1960s. Elden Johnson is considered the first investigator to apply scientifically based methods to the archaeological study of the region. Johnson did not always publish reports of his findings; however, his work is recorded on archaeological site forms with the SHPO office. After NSP purchased the land on Prairie Island, they sponsored data recovery operations directed by Johnson for the Bartron Site and two mound sites. Johnson nominated the Bartron site to the National Register of Historic Places in 1970. This site is the only property within the study area that is listed on the National Register of Historic Places. Three compliance surveys have been conducted within the study area since Elden Johnson's salvage work. None of these yielded any findings (The 106 Group 2008).

2.11 KNOWN OR REASONABLY FORESEEABLE PROJECTS IN SITE VICINITY

EPA-Permitted Dischargers to Air, Water, and Soil

In its "Envirofacts Warehouse" online database, the U.S. Environmental Protection Agency identifies dischargers to air, water, and soil. A search on Goodhue County, Minnesota determined that 42 industries produce and release air pollutants; 16 facilities have reported toxic releases; 300 facilities have reported hazardous waste activities; and 35 facilities are permitted to discharge to the waters of the United States. There are no Superfund sites in Goodhue County (EPA 2006g).

A search of Dakota County, Minnesota determined that 117 industries produce and release air pollutants; 61 facilities have reported toxic releases; 500 facilities have reported hazardous waste activities; 5 potential hazardous waste sites are part of the Superfund program; and 41 facilities are permitted to discharge to the waters of the United States (EPA 2006g).

An Envirofacts search for Pierce County industries determined that 17 industries produce and release air pollutants; 6 facilities have reported toxic releases; 190 facilities have reported hazardous waste activities; and 11 facilities are permitted to discharge to the waters of the United States. There are no Superfund sites in Pierce County, Wisconsin (EPA 2006g).

Federal Facilities in the Vicinity of PINGP

USACE owns and operates five dams (with locks) within a 50-mile radius of PINGP (Figure 2.1-1). To achieve a 9-foot channel in the Upper Mississippi River, the construction of a system of navigation locks and dams was authorized in 1930. Upper St. Anthony Falls Lock and Dam began operation in 1963. Lower St. Anthony Falls Lock and Dam began operation in 1956. The dams are located at river mile 853.9 and portions of both are owned by Xcel Energy Center (USACE 2006b). Lock and Dam 1 is also located in the Minneapolis/St. Paul area at river mile 847.9. In operation since 1917, the dam contains a hydroelectric power station owned and operated by Ford Motor Company (USACE 2006b).

Lock and Dam 2, near Hastings, is approximately 16 miles upstream of PINGP. It was completed in 1930 and includes a small hydroelectric power plant owned and operated by the City of Hastings. Lock and Dam 3, completed in 1938, is located approximately one mile downstream of PINGP (USACE 2006b).

Two long-standing and related problems at Lock and Dam 3 involve navigation safety and the Wisconsin embankments. Because the dam was constructed on a bend in the river with the lock on the outside of the bend, an outdraft current sweeps across the upper lock approach toward the gated part of the dam. This outdraft current makes navigation difficult and has caused many navigation accidents. Since 1963, 11 accidents have occurred when tows collided with the gated part of the dam. Navigation accidents can result in barges blocking one of the four roller gates in the gated part of

the dam, resulting in a rise in water level in navigation Pool 3 and increased flow over the Wisconsin embankments when there is head at the dam, creating a highly erosive situation. Corps planners have evidenced concern that the Wisconsin embankments could fail rapidly because of the weak soil conditions in that area, opening up a scour channel around Lock and Dam 3 that would cause an accidental drawdown of Pool 3 (USACE 2006a).

USACE recently published the Final Integrated General Reevaluation Report and Environmental Impact Statement for Lock and Dam 3 Mississippi River Navigation Safety and Embankments. The report offers a plan to improve navigation safety and strengthen the Wisconsin embankments at Lock and Dam 3 and assesses the environmental impacts of the proposed modifications. The improvements are intended to reduce the risk of accidental drawdown of Pool 3 (USACE 2006a).

Industries in the Vicinity of PINGP

The area within five miles of PINGP is devoted almost exclusively to agricultural pursuits. Outside of the City of Red Wing, very few industrial facilities exist.

The Treasure Island Resort and Casino owned by the Prairie Island Indian Community is located approximately one mile from the plant. In addition to a hotel, casino, and marina, Prairie Island Indian Community also operates a wastewater treatment facility. A gasoline station/convenience store is located approximately one-mile west-northwest from PINGP. Several factories, textile mills, and laboratories in Red Wing lie within 5 miles of PINGP (NMC 2007).

Other Generating Facilities in the Vicinity of PINGP

Two small hydroelectric facilities are located upstream of PINGP at Lock and Dam 1 and 2. The Ford Motor Company operates a hydroelectric plant at Lock and Dam 1. The City of Hastings operates another hydroelectric facility at Lock and Dam 2 (USACE 2006b).

Several Xcel Energy plants are located within 50 miles of PINGP. The closest plant to PINGP is Red Wing Steam Plant, a two-unit 20 MW plant in Red Wing that burns processed municipal solid waste, called refuse-derived fuel (RDF). Other Xcel plants within 50 miles include Hennepin Island, Inver Hills, West Faribault, Blue Lake, Black Dog, High Bridge, Riverside, and Allen S. King Generating Plants (Xcel Energy 2006). All run on coal, natural gas, or distillate fuel oil (Xcel Energy 2003), with the exception of Hennepin Island, which is a five-unit hydroelectric plant located at St. Anthony's falls in Minneapolis.

Dairyland Power Cooperative operates two coal-fired plants on the Mississippi River in Alma, Wisconsin, approximately 45 miles downstream of PINGP. The Alma Station is a five-unit plant with a capacity of 210 MW. The John P. Madgett Station (JPM), a single unit station, is just south of the Alma Station and has a generating capacity of 400 MW (Dairyland 2006).

CONCLUSIONS

Having evaluated environmental conditions in the vicinity of the PINGP site in this section and assessed potential impacts of license renewal in Chapter 4, NMC has not identified any obvious cumulative impacts and has not extended the discussion of potential cumulative impacts into Chapter 4, “Environmental Consequences of the Proposed Action and Mitigating Actions.”

TABLE 2.2-1
USGS GAGING STATIONS

USGS Station	River Mile	Drainage Area (mi^2)	Available Record
Prescott (#5344500)	811.4	44,800	1928-2005
Winona (#5378500)	725.7	59,200	1928-2005

TABLE 2.2-2
MISSISSIPPI RIVER FLOW STATISTICS AT USGS GAGING STATIONS

U.S.G.S. Station	Annual Mean	Highest Annual Mean	Lowest Annual Mean	Lowest Daily Mean
Prescott (#5344500)	18,380 cfs	38,540 cfs	4,367 cfs	1,380 cfs
Winona (#5378500)	29,590 cfs	56,850 cfs	9,742 cfs	2,250 cfs

cfs – cubic feet per second

TABLE 2.2-3
DISCHARGE FLOW AT LOCK AND DAM 3

Discharge Flow at Lock and Dam 3 (cubic feet per second)

	1999	2000	2001	2002	2003	2004	2005	2006	Monthly Average
January	10,790	8,974	9,110	10,932	9,229	6,661	9,913	17,790	10,425
February	12,589	9,548	8,364	10,104	7,871	6,728	11,575	18,186	10,621
March	17,897	22,219	9,910	11,497	13,210	15,055	14,668	20,774	15,654
April	42,013	15,570	112,400	40,657	25,613	24,673	44,730	51,413	44,634
May	47,426	18,839	82,655	33,974	42,194	19,432	30,977	40,997	39,562
June	34,423	22,070	53,177	26,323	27,413	45,987	39,157	21,510	33,758
July	27,548	21,052	23,981	34,597	32,739	19,510	21,897	7,800	23,641
August	24,432	10,026	12,165	29,065	10,084	10,606	9,761	7,648	14,223
September	18,013	6,687	9,193	24,513	7,087	19,227	15,180	6,453	13,294
October	14,200	6,790	9,577	28,600	6,771	19,532	35,948	7,252	16,084
November	13,243	17,463	11,040	18,467	8,167	21,943	19,170	7,133	14,578
December	9,671	9,558	13,813	12,135	8,310	12,258	19,123	6,771	11,455
Total/Year	272,245	168,796	355,385	280,864	198,688	221,612	272,099	213,727	247,927
Annual Average for 1999-2006			247,927						
Annual Average for 2000-2005			249,574						

TABLE 2.2-4
PINGP GROUNDWATER USE TABLE

Year	Administration Building Non Permitted Well [b] *	Permit 690171[a] Well 256120 - Installation 121 (Gallons)	Permit 690171[a] Well 256121 - Installation 122 (Gallons)	Permit 785153[a] Well 611076 - Steam Power CT Well (Gallons)	Permit 865114[a] Well 402599 - Screen House (Gallons)	Permit 965042 -Training center[a] (Gallons)		Total Annual	
						Domestic	Irrigation	Gallons	Gallons per Minute
2005	563,100	20,833,300	19,933,600	6,830,210	12,055,695	1,128,000	818,200	61,599,005	117
2004		18,576,900	13,336,200	5,280,430	15,517,800	846,800	978,100	54,536,230	104
2003		10,648,800	14,248,900	4,163,190	10,969,500	647,000	1,237,000	41,914,390	80
2002		18,958,300	11,609,300	3,550,800	4,280,700	1,674,100	--	40,073,200	76
2001		16,974,300	16,372,060	3,663,190	7,267,700	2,971,700	--	47,248,950	90
2000		13,676,800	12,812,800	3,745,780	7,474,900	2,242,900	--	39,953,180	76
Total 2000-2005	563,100	99,668,400	88,312,860	27,233,600	57,566,295	9,510,500	3,033,300	285,324,955	
Ave/yr		16,611,400	14,718,810	4,538,933	9,594,383	1,585,083	505,550	47,554,159	91
gpm	1.07	32 gpm	28 gpm	9 gpm	18 gpm	3 gpm	1 gpm		91

References:
a. NSP 2001, NSP 2002, NSP 2003, NSP 2004, NSP 2005, NSP 2006
b. Bergland 2006
* Not included in Total Annual column due to lack of data.

