# Kewaunee Power Station

# Applicant's Environmental Report

# Operating License Renewal Stage

# TABLE OF CONTENTS

# TABLE OF CONTENTS

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AQCR | Air Quality Control Region |
| ATC | American Transmission Company |
| BACT | Best Available Control Technology |
| Btu | British thermal unit |
| CAIR | Clean Air Interstate Rule |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| CSA | Combined Statistical Area |
| CWA | Clean Water Act |
| DECON | decontamination and dismantlement |
| DEK | Dominion Energy Kewaunee, Inc. |
| DSM | demand-side management |
| FES | Final Environmental Statement |
| $ft^3$ | cubic foot |
| GEIS | Generic Environmental Impact Statement |
| GIS | geographic information system |
| gpd | gallons per day |
| gpm | gallons per minute |
| IGCC | Integrated Gasification Combined Cycle |
| IPA | integrated plant assessment |
| ISO rating | International Standards Organization rating at standard atmospheric conditions of 59°F, 60 percent relative humidity, and 14.696 pounds of atmospheric pressure per square inch |
| $km^2$ | square kilometers |
| KNPP | Kewaunee Nuclear Power Plant |
| KPS | Kewaunee Power Station |
| kV | kilovolt |
| kWh | kilowatt hour |
| LAER | Lowest Achievable Emission Rate |
| lb | pound |
| MDC | Maximum Dependable Capacity |
| MeSA | Metropolitan Statistical Area |
| MiSA | Micropolitan Statistical Area |
| MISO | Midwest Independent Transmission System Operator |
| MM | million |

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| MW | megawatt |
| MWe | megawatts-electrical |
| MWt | megawatts-thermal |
| NAAQS | National Ambient Air Quality Standards |
| NMFS | National Marine Fisheries Service |
| NOV | notice of violation |
| NOx | nitrogen oxides |
| NPDES | National Pollutant Discharge Elimination System |
| NRC | Nuclear Regulatory Commission |
| NSPS | New Source Performance Standards |
| PBNP | Point Beach Nuclear Plant |
| PM | particulate matter |
| $PM_{10}$ | particulates with a diameter less than 10 microns |
| $PM_{2.5}$ | particulates with a diameter less than 2.5 microns |
| PPA | power purchase agreements |
| SAFSTOR | safe storage of the stabilized and defueled facility |
| SAMA | Severe Accident Mitigation Alternative |
| SHPO | State Historic Preservation Officer |
| SMITTR | Surveillance, monitoring, inspections, testing, trending, and recordkeeping |
| $SO_2$ | sulfur dioxide |
| S.W.O.T. | Strengths, Weaknesses, Opportunities, and Threats |
| TFM | 3-triflouromethyl-4-nitrophenol |
| USC | Ultrasupercritical |
| USCB | U.S. Census Bureau |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| WDNR | Wisconsin Department of Natural Resources |
| WisAHRD | Wisconsin Archaeological and Historic Resource Database |
| WP&L | Wisconsin Power and Light Company |
| WPDES | Wisconsin Pollutant Discharge Elimination System |
| WPSC | Wisconsin Public Service Corporation |
| WSRP | Wisconsin Shared Revenue Program |
| WTE | waste-to-energy |
| WWTF | Wastewater Treatment Facility |
| yr | year |

# 1.0 INTRODUCTION

## 1.1 Purpose of and Need for Action

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. Dominion Energy Kewaunee, Inc. (DEK) owns and operates Kewaunee Power Station (KPS), a one-unit generating plant, pursuant to NRC Operating License DPR-43. The current operating license will expire on December 21, 2013.

DEK has prepared this environmental report in conjunction with its application to NRC to renew the KPS operating license, as provided by the following NRC regulations:

Title 10, Energy, Code of Federal Regulations (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) and

Title 10, Energy, CFR, Part 51, Environmental Protection Requirements 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)].

NRC has defined the purpose and need for the proposed action, the renewal of the operating licenses for nuclear power plants such as KPS, as follows:

> "…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…" (NRC 1996a, pg. 28472)

The renewal operating license would allow for an additional 20 years of plant operation beyond the current KPS licensed operating period of 40 years.

## 1.2 Environmental Report Scope and Methodology

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. This appendix to the KPS license renewal application fulfills that requirement. In determining what information to include in the KPS environmental report, DEK 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 1996a, NRC 1996b, NRC 1996c, and NRC 1999a)
- Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS) (NRC 1996d and NRC 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)

DEK has prepared Table 1-1 to verify conformance with regulatory requirements. Table 1-1 indicates where the environmental report responds to each requirement of 10 CFR 51.53(c). In addition, each responsive section in the document is prefaced with the regulatory language and applicable language from supporting documents.

## 1.3 Kewaunee Power Station Licensee and Ownership

KPS is owned and operated by Dominion Energy Kewaunee, Inc., a wholly owned and indirect subsidiary of Dominion Resources, Inc. Prior to July 2005 the plant was owned by Wisconsin Public Service Corporation (WPSC) and Wisconsin Power and Light Company (WP&L). The plant received its operating license in December 1973.

In 1999, the Wisconsin legislature passed Act 9, which encouraged utilities with service areas in Wisconsin to transfer ownership and operation of transmission assets to an independent transmission company. In response to the Act, WPSC and WP&L transferred ownership of their transmission lines to the American Transmission Company (ATC). ATC is a for-profit, multi-state, transmission-only company, which owns, plans, maintains, monitors, and operates electric transmission equipment (ATC 2007). ATC is now responsible for operation and maintenance of the transmission lines that connect KPS to the electric power grid.

## Table 1-1. Environmental Report Responses to License Renewal Environmental Regulatory Requirements

| Regulatory Requirement | Responsive Environmental Report Section(s) | |
|---|---|---|
| 10 CFR 51.53(c)(1) | Entire Table | |
| 10 CFR 51.53(c)(2), Sentences 1 and 2 | 3.0 | 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 | 7.2.2 | 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 |
| | 7.2.2 | 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) | 4.1 | Water Use Conflicts (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a Small River with Low Flow) |
| | 4.6 | Groundwater Use Conflicts (Plants Using Cooling Towers Withdrawing Makeup Water from a Small River) |
| 10 CFR 51.53(c)(3)(ii)(B) | 4.2 | Entrainment of Fish and Shellfish in Early Life Stages |
| | 4.3 | Impingement of Fish and Shellfish |
| | 4.4 | Heat Shock |
| 10 CFR 51.53(c)(3)(ii)(C) | 4.5 | Groundwater Use Conflicts (Plants Using >100 gpm of Groundwater) |

## Table 1-1. Environmental Report Responses to License Renewal Environmental Regulatory Requirements (Continued)

| Regulatory Requirement | Responsive Environmental Report Section(s) | |
|---|---|---|
| | 4.7 | Groundwater Use Conflicts (Plants Using Ranney Wells) |
| 10 CFR 51.53(c)(3)(ii)(D) | 4.8 | Degradation of Groundwater Quality |
| 10 CFR 51.53(c)(3)(ii)(E) | 4.9 | Impacts of Refurbishment on Terrestrial Resources |
| | 4.10 | Threatened or Endangered Species |
| 10 CFR 51.53(c)(3)(ii)(F) | 4.11 | Air Quality During Refurbishment |
| 10 CFR 51.53(c)(3)(ii)(G) | 4.12 | Microbiological Organisms |
| 10 CFR 51.53(c)(3)(ii)(H) | 4.13 | Electric Shock from Transmission-Line-Induced Currents |
| 10 CFR 51.53(c)(3)(ii)(I) | 4.14 | Housing Impacts |
| | 4.15 | Public Utilities: Public Water Supply Availability |
| | 4.16 | Education Impacts from Refurbishment |
| | 4.17 | Offsite Land Use |
| 10 CFR 51.53(c)(3)(ii)(J) | 4.18 | Transportation |
| 10 CFR 51.53(c)(3)(ii)(K) | 4.19 | Historic and Archaeological Resources |
| 10 CFR 51.53(c)(3)(ii)(L) | 4.20 | 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 | 2.6.2 | Minority and Low-Income Populations |

> = greater than
gpm = gallons per minute

## 1.4 References

ATC (American Transmission Company) 2007. *Reliability: 2006 Annual Report American Transmission Company*. Available online at http://www.atcllc.com/documents/2006_AR_final.pdf. Accessed November 26, 2007.