TABLE 2.3-1
THREATENED AND ENDANGERED SPECIES POTENTIALLY AFFECTED BY OPERATION OF PINGP AND ASSOCIATED TRANSMISSION LINES[1]

Scientific Name	Common Name	Federal Status[2]	State Status[2] (Minnesota)	State Status[2] (Wisconsin)
Mammals				
Perognathus flavescens	Plains Pocket Mouse	-	SSC	NA
Birds				
Buteo lineatus	Red-shouldered Hawk	-	SSC	NA
Cygnus buccinator	Trumpeter Swan	-	T	NA
Dendroica cerulea	Cerulean Warbler	-	SSC	NA
Falco peregrinus	Peregrine Falcon	-	T	NA
Haliaeetus leucocephalus	Bald Eagle[3]	-	SSC	NA
Lanius ludovicianus	Loggerhead Shrike	-	T	NA
Sterna forsteri	Forster's Tern	-	SSC	NA
Wilsonia citrina	Hooded Warbler	-	SSC	NA
Amphibians and Reptiles				
Acris crepitans	Northern Cricket Frog	-	E	NA
Apalone mutica	Smooth Softshell Turtle	-	SSC	NA
Clemmys insculpta	Wood Turtle[3]	-	T	NA
Coluber constrictor	Eastern Racer	-	SSC	NA
Crotalus horridus	Timber Rattlesnake	-	T	NA
Emydoidea blandingii	Blanding's Turtle[3]	-	T	NA
Pituophis catenifer	Gopher Snake	-	SSC	NA
Fish				
Acipenser fulvescens	Lake Sturgeon	-	SSC	SC
Alosa chrysochloris	Skipjack Herring	-	SSC	E
Ammocrypta asprella	Crystal Darter	-	SSC	E
Anguilla rostrata	American Eel	-	-	SC
Clinostomus elongatus	Redside Dace	-	-	SC
Cycleptus elongatus	Blue Sucker	-	SSC	T
Etheostoma asprigene	Mud Darter	-	-	SC
Etheostoma clarum	Western Sand Darter	-	-	SC
Fundulus diaphanus	Banded Killifish	-	-	SC
Hiodon alosoides	Goldeye	-	-	E
Ictiobus niger	Black Buffalo	-	SSC	T
Macrhybopsis aestivalis	Shoal Chub	-	-	T
Macrhybopsi storeiana	Silver Chub	-	-	SC
Moxostoma carinatum	River Redhorse	-	-	T
Notropis amnis	Pallid Shiner	-	SSC	E
Notropis texanus	Weed Shiner	-	-	SC
Opsopoeodus emiliae	Pugnose Minnow	-	-	SC
Polyodon spathula	Paddlefish	-	T	T
Mussels				
Actinonaias ligamentina	Mucket	-	T	
Alasmidonta marginata	Elktoe	-	T	SC
Arcidens confragosus	Rock Pocketbook	-	E	T
Cumberlandia monodonta	Spectaclecase	C	T	E

TABLE 2.3-1 (CONTINUED)
THREATENED AND ENDANGERED SPECIES POTENTIALLY AFFECTED BY OPERATION OF PINGP AND ASSOCIATED TRANSMISSION LINES[1]

Scientific Name	Common Name	Federal Status[2]	State Status[2] (Minnesota)	State Status[2] (Wisconsin)
Mussels (continued)				
Cyclonaias tuberculata	Purple Wartyback	-	T	E
Ellipsaria lineolata	Butterfly	-	T	E
Elliptio crassidens	Elephant-ear	-	E	E
Elliptio dilatata	Spike	-	SSC	-
Epioblasma triquetra	Snuffbox	-	T	E
Fusconaia ebena	Ebonyshell	-	E	E
Lampsilis higginsi	Higgins Eye[3]	E	E	E
Lampsilis teres	Yellow/Slough Sandshell	-	E	E
Lasmigona costata	Fluted-shell	-	SSC	-
Ligumia recta	Black Sandshell	-	SSC	-
Megalonaias nervosa	Washboard	-	T	SC
Obovaria olivaria	Hickory nut	-	SSC	-
Plethobasus cyphyus	Sheepnose (bullhead)	C	E	E
Pleurobema sintoxia fka *P. coccineum*	Round Pigtoe	-	T	SC
Quadrula fragosa	Winged Mapleleaf	E	E	E
Quadrula metanevra	Monkeyface	-	T	T
Quadrula nodulata	Wartyback	-	E	-
Tritogonia verrucosa	Pistolgrip (buckhorn)	-	T	T
Insects				
Aflexia rubranura	Red Tailed Prairie Leafhopper	-	SSC	-
Gompherus externus	Plains clubtail		-	SC
Ophiogomphus smithi	Sand snaketail	-	-	SC
Neurocordulia molesta	Smoky shadowfly	-	-	SC
Speyeria idalia	Regal Fritillary	-	SSC	-
Stylurus plagiatus	Russet-tipped clubtail	-	-	SC
Plants				
Agalinis auriculata	Eared False Foxglove	-	E	NA
Aristida tuberculosa	Sea-beach Needlegrass	-	SSC	NA
Arnoglossum plantagineum	Tuberous Indian-plantain	-	T	NA
Asclepias amplexicaulis	Clasping Milkweed	-	SSC	NA
Asclepias sullivantii	Sullivant's Milkweed	-	T	NA
Besseya bullii	Kitten-tails	-	T	NA
Botrychium oneidense	Blunt-lobed Grapefern	-	E	NA
Botrychium rugulosum	St. Lawerence Grapefern	-	T	NA
Carex sterilis	Sterile Sedge	-	T	NA
Cirsium hillii	Hill's Thistle	-	SSC	NA
Cladium mariscoides	Twig-rush	-	SSC	NA
Cristatella jamesii	James' Polanisia	-	E	NA
Cypripedium candidum	Small White Lady's-slipper	-	SSC	NA

TABLE 2.3-1 (CONTINUED)
THREATENED AND ENDANGERED SPECIES POTENTIALLY AFFECTED BY OPERATION OF PINGP AND ASSOCIATED TRANSMISSION LINES[1]

Scientific Name	Common Name	Federal Status[2]	State Status[2] (Minnesota)	State Status[2] (Wisconsin)
Plants (continued)				
Eleocharis rostellata	Beaked Spike-rush	-	T	NA
Eryngium yuccifolium	Rattlesnake-master	-	SSC	NA
Erythronium propullans	Dwarf trout lily[3]	E	E	NA
Hudsonia tomentosa	Beach-heather	-	SSC	NA
Juniperus horizontalis	Creeping Juniper	-	SSC	NA
Lespedeza leptostachya	Prairie bush-clover[3]	T	T	NA
Lesquerella ludoviciana	Bladder Pod	-	E	NA
Minuartia dawsonensis	Rock Sandwort	-	SSC	NA
Oenothera rhombipetala	Rhombic-petaled Evening Primrose	-	SSC	NA
Opuntia macrorhiza	Plains Prickly Pear	-	SSC	NA
Orobanche fasciculata	Clustered Broomrape	-	SSC	NA
Panax quinquefolius	American Ginseng	-	SSC	NA
Rhynchospora capillacea	Hair-like Beak-rush	-	T	NA
Scleria verticillata	Whorled Nut-Rush	-	T	NA
Trillium nivale	Snow Trillium	-	SSC	NA
Valeriana edulis ciliata	Valerian	-	T	NA

[1] Source of County Occurrence: FWS 2007a, MDNR 2007a, MDNR 2007b, WDNR 2007

[2] E = Endangered, T = threatened, C = Candidate for federal listing, SSC = Minnesota Species of Special Concern, SC = Wisconsin Species of Concern, - = not listed, NA – Not applicable because only those Wisconsin state-listed species present in the Mississippi River were identified in this analysis.

[3] Identified as species of concern by the Prairie Island Indian Community (PIIC 2008).

TABLE 2.5-1
DECENNIAL POPULATIONS, PROJECTIONS, AND GROWTH RATES

	Goodhue County		Dakota County		Minnesota		Pierce County		Wisconsin	
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1980[a]	38,749	N/A	194,279	N/A	4,075,970	N/A	31,149	N/A	4,705,767	N/A
1990[a]	40,690	5.01%	275,227	41.67%	4,375,099	7.34%	32,765	5.19%	4,891,769	3.95%
2000[b]	44,127	8.45%	355,904	29.31%	4,919,479	12.44%	36,804	12.33%	5,363,675	9.65%
2010[c,d]	47,140	6.83%	422,990	18.85%	5,452,500	10.83%	39,818	8.19%	5,751,470	7.23%
2020[c,d]	50,430	6.98%	470,460	11.22%	5,909,400	8.38%	42,655	7.12%	6,110,878	6.25%
2030[c,d]	52,890	4.88%	501,020	6.50%	6,268,200	6.07%	45,850	7.49%	6,415,923	4.99%

a. USCB 1995a, 1995b
b. USCB 2000b
c. MDA 2002
d. WDA 2004

TABLE 2.5-2
BLOCK GROUPS WITHIN 50 MILES OF PINGP WITH MINORITY OR LOW-INCOME POPULATIONS MORE THAN 20% GREATER THAN THE STATE PERCENTAGE

County Name	State Name	Number of Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate	Hispanic	Low-Income Households	Total Population*
Anoka	Minnesota	127	0	0	0	0	0	0	0	0	0	142066
Carver	Minnesota	17	1	0	0	0	0	0	1	1	0	28911
Chisago	Minnesota	4	0	0	0	0	0	0	0	0	0	1334
Dakota	Minnesota	194	0	0	0	0	0	0	0	0	0	355904
Dodge	Minnesota	15	0	0	0	0	0	0	0	0	0	15482
Goodhue	Minnesota	37	0	0	0	0	0	0	0	0	0	44127
Hennepin	Minnesota	892	111	3	11	0	5	1	196	32	61	956280
Le Sueur	Minnesota	6	0	0	0	0	0	0	0	0	0	6607
Olmsted	Minnesota	109	1	0	0	0	0	0	3	0	2	114388
Ramsey	Minnesota	401	16	0	43	0	5	0	109	14	23	511035
Rice	Minnesota	43	0	0	0	0	0	0	0	2	0	56455
Scott	Minnesota	50	0	0	0	0	1	0	1	1	0	83621
Steele	Minnesota	21	0	0	0	0	0	0	0	0	0	27123
Wabasha	Minnesota	19	0	0	0	0	0	0	0	0	0	21610
Waseca	Minnesota	1	0	0	0	0	0	0	0	0	0	84
Washington	Minnesota	117	2	0	0	0	0	0	2	0	0	201020
Winona	Minnesota	3	0	0	0	0	0	0	0	0	0	1579
Barron	Wisconsin	1	0	0	0	0	0	0	0	0	0	193
Buffalo	Wisconsin	12	0	0	0	0	0	0	0	0	0	8867
Dunn	Wisconsin	31	0	0	0	0	0	0	0	0	3	34979

TABLE 2.5-2 (CONTINUED)
BLOCK GROUPS WITHIN 50 MILES OF PINGP WITH MINORITY OR LOW-INCOME POPULATIONS MORE THAN 20% GREATER THAN THE STATE PERCENTAGE.

County Name	State Name	Number of Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate	Hispanic	Low-Income Households	Total Population*
Eau Claire	Wisconsin	3	0	0	0	0	0	0	0	0	0	4745
Pepin	Wisconsin	7	0	0	0	0	0	0	0	0	0	7213
Pierce	Wisconsin	26	0	0	0	0	0	0	0	0	0	36804
Polk	Wisconsin	16	0	0	0	0	0	0	0	0	0	14015
St. Croix	Wisconsin	45	0	0	0	0	0	0	0	0	0	63155
	TOTALS	2197	131	3	54	0	11	1	312	50	89	2733326
	Minnesota Percentages		3.55	1.14	2.94	0.04	1.36	1.71	10.73	2.96	7.91	
	Wisconsin Percentages		5.75	0.89	1.68	0.03	1.60	1.26	11.21	3.64	8.38	

Shading indicates that the county is completely contained within the 50-mile radius.

*The total population listed for each county is the population for the portion of the county that falls within the 50-mile radius.