NRC (U.S. Nuclear Regulatory Commission) 1996a. *Environmental Review for Renewal of Nuclear Power Plant Operating Licenses.* Federal Register, Vol. 61, No. 109, pp. 28467 – 28497. June 5.

NRC (U.S. Nuclear Regulatory Commission) 1996b. *Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Correction.* Federal Register, Vol. 61, No. 147, pp. 39555 – 39556. July 30.

NRC (U.S. Nuclear Regulatory Commission) 1996c. *Environmental Review for Renewal of Nuclear Power Plant Operating Licenses*. Federal Register, Vol. 61, No. 244, pp. 66537 – 66554. December 18.

NRC (U.S. Nuclear Regulatory Commission) 1996d. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)*. Volumes 1 and 2. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

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. Washington, DC. May. NRC ADAMS Accession Number 9606180288.

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. Washington, DC. May. NRC ADAMS Accession Numbers 9606180325 and 9606180333.

NRC (U.S. Nuclear Regulatory Commission) 1999a. *Changes to Requirements for Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Final Rules.* Federal Register, Vol. 64, No. 171, pp. 48496 – 48507. September 3.

NRC (U.S. Nuclear Regulatory Commission) 1999b. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* 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. Washington, DC. August. NRC ADAMS Accession Number ML040690720.

# 2.0 SITE AND ENVIRONMENTAL INTERFACES

## 2.1 Location and Features

Kewaunee Power Station (KPS) is a one-unit pressurized-water reactor power plant located on the west-central shore of Lake Michigan in Kewaunee County, Wisconsin, approximately 30 miles east-southeast of Green Bay and 8 miles south of the City of Kewaunee (KPS 2007a). Figure 2.1-1 and Figure 2.1-2 are KPS 50-mile and 6-mile vicinity maps, respectively.

The KPS site boundary encompasses approximately 908 acres. With the exception of a highway traversing the site (State Route 42), town roads, and the Sandy Bay Cemetery, a 1.13-acre cemetery that is owned and maintained by the Town of Carlton, all property within the site boundary is owned and operated by Dominion Energy Kewaunee, Inc. (DEK) (Figure 2.1-3) (KPS 2007a). Structures, facilities, and parking lots occupy approximately 60 acres. Approximately 450 acres are used for agriculture. The balance remains in a mixture of woods, fields in various stages of succession, small wetlands and watercourses, and open areas. The site includes approximately two miles of continuous frontage on the western shore of Lake Michigan. Site structures include: a reactor containment and associated auxiliary, service, turbine, warehouse, and office buildings; switchyard; sewage treatment plant, screenhouse, and cooling water intake and discharge structures; and independent spent fuel storage installation. Section 3.1 describes key features of KPS.

The area within six miles of KPS includes portions of Kewaunee and Manitowoc Counties and is largely rural, characterized by farmland, woods, and small residential communities. The station is located in the town of Carlton. Besides the Cities of Green Bay and Kewaunee, KPS is approximately 17.5 miles north-northeast of Manitowoc, 42 miles north-northeast of Sheboygan, and 43 miles east of Appleton (Figure 2.1-1). The Oneida Indian Reservation is located on the western edge of Green Bay approximately 35 miles northwest of the plant.

Overall ground surface at the site is gently rolling to flat, with elevations varying from 10 to 100 feet above the level of Lake Michigan. The land surface slopes gradually toward the lake from the higher glacial moraine areas west of the site. At the northern and southern edges of the site, bluffs face the Lake Michigan shore; near the center of the site, the land slopes to a sandy beach (KPS 2007a). Historically, coastline recession along the Wisconsin shoreline has ranged up to 12 feet per year (AEC 1972). KPS has provided riprap to control further recession of the shoreline at the site (KPS 2007a).

KPS was built near the eastern edge of an area where a vast forest was buried by the Valderan glacier about 12,400 years ago. The Two Creeks Buried Forest unit of the Ice Age National Scientific Reserve is located approximately one mile south of the KPS property. The Reserve is a national park system affiliated area, and provides public access to remnants of the buried forest. Figure 2.1-2 shows the location of this recreational area. Door County, just north of Kewaunee County, was named one of the top ten vacation destinations in North America (Door County 2008). The Point Beach State Forest is located approximately 8 miles south of the KPS property and offers fishing, boating, hiking, camping, and picnicking. Figure 2.1-1 shows the location of these recreational areas.

A few industrial areas are located south of the plant site in the cities of Two Rivers and Manitowoc and to the west in the Fox River Valley. The nearest industrial site is the Point Beach Nuclear Plant (PBNP), located approximately 4.5 miles south of KPS (KPS 2007a). Figure 2.1-2 shows the location of the PBNP site and Section 2.12 provides additional information about the PBNP site.

## 2.2 Aquatic Ecological Communities

### Overview of Lake Michigan Ecosystem

KPS lies on the western shore of Lake Michigan, the only Great Lake that lies entirely within the boundaries of the United States. Lake Michigan is the second largest of the Great Lakes by volume [1,180 cubic miles; 4,900 cubic kilometers] and third largest by area [22,300 square miles ($mi^2$); 57,800 square kilometers ($km^2$)]. It drains an area of 45,600 $mi^2$ (118,000 $km^2$). (EPA 1995) Major tributaries of Lake Michigan include the Fox-Wolf, Grand, and Kalamazoo Rivers. Lake Michigan is joined to Lake Huron at the Straits of Mackinac; thus, the two basins are hydrologically connected. The northern part of the Lake Michigan watershed is agricultural/forested and sparsely populated, except for the Fox River Valley that drains into Green Bay. Green Bay receives wastes from the world's largest concentration of pulp and paper mills. The southern part of Lake Michigan is among the most urbanized areas in the Great Lakes region, containing the Milwaukee and Chicago metropolitan areas.

The water quality of Lake Michigan has been degraded by industrial, municipal, agricultural, navigational, and recreational water users for more than 150 years. While major point sources of pollutants have been curtailed since the enactment of the Clean Water Act, the lake continues to receive pollutants from regulated point sources, non-point source discharges, and from the atmosphere. The United States and Canada, in consultation with state and provincial governments, are working to "…restore and maintain the chemical, physical, and biological integrity of the water of the Great Lakes Basin Ecosystem" under the provisions of the Great Lakes Water Quality Agreement, signed in 1972 and amended in 1987 (EPA 2006a).

As part of this effort, the Lake Michigan Technical Committee developed a Lake Michigan Lakewide Management Plan (EPA 2006a) that describes the current state of lake habitats (open waters, wetlands, tributary streams), identifies areas of concern, and recommends future steps that should be taken to protect and restore Lake Michigan ecosystems. These recommendations range from controls on ballast water to remediation of contaminated (sediment) sites to the implementation of Total Maximum Daily Load strategies for tributary streams. The Lake Michigan Lakewide Management Plan lists a number of areas in which improvements have been made (e.g., reduction of point-source pollutants entering the basin and protection and restoration of wetlands), but notes that other areas still need improvement (e.g., deposition of toxic air pollutants in the watershed and non-point source pollutants). The Lake Michigan Lakewide Management Plan may be the most comprehensive source of information available on the current state of "health" of the Lake Michigan ecosystem.

### Aquatic Communities

The *Final Environmental Statement Related to Operation of Kewaunee Nuclear Power Plant* (FES) (AEC 1972) describes the aquatic communities of Lake Michigan, a deep oligotrophic lake with relatively low primary productivity. It also summarizes monitoring studies conducted in the KPS vicinity in the 1960s and 1970s. The FES is a source of site-specific historical information, which will be discussed in this environmental report in the context of long-term changes in Lake Michigan aquatic communities.

The FES notes that relatively few benthic organisms were found in pre-operational surveys of near-shore areas at the KPS site (AEC 1972, pg. II-46). Diversity and numbers of benthic organisms were limited by the substrate type (sand over hard clay) and the absence of aquatic vegetation along the shore and lake bottom. Chironomids dominated (grab) samples. Smaller numbers of oligochaetes and amphipods were collected.