TABLE 2.6-1
GOODHUE COUNTY MAJOR EMPLOYERS

Employer	Community	Products/Services	Employee Count
Treasure Island Casino	Red Wing	Gambling Industries	1,500
Red Wing Shoe Company	Red Wing	Footwear Manufacturing	724
Xcel Energy	Red Wing	Nuclear Electric Power Generation	611
Fairview Red Wing Medical Center	Red Wing	General Medical and Surgical Hospitals	585
Independent School District #256	Red Wing	Elementary and Secondary Schools	500
Norwood	Red Wing	Other Miscellaneous Manufacturing	380

MDEED 2008

TABLE 2.6-2
DAKOTA COUNTY MAJOR EMPLOYERS

Employer	Community	Products/Services	Employee Count
West Information Publishing Group	Eagan	Newspaper, Periodical, Book, & Directory Publishers	6,000
Rosemount School District #196	Rosemount	Elementary and Secondary Schools	4,000
Blue Cross and Blue Shield	Eagan	Insurance Carriers	3,300
Northwest Airlines	Eagan	Scheduled Air Transportation	2,300
Apple Valley Schools-ISD #196	Apple Valley	Elementary and Secondary Schools	1,913
Dakota County	Hastings	Executive and Legislative Offices, Combined	1,849
Burnsville Public Schools-ISD #191	Burnsville	Elementary and Secondary Schools	1,600
Lockheed-Martin Tactical Defense Sys	Eagan	Computer and Peripheral Equipment Manufacturing	1,600
Lakeville Public School District #194	Lakeville	Elementary and Secondary Schools	1,596
US Postal Service	Eagan	Postal Service	1,570
United Parcel Service	Eagan	Couriers	1,435
Fairview Ridges Hospital	Burnsville	General Medical and Surgical Hospitals	1,400
Goodrich Sensor Systems	Burnsville	Computer and Peripheral Equipment Manufacturing	1,150
CHS Cooperatives	Inver Grove Heights	Pesticide & Other Agricultural Chemical Mfg.	1,000
Coca-Cola Bottling Company	Eagan	Beverage Manufacturing	900
Flint Hills	Rosemount	Petroleum and Coal Products Manufacturing	850
Sportsman's Guide	South St. Paul	Mail-Order Houses	800
Regina Medical Complex	Hastings	General Medical and Surgical Hospitals	730
Ecolab Research Facility	Eagan	Soap and Other Detergent Mfg.	700
Wells Fargo Mortgage	Eagan	Electronics and Other Appliance Stores	700
Ryt-Way Industries, Inc.	Lakeville	Food Service Contractors	688
West St. Paul, Mendota Heights, Egan – ISD #197	West St. Paul	Elementary and Secondary Schools	651
Northern Hydraulics, Inc.	Burnsville	Industrial Machinery Manufacturing	600
School District 200	Hastings	Elementary and Secondary Schools	600
Dakota County	West St. Paul	Admin. Of Human Resource Programs	577
Smead Manufacturing Co	Hastings	Office Supplies and Stationary Stores	575
Pepsi-Cola Bottling Company	Burnsville	Beverage Manufacturing	550
Prime Therapeutics	Eagan	Management, Scientific, & Technical Consulting Services	550
Farmington Public Schools-ISD #192	Farmington	Elementary and Secondary Schools	540
Inver Grove Hts School District #199	Inver Grove Heights	Elementary and Secondary Schools	525
Northland Insurance Company	Mendota Heights	Insurance Carriers	456

TABLE 2.6-2 (CONT)
DAKOTA COUNTY MAJOR EMPLOYERS

Employer	Community	Products/Services	Employee Count
Federal Aviation Administration	Farmington	Admin. Of Economic Programs	450
South St. Paul School District #6	South St. Paul	Elementary and Secondary Schools	450
Travel Tags	Inver Grove Heights	Comm. Flexographic Printing	430
Inver Hills Community College	Inver Grove Heights	Colleges, Universities, and Prof. Schools	425
ConAgra Store Brands	Lakeville	Breakfast Cereal Mfg.	400
Freightmasters, Inc.	Eagan	General Freight Trucking	400
Yellow Freight System, Inc.	Burnsville	Support Activities for Road Transportation	400
Skyline	Eagan	Specialized Design Services	400
Target	West St. Paul	Department Stores	400
Southview Acres Health Care	West St. Paul	Nursing Care Facilities	375
Waterous Co.	South St. Paul	Pump and Pumping Equip. Man.	375
Intek Plastics, Inc.	Hastings	Plastics Material and Resin Mfg.	350
Transport Corp of America	Eagan	General Freight Trucking	350
Dakota County	Apple Valley	Executive, Legislative, & Other Gen. Govt. Support	349
Best Brands	Eagan	Other Food Manufacturing	330
Delta Dental	Eagan	Insurance Carriers	330
CUB Foods	Burnsville	Department Stores	300
Evergreen Industries	Inver Grove Heights	Nursery and Tree Prod.	300
Frontier Communications of MN	Burnsville	Wired Telecommunications Carriers	300
Genz-Ryan	Burnsville	Plumbing, Heating, & Air Conditioning Contractors	300
Wal-Mart	West St. Paul	Department Stores	300

MDEED 2008

TABLE 2.6-3
PIERCE COUNTY MAJOR EMPLOYERS

Employer	Products/Services	Employee Count
University of Wisconsin-River Fall	Colleges and Universities	500-999
School District of River Falls	Elementary and Secondary Schools	500-999
Pierce County	Executive and Legislative Offices, Combined	250-499
Mentor Management, Inc.	Residential Mental Retardation Facilities	250-499
Ellsworth Community School District	Elementary and Secondary Schools	250-499

State of Wisconsin 2006

TABLE 2.7-1
PINGP TAX INFORMATION 2001-2006

Year	Goodhue County Tax Revenues[a] ($)	PINGP Property Tax Paid to Goodhue County ($)	Percent of Goodhue County Revenues	City of Red Wing Tax Revenues[b] ($)	PINGP Property Tax Paid to City of Red Wing ($)	Percent of City of Red Wing Revenues	School District 256 Tax Revenues[c] ($)	PINGP Property Tax Paid to School District 256 ($)	Percent of School District 256 Revenues
2001	21,047,515	5,780,345	27.5	8,897,957	4,654,701	52.3	14,781,300	6,611,339	44.7
2002	20,582,802	4,591,222	22.3	10,898,020	4,812,822	44.2	6,511,963	2,475,453	38.0
2003	21,069,501	4,358,238	20.7	11,418,308	4,764,870	41.7	5,688,503	2,024,973	35.6
2004	21,680,726	4,043,443	18.6	11,519,238	4,515,593	39.2	6,902,380	2,110,570	30.6
2005	22,266,086[d]	3,702,828	16.6	10,919,238	3,968,674	36.4	6,691,909	1,840,068	27.5
2006	Not yet published	3,747,250	--	11,603,151	4,318,291	37.2	6,943,346	1,979,347	28.5

a. Hove 2006
b. Schlichting 2007
c. MDE 2007
d. State of Minnesota 2006

TABLE 2.8-1
STATE-REGULATED MUNICIPAL WATER SYSTEMS IN THE THREE-COUNTY AREA

System Name	Permitted Annual Average Withdrawal (MGY)[b]	Reported Annual Average Withdrawal 2000 – 2004 (MGY)[b]	Population Served – Groundwater and Surface Water[b, c]
Groundwater			
Dakota County, MN			
Apple Valley	30,000	1,834 – 2,331	48,000
Burnsville	51,200	2,317 – 3,018	62,200
Eagan	51,000	2,335 - 3,289	67,051
Empire Township	104	39 – 53	1,300
Farmington	2,650	374 – 551	13,000
Hampton	44	15 – 25	650
Hastings	6,000	790 – 963	21,631
Inver Grove Heights	6,250	973 – 1,116	33,000
Lakeville	37,380	1,698 – 2,183	51,000
New Trier	10	3.1 – 3.6	115
Randolph	17.4	11.3 – 15.8	351
Rosemont	4,728	537 – 765	21,000
South Saint Paul	8,400	1,064 – 1,234	20,303
Vermillion	50	20.5 – 27.8	442
Dakota County Municipal Total	**197,833 MGY (542 MGD)**	**12,011 - 15,575 MGY (32.9 – 42.7 MGD)**	
Dakota County excess capacity (542 MGD – 42.7 MGD) is 499.3 MGD			
Goodhue County, MN[a]			
Bellechester	14.6	4.1 – 8	172
Cannon Falls	1,040	194 – 253	3,700
Dennison	13	5 – 8.3	168
Goodhue	80	29 – 33	778
Kenyon	144	54 – 68	1,661
Pine Island	332	94 – 110	2,337
Red Wing	4,725	643 – 710	16,100
Wanamingo	120	32 – 43	1,007
Zumbrota	660	168 – 189	3,004
Goodhue County Municipal Total	**7,129 MGY (19.5 MGD)**	**1,223 – 1,422 MGY (3.4 – 3.9 MGD)**	
Goodhue County excess capacity (19.5 MGD – 3.9 MGD) is 15.6 MGD.			

TABLE 2.8-1 (CONTINUED)
STATE-REGULATED MUNICIPAL WATER SYSTEMS IN THE THREE-COUNTY AREA

System Name	Total Pump Design Yield (MGY)[d]	Reported Annual Average Withdrawal 2005 (MGY)[d]	Population Served – Groundwater and Surface Water[c]
Pierce County, WI [c]			
Bay City	135	15	571
Ellsworth	368	101	2,844
Elmwood	752	22	841
Maiden Rock	184	4	121
Prescott	1,314	171	3,645
River Falls	2,597	396	12,560
Spring Valley	258	38	1,271
Pierce County Municipal Total	**5,608 MGY (15.4 MGD)**	**747 MGY (2 MGD)**	
Pierce County excess capacity (15.4 MGD – 2 MGD) is 13.4 MGD.			
Total For Dakota, Goodhue and Pierce Counties	**210,570 MGY (577 MGD)**	**17,742 MGY [1] (48.6 MGD)**	
Excess capacity for these three counties (577 MGD – 48.6 MGD) is 528.4 MGD.			