Since that time, nearshore benthic communities in Lake Michigan have undergone dramatic changes as a result of reductions in nutrient loads (phosphorus in particular) and the establishment of the non-native zebra mussel (*Dreissena polymorpha*). Higher nutrient loads in the 1950s and 1960s were associated with higher productivity and higher densities of amphipods, oligochaetes, and sphaeriids (Nalepa et al. 1998). They were also responsible for blooms of Cladophera, a filamentous green alga. Cladophera became a nuisance when large mats of the alga broke free from the lake bottom and were deposited on the shore, causing a strong odor and interfering with recreational use of the lake. The algal blooms have recurred in recent years (WDNR 2007a). Lower nutrient loads, the result of Clean Water Act-mandated changes and National Pollutant Discharge Elimination System programs that reduced point and non-point source pollutants in the 1970s and 1980s, produced declines in oligochaetes and sphaeriids throughout southern Lake Michigan. Historically high densities of the amphipod *Diporeia*, an important food for lake whitefish (*Coregonus clupeaformis*) and a number of forage species, declined as zebra mussel densities increased in the 1990s (Nalepa et al. 1998). Large populations of zebra mussels filter feeding in nearshore waters appear to reduce the amount of food available to *Diporeia*, a surface-feeding detritivore, and limit its numbers.

The FES (AEC 1972) observes that inshore waters of Lake Michigan during preoperational monitoring for KPS were characterized by greater diatom populations and a different mix of diatom species than offshore waters, and relates these differences to nutrient enrichment from land runoff and waste effluents in the region. Of 104 species of phytoplankton collected in the KPS area, the diatom *Fragilaria pinnata* was most abundant, followed by *Fragilaria crotonensis*, *Stephanodiscus hantzschii*, and *Synedra acus*. Blue-green algae were second in abundance to diatoms. (AEC 1972)

Makarewicz, Lewis, and Bertram (1994) examined trends in phytoplankton abundance in Lake Michigan from 1983 – 1992 (and, to a limited extent, historical trends) and related them to "top-down mediated changes" observed in the fish and zooplankton communities. Diatoms dominated spring samples in all years but one (1989), making up 69 percent (1983) to 95 percent (1986) of total algal biomass. Depending on zooplankton community composition, summer samples were dominated by diatoms, green algae, chrysophytes (golden-brown algae), and pyrrophytes (dinoflagellates; unicellular flagellated algae). As a general rule, the presence of the large-bodied zooplankter *Daphnia* resulted in increasing abundance of colonial algae and filamentous algae, while low numbers of *Daphnia* were associated with small, unicellular forms.

Although copepods, especially *Cyclops* and *Diaptomus*, tended to dominate Lake Michigan zooplankton communities at the time preoperational surveys were conducted at KPS, cladocerans were important seasonally. In late summer and early fall, the cladoceran *Bosmina longirostris* comprised 50 to 80 percent of the zooplankton community. Two species of *Daphnia*, another cladoceran, were also common in samples. (AEC 1972)

Makarewicz, Lewis, and Bertram (1994) also noted that large zooplankton (large cladocerans, calanoid copepods, and cyclopoid copepods) became more abundant in 1983 – 1985 after a "sharp decline" in the abundance of the planktivorous alewife (*Alosa pseudoharengus*) in 1982 and 1983. The reduction in alewife predation pressure also may have played a role in the establishment of *Bythotrephes cederstroemi*, a large cladoceran that preys on other zooplankton. Native to northern Europe, this species first appeared in the Great Lakes in 1984. It was first identified in Lake Michigan samples in 1986 and was consistently present in summer samples from 1987 – 1992 (Makarewicz, Lewis, and Bertram 1994). Aside from possible impacts on zooplankton populations (with which it competes and on which it preys), *Bythotrephes cederstroemi* (now commonly known as the spiny water flea) also competes with larval fish for food, with unknown consequences.

Fish populations in Lake Michigan have been shaped by the introduction of a number of aquatic species, some accidentally introduced and others planted by state and federal fish and game agencies. Several Atlantic Coast species, the sea lamprey (*Petromyzon marinus*) and the alewife being the most important, entered Lake Michigan via the Erie Barge Canal (which connects the Hudson River and Lake Erie) and the Welland Canal (which connects Lake Ontario and Lake Erie). Both species have had a devastating effect on native fish populations, including lake herring, whitefish, and lake trout, all of which were commercially and/or recreationally important prior to the arrival of these exotics.

The sea lamprey, an anadromous species within its native range, first appeared in the lower Great Lakes (Lake Ontario) in the 1830s, having made its way to Lake Ontario by way of man-made shipping canals. It invaded Lake Erie via the improved Welland Canal, circa 1920, subsequently moved into Lake Huron in 1932, and into Lake Michigan in 1936 (USGS 2007). The sea lamprey, a primitive predaceous species, attaches to large pelagic fishes by rasping holes in the sides of fish and digesting blood and tissues of the prey. The aftermath of the attack is usually death for the prey, either directly from the loss of fluids or indirectly from secondary infection of the wound. They remain attached until they are satiated or the host dies. Fish that survive are usually in poor condition and may take years to recover. Lake trout, burbot, and lake whitefish populations were devastated by lamprey predation in the 1940s and 1950s. Sea lamprey predation, in combination with other factors (overfishing, in particular) led to the extinction of three native coregonids, the longjaw cisco (*Coregonus alpenae*), the deepwater cisco (*Coregonus johannae*), and the blackfin cisco (*Coregonus nigripinnis*). (Fuller, Nico, and Maynard 2007)

The weak link in the life cycle of the lamprey is the larval stage. Ammocoetes larvae are restricted to streams, where they may be killed by lampricides. Chemicals that were effective in controlling lamprey larvae were developed in the 1950s and 1960s, chief among them 3-triflouromethyl-4-nitrophenol (TFM), discovered in 1957. These chemicals, combined with physical and electrical barriers to spawning streams, have been effective in controlling sea lampreys in the Great Lakes and have permitted the partial recovery of some fish populations previously reduced to near-extinction. Although TFM is largely non-toxic to other fish and wildlife, resource agencies continue to search for alternatives, because of the high cost of lampricides and public concern about the use of chemical pesticides.

The alewife, which first appeared in Lake Michigan in 1949, increased in abundance as its main predators (lake trout and burbot) were weakened or eliminated by sea lampreys.

Alewife populations exploded in the 1950s and, by 1967, made up an estimated 85 percent of fish biomass in Lake Michigan. (Peeters 1998) The expansion of alewife populations in Lake Michigan and other Great Lakes contributed to the decline of native planktivorous fishes, including the emerald shiner, the whitefish, the lake herring, and a number of chub species (Peeters 1998; Fuller, Maynard, and Raikow 2007).

In the mid-1960s, massive die-offs of alewives created a nuisance and potential health risks as they washed on to Lake Michigan's shores. The exact cause of these die-offs is unknown, but they may be related to sudden temperature changes associated with weather changes or upwellings, along with a sensitivity to osmotic stress associated with life entirely in fresh water (Moy 2001). Alewife die-offs still occur periodically in Lake Michigan.

In an effort to control alewife and rainbow smelt numbers and improve sport fishery, American and Canadian fish and game agencies in the mid-1960s began stocking several Pacific trout and salmon species (steelhead, coho salmon, chinook salmon) and brown trout in Lake Michigan (Crawford 2001). These trout and salmon flourished and, by the 1970s, Lake Michigan fishermen were landing large numbers of large trout and salmon. Catch rates peaked in the mid- to late-1980s, and then leveled off, as alewife numbers declined.

The *FES related to operation of the Kewaunee Nuclear Power Plant* (AEC 1972) discusses the impact of the sea lamprey, the alewife, and indiscriminate stocking of exotic species on Lake Michigan's fish community and presents information on fish surveys conducted in 1971 in the area of the station. Fish collections in the area of the Kewaunee site prior to plant startup were dominated by alewife (73 percent of fish collected), lake trout (12 percent), and smelt (6 percent). Smaller numbers of lake chubs, yellow perch, white suckers, longnose dace, and slimy sculpin were also captured. Lake trout were by far the most abundant sport fish in the area of KPS in 1971. Most of these were five-year-old fish stocked in 1966 by state and federal resource agencies.