Sources: a. EPA 2006f; b. MN DNR 2005a, c. WDNR 2006, d. WIPSC 2006

Note 1) Maximum withdrawal data value for Dakota and Goodhue Counties used to obtain the total for Dakota, Goodhue, and Pierce Counties.
MGY = Million gallons per year
MGD = Million gallons per day

TABLE 2.8-2
TRAFFIC STATISTICS FOR MOST LIKELY ROUTES TO THE PINGP SITE

Figure 2.8-1 Locations	Goodhue County Road Segments	Number of Lanes[a]	Mn DOT Road Classification[a]	LOS for Road/Highway Segment[a]	Road/Highway Capacity (vehicles per day)[a]	Average Annual Daily Traffic (AADT) for 2002/2003[a]
1	County Road 18 (just north of intersection with Sturgeon Lake Road)	2	Rural County Road	N/A	12,000	6,200
2	County Road 18 Segment (south of intersection with Sturgeon Lake Road and north of County Road 19)	2	Rural County Road	N/A	12,000	7,400
3	County Road 18 (between County Road 19 and County Road 46, Mt. Carmel Rd.)	2 plus climbing lane	Rural County Road	N/A	12,000 +	6,000
4	Sturgeon Lake Road	4	Urban Undivided County Road	N/A	20,000	11,500
5	County Road 19 (between County Road 18 and U.S. Highway 61)	2	Rural County Road	N/A	5,000	360
6	County Road 31 (between County Road 18 and U.S. Highway 61)	2	Rural County Road	N/A	10,000	490
7	County Road 7 (just south of intersection with U.S. Highway 61)	2	County Road	N/A	N/A	445
8	U.S. Highway 61 (between County Road 18 and State Road 19)	4	Rural Divided U.S Highway	N/A	40,000	14,400
9	U.S. Highway 61 (between State Road 316 and County Road 19)	4	Rural Divided U.S Highway	N/A	40,000	10,800

a. Bjornstad 2006
N/A = Not available or not provided

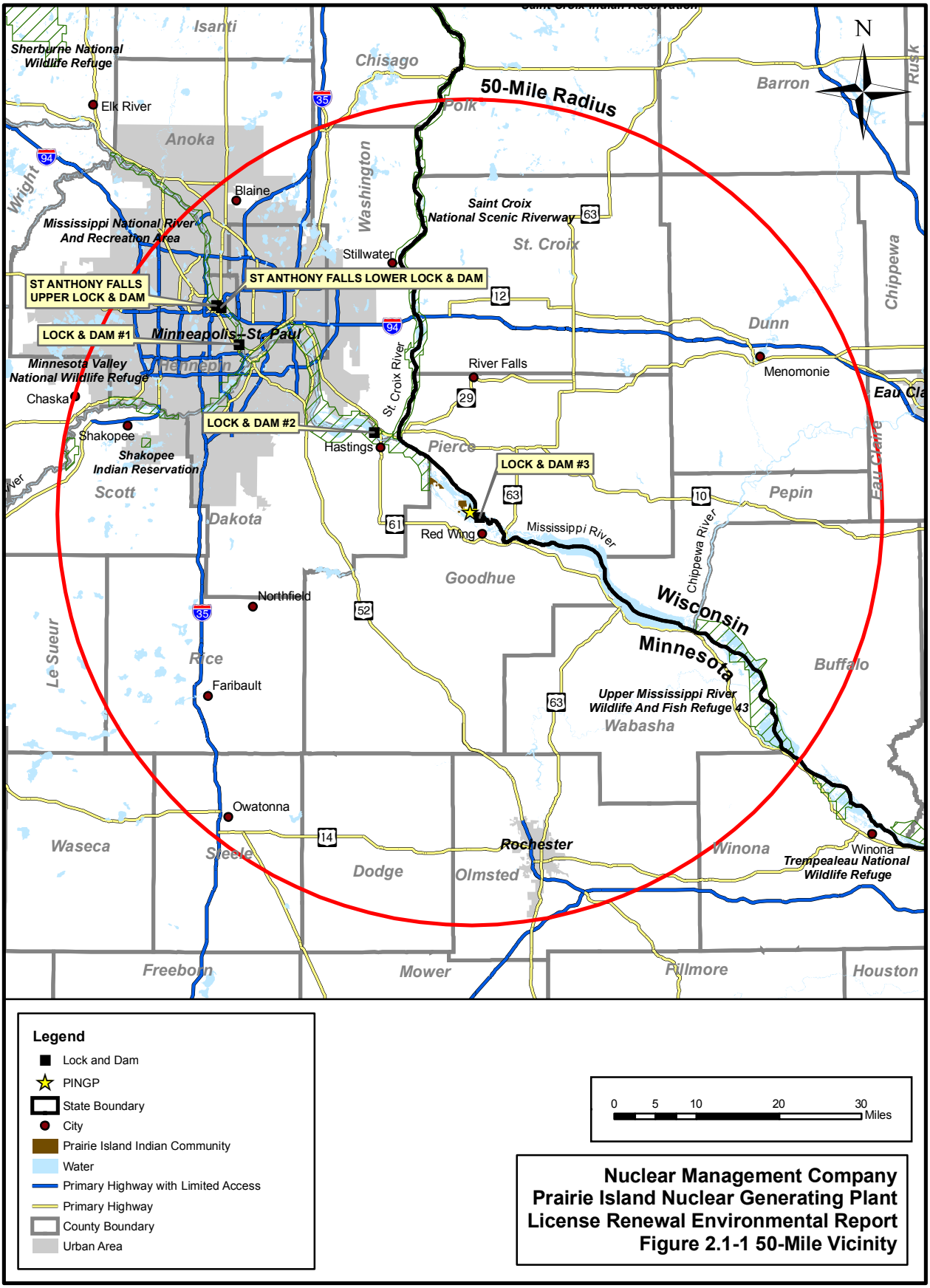
TABLE 2.10-1
SITES LISTED IN THE NATIONAL REGISTER OF HISTORIC PLACES THAT FALL WITHIN A 6-MILE RADIUS OF PINGP

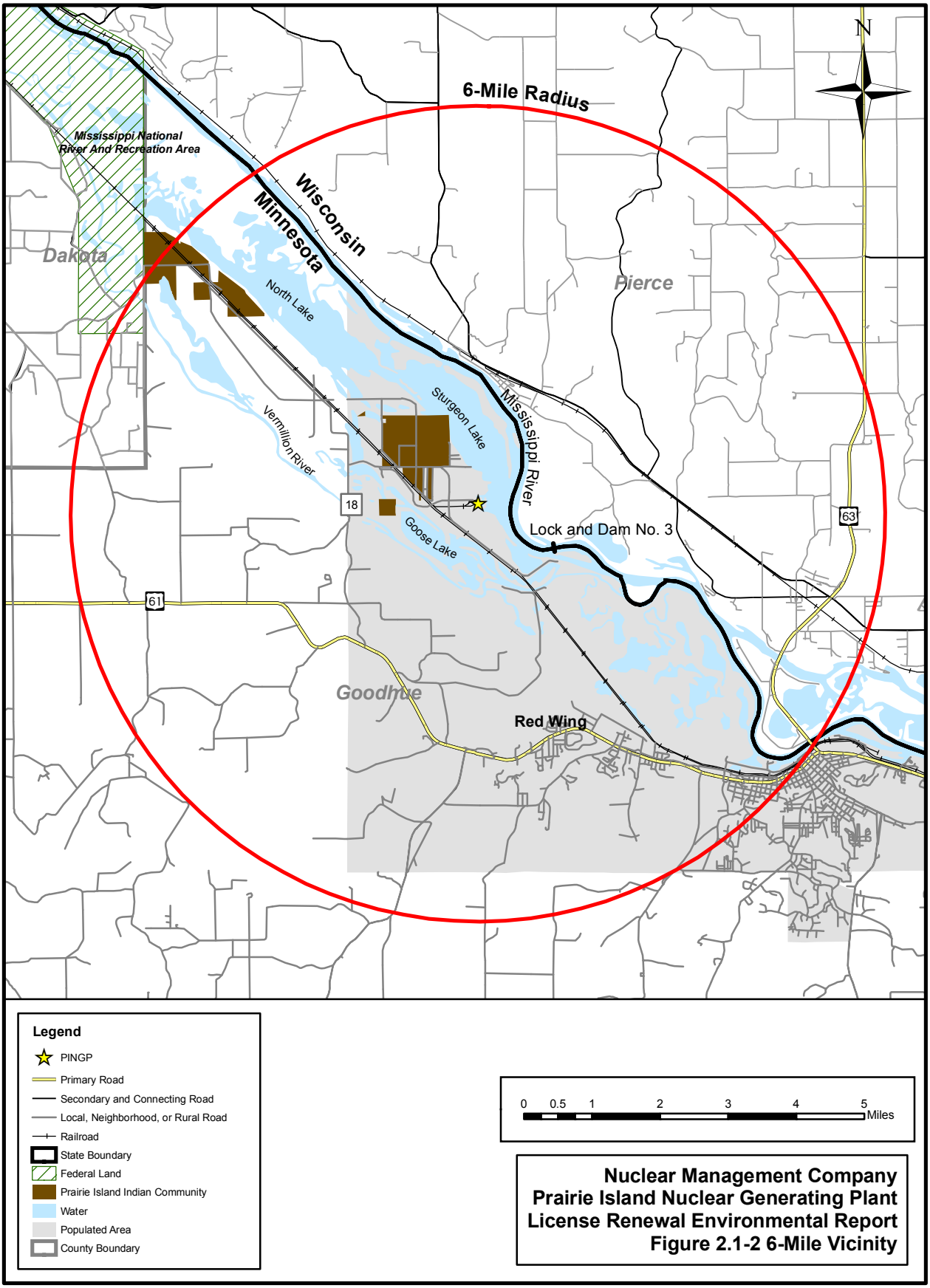
Site Name	Location
Goodhue County, Minnesota	
Alexander Anderson Estate -- Tower View	West of Red Wing on U.S. 61, Red Wing
Barn Bluff	Junction of U.S. 61 and U.S. 63, Red Wing
Bartron Site	Address restricted, Red Wing
Bridge No. 12 (Bullard Cr. Bridge)	Twp. Road 43 over Bullard Cr., Red Wing
Carlson Lime Kiln	E. 5th Street, Red Wing
Chicago Great Western Depot	W. Main and Fulton Streets, Red Wing
Cross of Christ Lutheran Church	MN 61, Red Wing
Diamond Round Barn	MN 61, Red Wing
District No. 20 School	MN 58, Red Wing
Fort Sweeney Site	Address restricted, Red Wing
Fryk (E.J.) Barn	Off MN 61, Red Wing
Gladstone Building	309 Bush Street, Red Wing
Hewitt (Dr. Charles) Laboratory	216 Dakota Street, Red Wing
Hoyt (E.S.) House	300 Hill Street, Red Wing
Immanuel Lutheran Church	Off MN 58, Red Wing
Kappel Wagon Works	221 W. 3rd Street, Red Wing
Keystone Building	409 Main Street, Red Wing
Lawther (James L.) House	927 W. 3rd Street, Red Wing
Mandata to Wabasha Military Road, Cannon River Section	Cannon Bottom Road, Red Wing
Minnesota State Training School	E. 7th Street, Red Wing
Minnesota Stonewear Company	1997 W. Main Street, Red Wing
Nelson (Julia B.) House	219 5th Street, Red Wing
Pratt – Talbott House	706 W. 4th Street, Red Wing
Red Wing City Hall	W. 4th Street, Red Wing
Red Wing Iron Works	401 Levee Street, Red Wing
Red Wing Mall Historic District	Along East and West Avenues and Broadway between 6th St. and levee
Sheldon Memorial Auditorium	443 W. 3rd St., Red Wing
Sheldon (T. B.) House	805 W. 4th Street, Red Wing
Spring Creek Petroglyphs	Address restricted, Red Wing
St. James Hotel	Bush and Main Streets, Red Wing
St. James Hotel and Buildings (boundary increase)	Bush and Main Streets, Red Wing