The Clean Water Act Section 316(a) Demonstration for KPS (NES 1976) presents catch data for sampling locations near the station over the 1971 – 1975 period, a period that included both preoperational (1971 through mid-1974) and operational (mid-1974 through 1975) data. Alewives dominated samples over the five-year period, comprising 65 percent of the total catch. They were followed in abundance by rainbow smelt (7 percent), yellow perch (6.9 percent), lake trout (6.7 percent), lake chub (4.2 percent), white sucker (2.6 percent), longnose dace (2.5 percent), and longnose sucker (1.6 percent). Aside from lake trout, other sport fish collected during the study were rainbow trout, brown trout, brook trout, coho salmon, and Chinook salmon. The authors of the 316(a) study assert that "virtually all trout and salmon in Lake Michigan are stocked fish" and suggest that the abundance of any of these species in a particular area is a function of stocking rates. (NES 1976, p. 155)

The KPS 316(a) Demonstration did not detect increased or decreased densities of fish (carp were the exception) in the vicinity of the station's discharge (NES 1976, p. 190) but noted that an extensive sport fishery for trout and salmon had developed since plant startup in the area of the plant's thermal discharge (NES 1976, p. 184). This stems from the fact that formal fish sampling emphasized gill netting near the lake bottom, whereas

sport fishermen pursuing trout and salmon (particularly those fishing from shore and small boats) tend to concentrate their efforts higher in the water column, near the surface.

The Demonstration also noted that any fish egg or larval mortality that might have occurred had no discernible effect on the existing fish community, and that data collected had demonstrated the thermal discharge caused no appreciable harm to the resources either inside or outside the discharge zone (NES 1976, p. 24).

Because of concern that alewife and smelt populations in Lake Michigan were not adequate to support the booming populations of trout and salmon, fisheries managers in states bordering Lake Michigan began reducing, in 1999, the numbers of Chinook salmon stocked. This appears to have allowed alewife and smelt populations to stabilize, while at the same time improving the growth and overall health of trout and salmon. The massive plantings of non-native salmonids (745 million fish were stocked between 1966 and 1998), originally viewed as an unqualified success, are now being reconsidered in view of disease outbreaks and possible impacts to native salmonid species (brook trout and lake trout). (Crawford 2001)

Abundance of adult alewives was generally high over the 1973 – 1981 period, was markedly lower over the 1982 – 1986 period, spiked in 1987 (reaching levels seen in the 1970s), fluctuated from 1988 – 1999, increased sharply in 2002, then declined until 2005 (Madenjian et al. 2006, Figure 2). Since 1988, alewife abundance and biomass have fluctuated with no consistent trend, as strong year classes (1998 in particular) produced short-term increases in number and poor year classes produced decreases in number. Although generally less abundant than in the 1950s and 1960s, the alewife remains the most important forage species for salmonids in Lake Michigan and continues to be the focus of fisheries managers. (Madenjian et al. 2006)

Three other forage species — bloater (*Coregonus hoyi*), rainbow smelt (*Osmerus mordax*), and deepwater sculpin (*Myoxocephalus thompsoni*) — are also important components of the Lake Michigan fish community. Bloaters, which are eaten by lake trout and salmon, exhibit density-dependent growth and recruitment. Abundance of bloaters was extremely high in Lake Michigan in the late 1980s, but declined steadily thereafter as high population densities apparently inhibited reproduction and recruitment. Rainbow smelt abundance was low throughout the 1990s and 2000s, with biomass measures approximately one-fourth of those observed in the 1980s. Deepwater sculpin population numbers fluctuated throughout the 1980s, 1990s, and 2000s. The deepwater sculpin and the closely-related slimy sculpin (*Cottus cognatus*) are eaten by juvenile lake trout and burbot. (Madenjian et al. 2006)

Taken as a group, biomass of Lake Michigan forage (prey) fishes increased from the 1970s to the late 1980s, peaked in 1989, and appear to have declined steadily since 1989 (Madenjian et al. 2006, Figure 11). The overall decline in forage fish biomass over the 1990s is due primarily to the decline in abundance of a single species, the bloater.