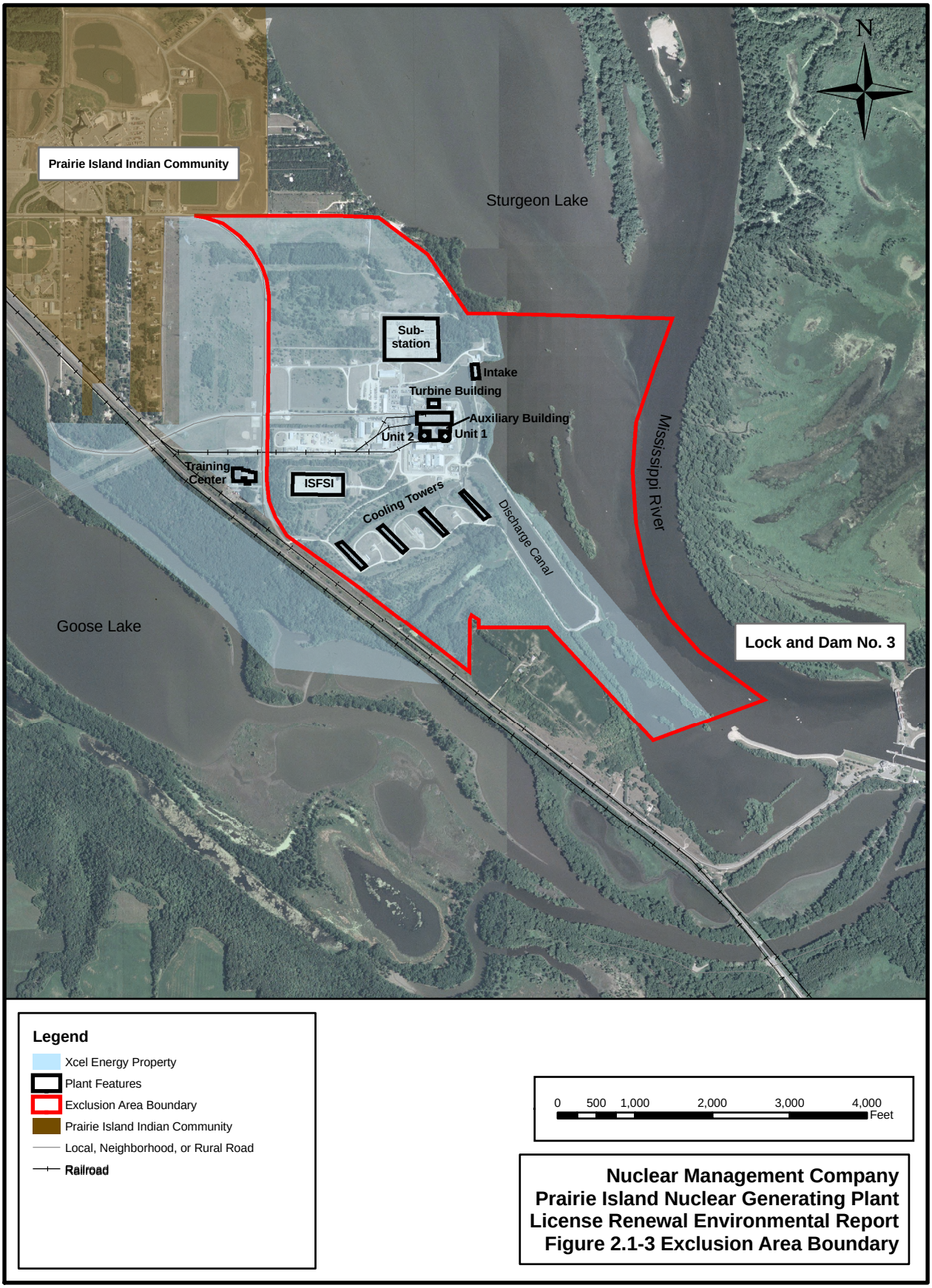
TABLE 2.10-1 (CONTINUED)
SITES LISTED IN THE NATIONAL REGISTER OF HISTORIC PLACES THAT FALL WITHIN A 6-MILE RADIUS OF PINGP

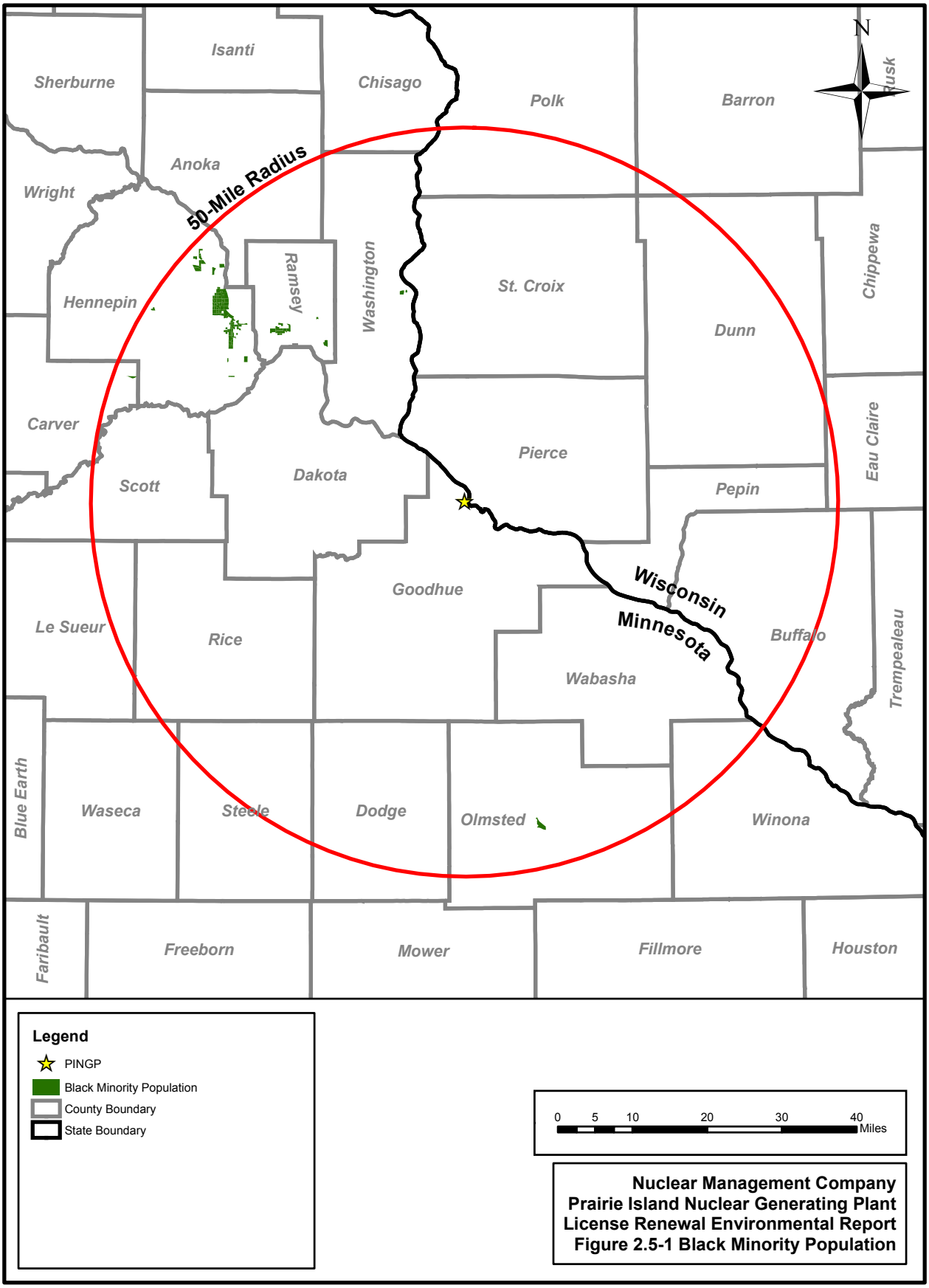
Site Name	Location
Towne-Akenson House	1121 W. 3rd St., Red Wing
Vasa Historic District	Off MN 19, Red Wing
Wallauer Farmhouse	MN 58, Red Wing
Pierce County, Wisconsin	
Diamond Bluff – Mero Mound Site	Address restricted, Diamond Bluff
Mero Archaeological District	Address restricted, Diamond Bluff

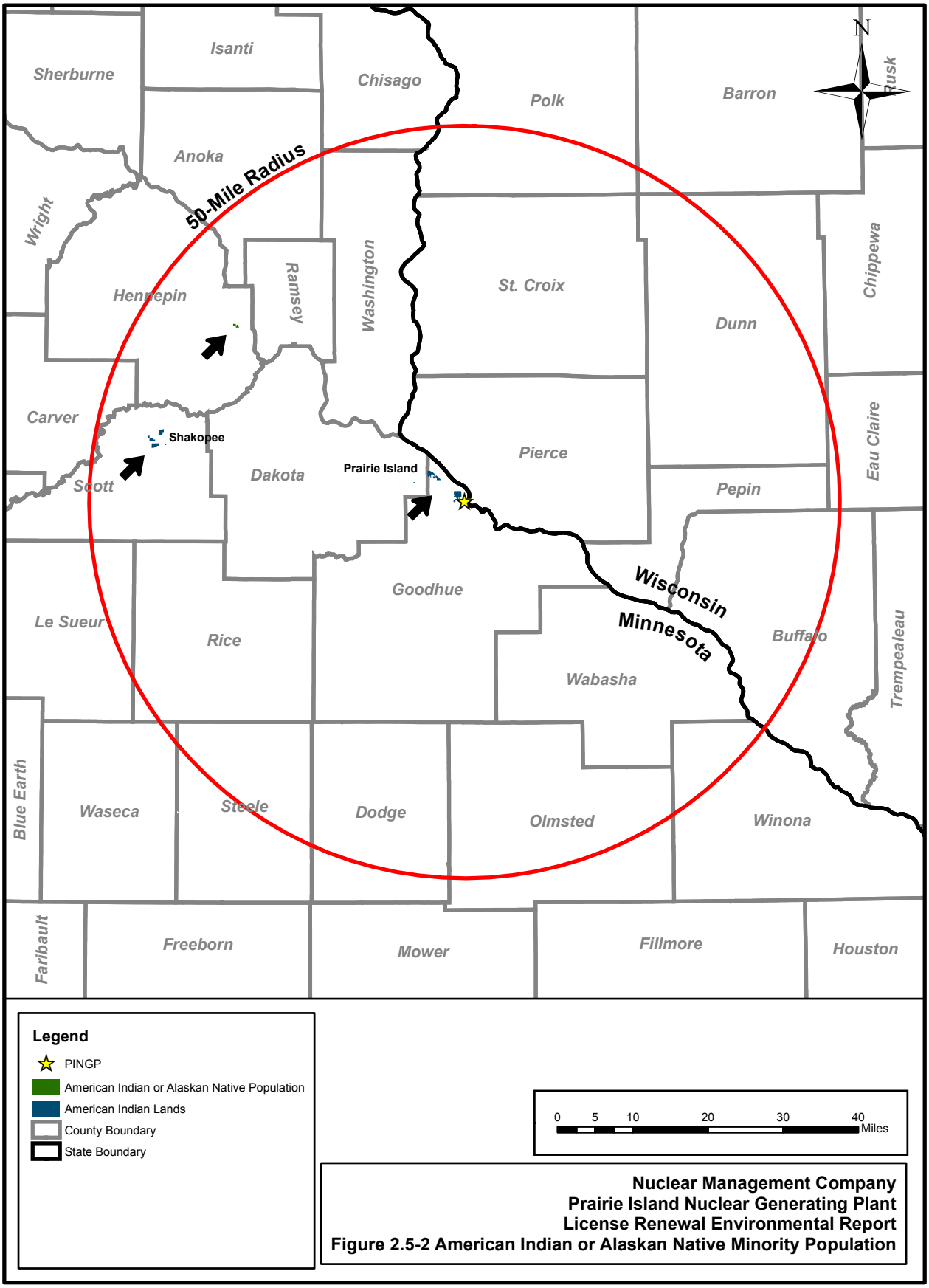
Source: NPS 2006c.


N
50-Mile Radius
Isanti
Sherburne National Wildlife Refuge
Chisago
Elk River
Anoka
Wright
Blaine
Washington
Mississippi National River And Recreation Area
Saint Croix National Scenic Riverway
Stillwater
St. Croix
ST ANTHONY FALLS UPPER LOCK & DAM
ST ANTHONY FALLS LOWER LOCK & DAM
LOCK & DAM #1
Minneapolis - St. Paul
Hennepin
Minnesota Valley National Wildlife Refuge
Chaska
Shakopee
Shakopee Indian Reservation
LOCK & DAM #2
St. Croix River
River Falls
Hastings
Pierce
LOCK & DAM #3
Scott
Dakota
Red Wing
Mississippi River
Goodhue
Northfield
Le Sueur
Rice
Faribault
Wisconsin
Minnesota
Chippewa River
Upper Mississippi River Wildlife And Fish Refuge 43
Wabasha
Barron
Polk
Rusk
Dunn
Chippewa
Menomonie
Eau Claire
Pepin
Buffalo
Owatonna
Waseca
Steele
Dodge
Rochester
Olmsted
Winona
Winona Trempealeau National Wildlife Refuge
Freeborn
Mower
Fillmore
Houston
Legend
Lock and Dam
PINGP
State Boundary
City
Prairie Island Indian Community
Water
Primary Highway with Limited Access
Primary Highway
County Boundary
Urban Area
0 5 10 20 30 Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.1-1 50-Mile Vicinity

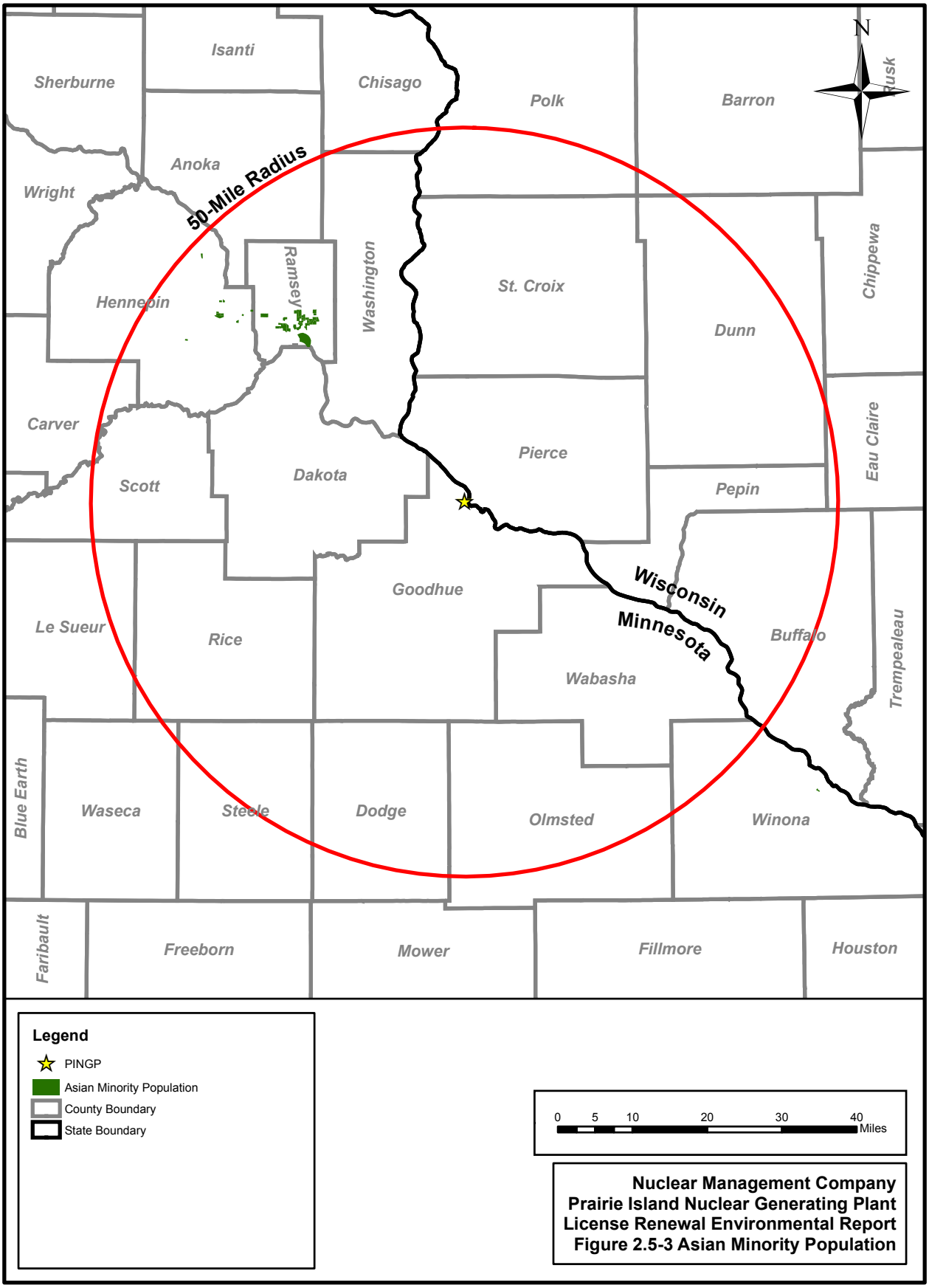

N
6-Mile Radius
Mississippi National River And Recreation Area
Wisconsin
Minnesota
Dakota
Pierce
North Lake
Sturgeon Lake
Vermillion River
Mississippi River
18
Goose Lake
Lock and Dam No. 3
63
61
Goodhue
Red Wing
Legend
PINGP
Primary Road
Secondary and Connecting Road
Local, Neighborhood, or Rural Road
Railroad
State Boundary
Federal Land
Prairie Island Indian Community
Water
Populated Area
County Boundary
0 0.5 1 2 3 4 5
Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.1-2 6-Mile Vicinity

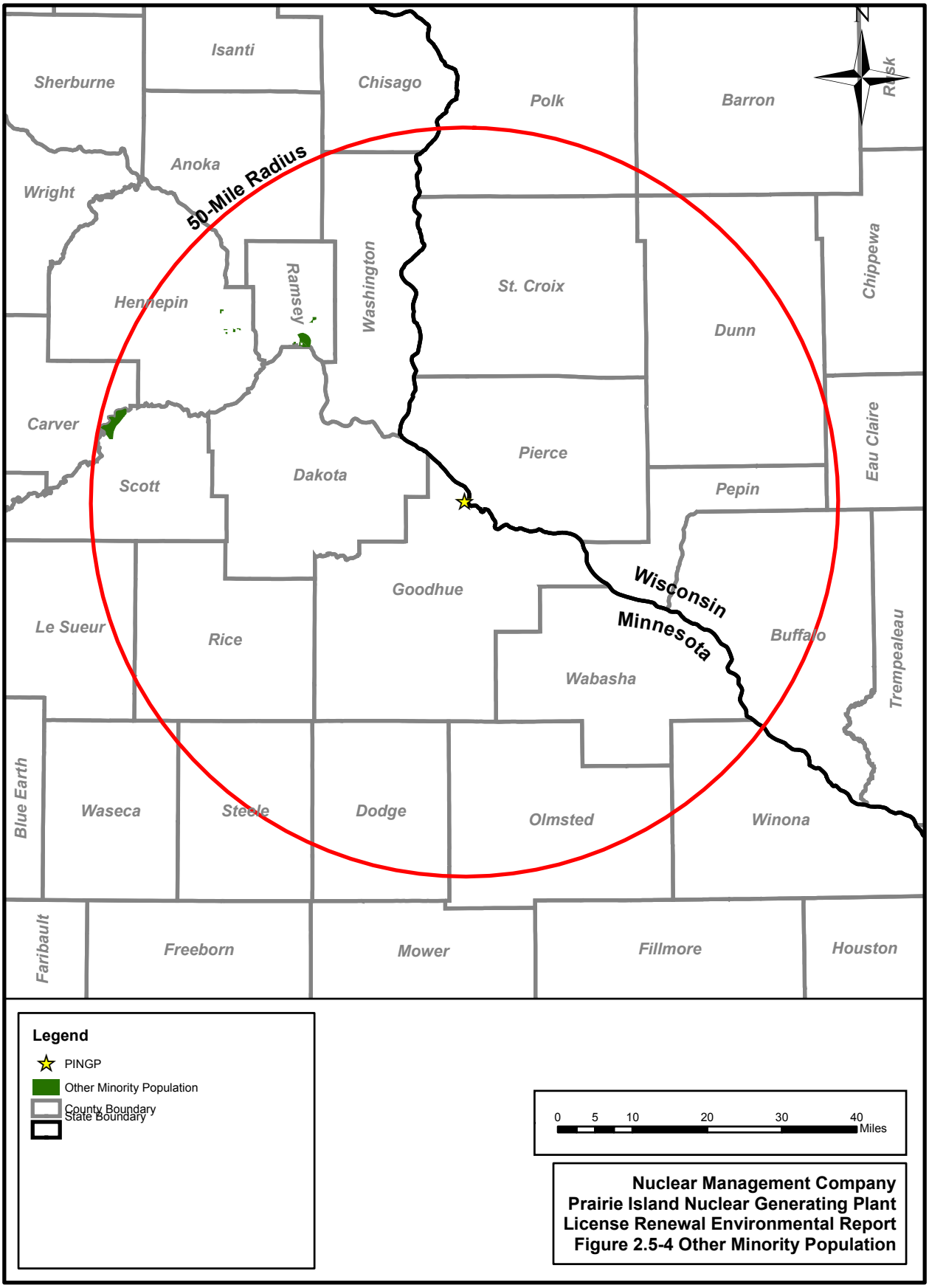

N
Prairie Island Indian Community
Sturgeon Lake
Sub-
station
Intake
Turbine Building
Auxiliary Building
Unit 2
Unit 1
Training
Center
ISFSI
Cooling Towers
Discharge Canal
Mississippi River
Goose Lake
Lock and Dam No. 3
Legend
Xcel Energy Property
Plant Features
Exclusion Area Boundary
Prairie Island Indian Community
Local, Neighborhood, or Rural Road
Railroad
0 500 1,000 2,000 3,000 4,000
Feet
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.1-3 Exclusion Area Boundary

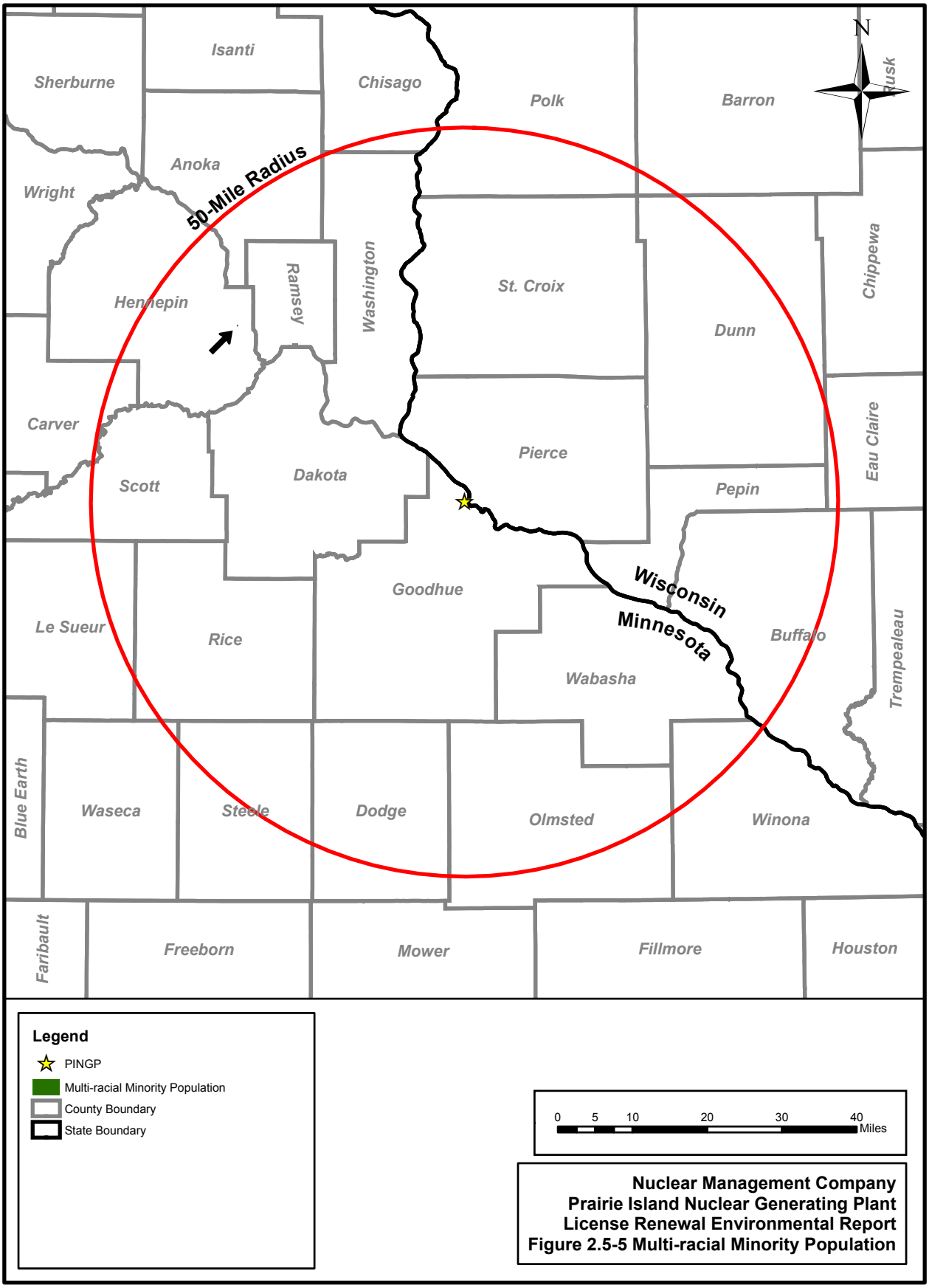

N
Isanti
Sherburne
Chisago
Polk
Barron
Rusk
Anoka
Wright
50-Mile Radius
Ramsey
Washington
St. Croix
Chippewa
Hennepin
Dunn
Carver
Pierce
Eau Claire
Scott
Dakota
Pepin
Wisconsin
Minnesota
Goodhue
Le Sueur
Rice
Buffalo
Wabasha
Trempealeau
Blue Earth
Waseca
Steele
Dodge
Olmsted
Winona
Faribault
Freeborn
Mower
Fillmore
Houston
Legend
PINGP
Black Minority Population
County Boundary
State Boundary
0 5 10 20 30 40
Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.5-1 Black Minority Population



Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.5-2 American Indian or Alaskan Native Minority Population


N
Isanti
Sherburne
Chisago
Polk
Barron
Rusk
Anoka
Wright
50-Mile Radius
Ramsey
Washington
St. Croix
Chippewa
Hennepin
Dunn
Carver
Pierce
Eau Claire
Scott
Dakota
Pepin
Wisconsin
Minnesota
Goodhue
Le Sueur
Rice
Buffalo
Wabasha
Trempealeau
Blue Earth
Waseca
Steele
Dodge
Olmsted
Winona
Faribault
Freeborn
Mower
Fillmore
Houston
Legend
PINGP
Asian Minority Population
County Boundary
State Boundary
0 5 10 20 30 40
Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.5-3 Asian Minority Population


N
Isanti
Sherburne
Chisago
Polk
Barron
Rusk
Anoka
Wright
50-Mile Radius
Washington
Ramsey
Hennepin
St. Croix
Chippewa
Dunn
Carver
Scott
Dakota
Pierce
Eau Claire
Pepin
Goodhue
Wisconsin
Minnesota
Le Sueur
Rice
Buffalo
Wabasha
Trempealeau
Blue Earth
Waseca
Steele
Dodge
Olmsted
Winona
Faribault
Freeborn
Mower
Fillmore
Houston
Legend
PINGP
Other Minority Population
County Boundary
State Boundary
0 5 10 20 30 40
Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.5-4 Other Minority Population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Buffalo
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Trempealeau
Blue Earth
Waseca
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Freeborn
Mower
Fillmore
Houston
Legend
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Multi-racial Minority Population
County Boundary
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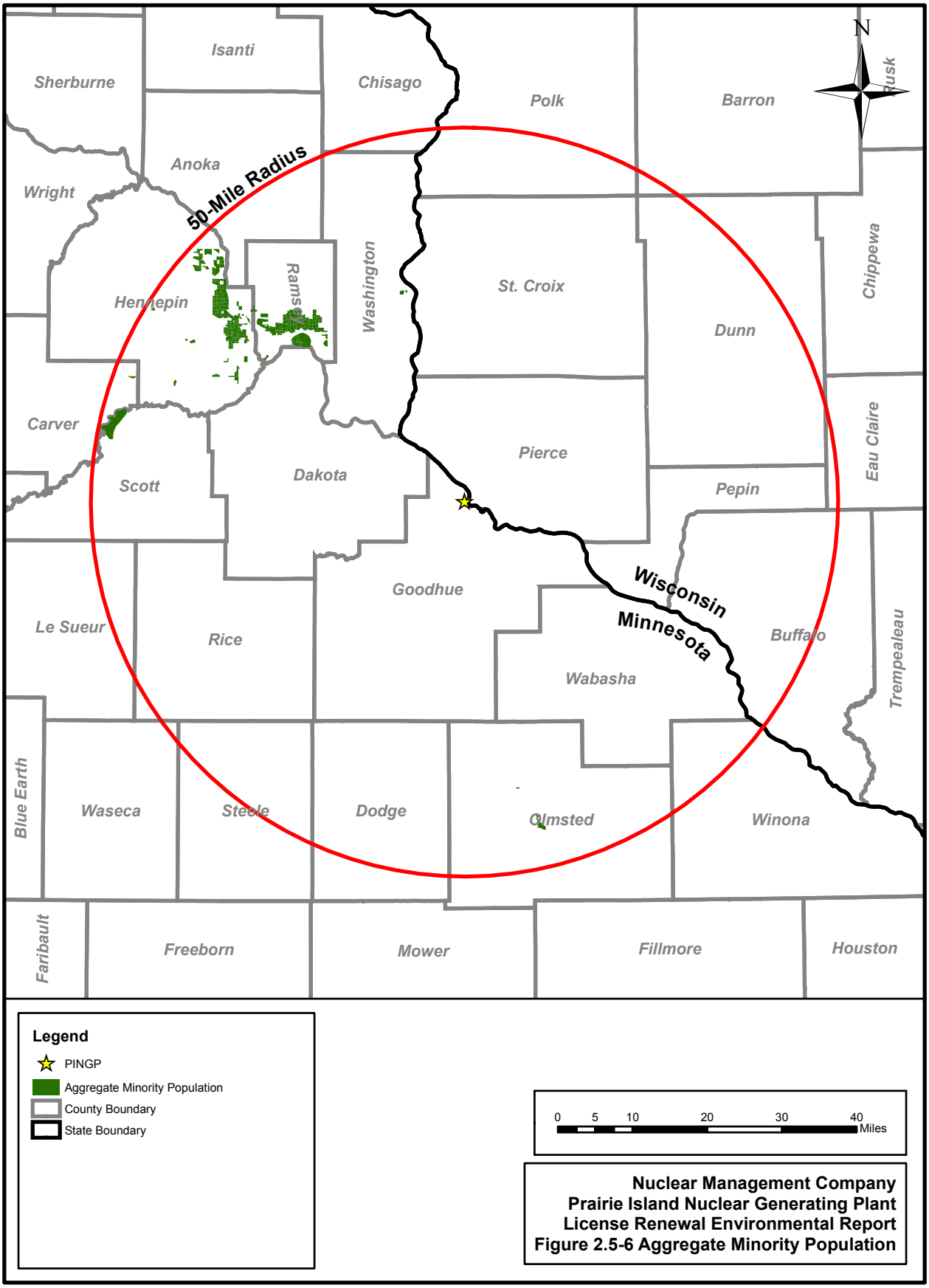
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.5-5 Multi-racial Minority Population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Aggregate Minority Population
County Boundary
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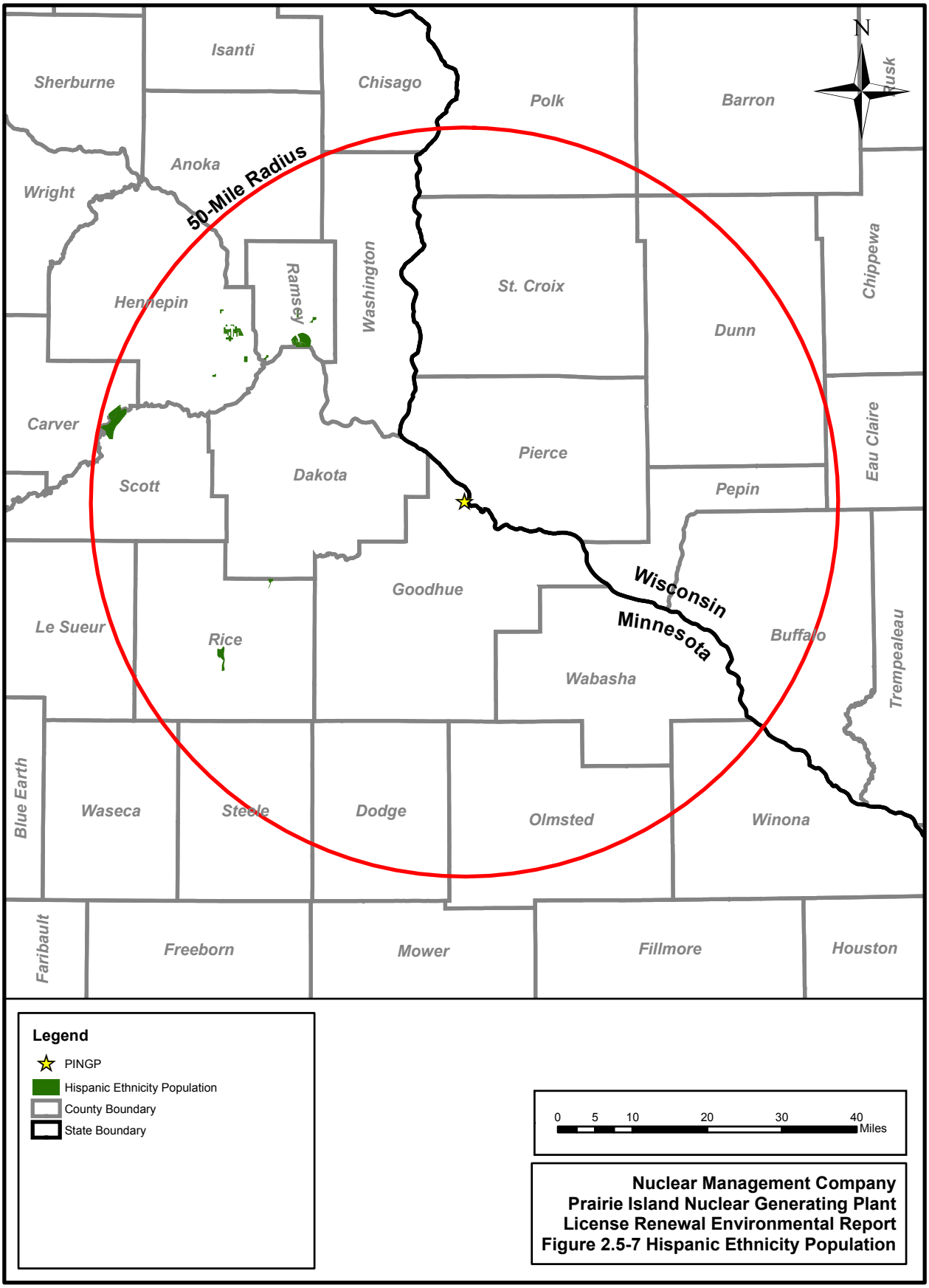
License Renewal Environmental Report
Figure 2.5-6 Aggregate Minority Population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PINGP
Hispanic Ethnicity Population
County Boundary
State Boundary
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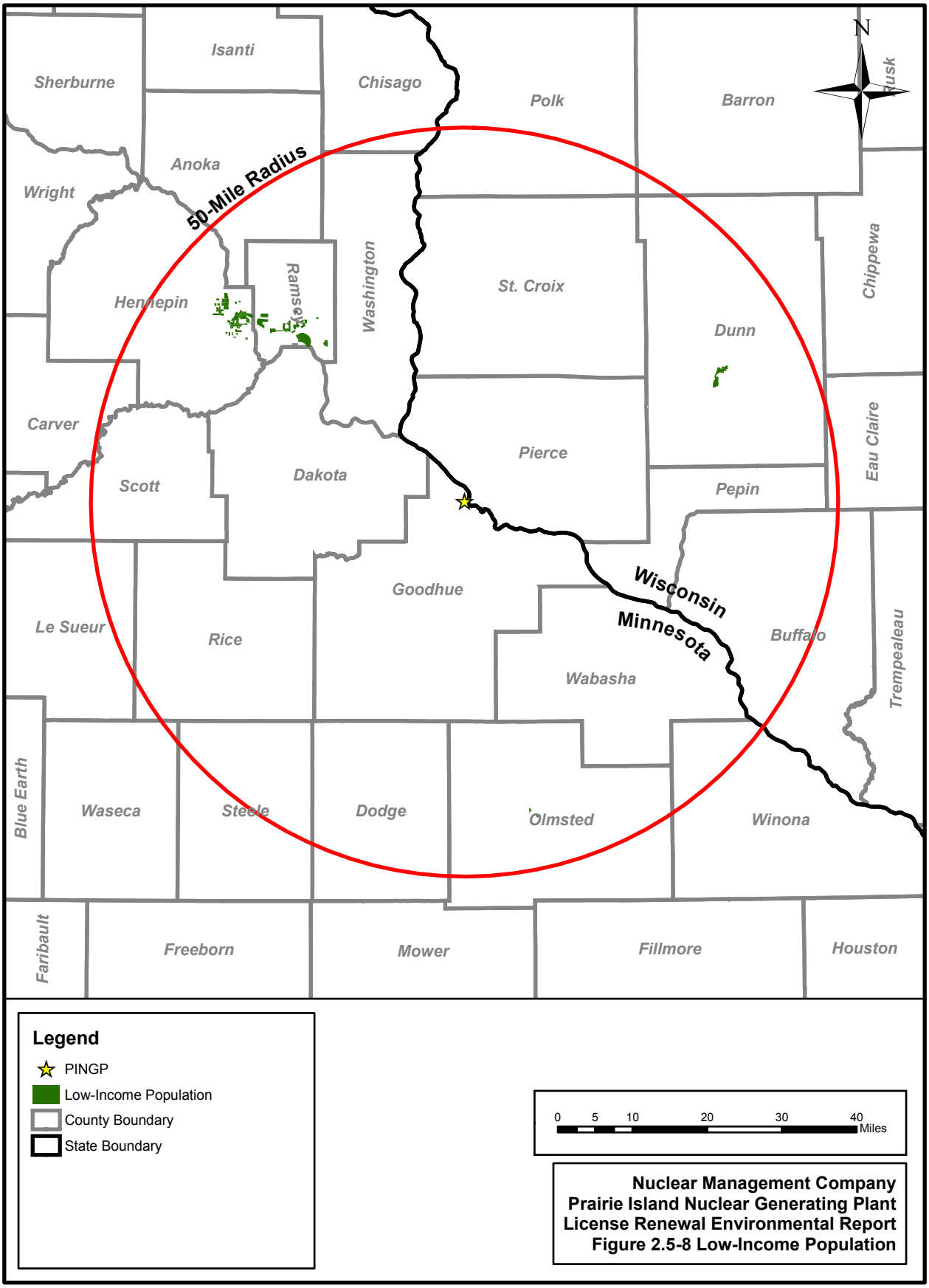
Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.5-7 Hispanic Ethnicity Population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Eau Claire
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Wisconsin
Minnesota
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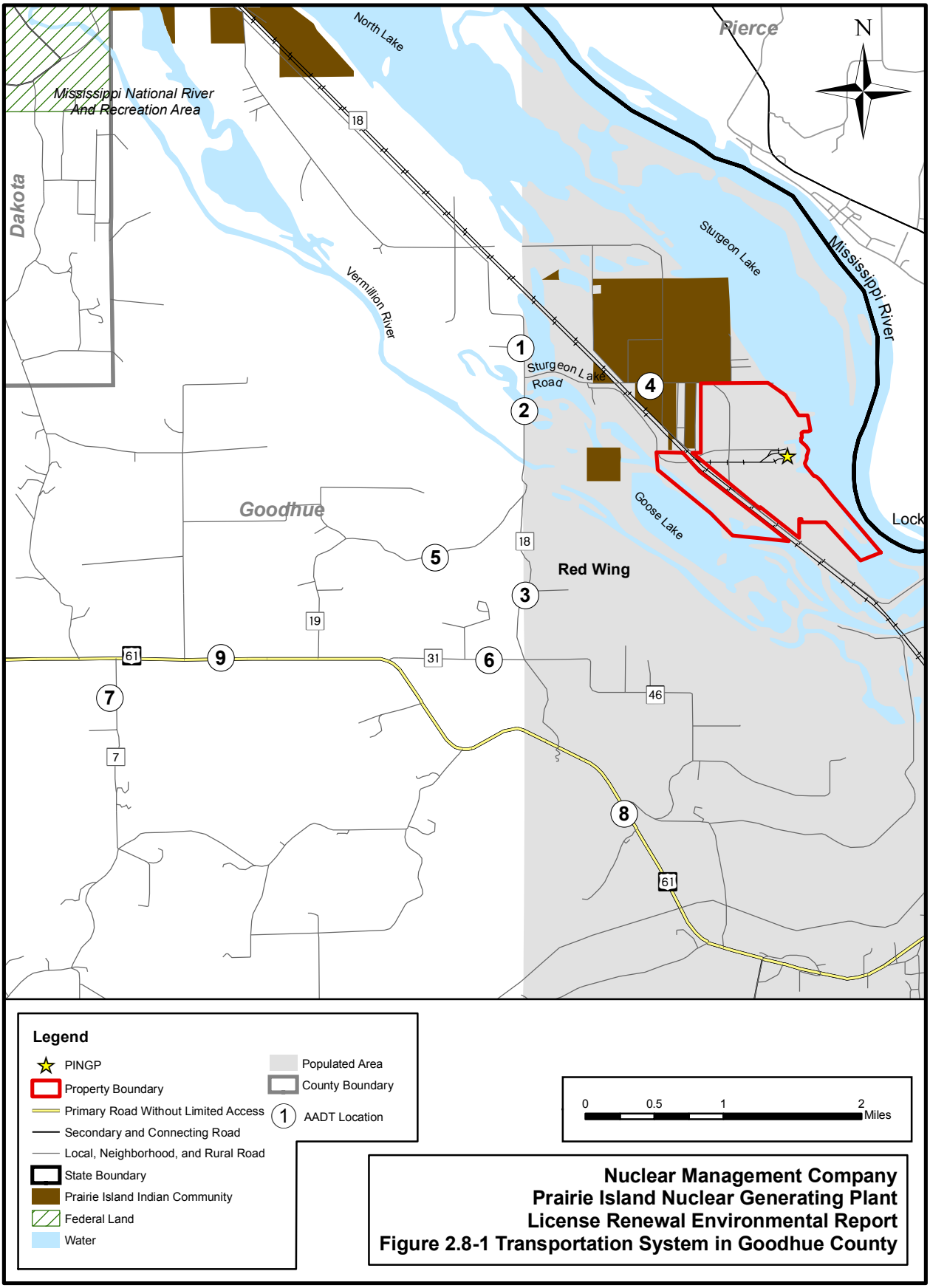
Buffalo
Wabasha
Trempealeau
Blue Earth
Waseca
Steele
Dodge
Olmsted
Winona
Faribault
Freeborn
Mower
Fillmore
Houston
Legend
PINGP
Low-Income Population
County Boundary
State Boundary
0 5 10 20 30 40
Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.5-8 Low-Income Population


North Lake
Pierce
N
Mississippi National River
And Recreation Area
Dakota
18
Vermillion River
Sturgeon Lake
Mississippi River
1
Sturgeon Lake
Road
4
2
Goodhue
Goose Lake
Lock
5
18
Red Wing
3
19
61
9
31
6
7
46
7
8
61
Legend
PINGP
Property Boundary
Primary Road Without Limited Access
Secondary and Connecting Road
Local, Neighborhood, and Rural Road
State Boundary
Prairie Island Indian Community
Federal Land
Water
Populated Area
County Boundary
1 AADT Location
0 0.5 1 2 Miles
Nuclear Management Company
Prairie Island Nuclear Generating Plant
License Renewal Environmental Report
Figure 2.8-1 Transportation System in Goodhue County

2.12 REFERENCES

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

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