Although the top of the Lake Michigan food chain is now dominated by introduced species of trout and salmon, two top predators that had been largely eliminated by the 1960s appear to be recovering. The burbot (*Lota lota*), scarce in the 1960s, increased in abundance in the 1970s as a result of sea lamprey controls. Burbot abundance increased

throughout the 1980s and 1990s, peaking in 1997, but numbers have declined in recent years. (Madenjian et al. 2006) Lake trout, almost eliminated by the sea lamprey in the 1950s, have also increased in abundance, but numbers are maintained by stocking programs rather than by natural reproduction. Current efforts to restore the lake trout to Lake Michigan focus on stocking a variety of lake trout strains in offshore refuges that offer protection from commercial and recreational fishermen. Two to four million yearling lake trout are stocked annually in Lake Michigan.

The number of fish caught by sport fishermen in Wisconsin waters of Lake Michigan (including Green Bay) in 2005 were: lake trout – 14,139; rainbow trout – 48,490; brown trout – 27,489; Coho salmon – 59,244; Chinook salmon – 418,918; northern pike – 1,850; smallmouth bass – 8,471; yellow perch – 307,804; and walleye – 9,402 (Eggold and Zinutiez 2006).

As noted previously, non-native fish species have exerted a profound "top-down" effect on Lake Michigan and its aquatic communities in recent years. Large predatory fishes control abundance and distribution of forage species, such as alewife and rainbow smelt which, in turn, selectively crop zooplankton. The composition of the zooplankton community determines the composition of the phytoplankton community, which directly affects primary productivity and water clarity.

The zebra mussel, another exotic, has had an equally important effect on Lake Michigan's aquatic communities by consuming zooplankton and phytoplankton, fundamentally altering food webs, and displacing native mussels. The first zebra mussel was discovered in Lake Michigan in May 1988 in Indiana Harbor at Gary, Indiana. By 1990, adult zebra mussels had been found at multiple sites in the Chicago area and, by 1992, ranged along the eastern and western shoreline in the southern two-thirds of the lake, as well as Green Bay and Grand Traverse Bay. (Fleischer et al. 2001)

Because they are capable of filtering large volumes of water (up to one liter a day per adult), zebra mussels remove large numbers of phytoplankton and zooplankton from the water column. As a consequence, water clarity increases and plankton populations tend to decline precipitously. Secondary impacts can be positive (increased water clarity and increased light transmissivity allows submerged aquatic vegetation to become established in deeper waters) or negative (some species of fish and waterfowl feed heavily on zebra mussels, which bioconcentrate contaminants). The increased water clarity created by the zebra mussel is also believed to have played a role in the resurgence of Cladophora blooms, as the increased clarity has opened up more of the lake bottom as habitat for this green alga. Large mats of Cladophora pile up on the shores throughout Lake Michigan during the mid- to late-summer. (WDNR 2007a)

Zebra mussels displace native clams and unionid mussels by interfering with their feeding, growth, reproduction, and respiration, often directly by attaching to the clam or mussel. They prefer live unionids to dead unionids or rocks, which tends to focus and magnify the the impact of a zebra mussel invasion. Hundreds or thousands of zebra mussels may attach to a single large unionid. Because zebra mussels also have a high reproductive potential, they often move (or are carried) into an area and eliminate native unionid mussels in two to three years. (Schloesser, Nalepa, and McKie 1996)

## 2.3 Groundwater Resources

The subsurface soils at KPS consist of glacial drift which is primarily silty clay containing various amounts of sand, gravel, and seams of sand and silt. The glacial soils range in thickness from 60 to 150 feet thick. Bedrock directly underlying the glacial material consists of a moderately fractured Niagara Dolomite and is 350 to 600 feet thick and has a regional dip of 30 feet per mile to the east. Lower bedrock formations consist predominantly of sandstone and dolomite with subordinate layers of shale. The major source of groundwater at the site is precipitation falling locally and on higher terrain to the west. Groundwater depths across the site vary from 10 to 30 feet. The water table slopes to the east in the direction of Lake Michigan. (KPS 2007a, App. A)

There are three principal aquifers and one minor aquifer that lie beneath the site. The principal aquifers are the Glacial Outwash Aquifer, the Niagara Dolomite Aquifer, and the Deep Sandstone Aquifer. The Glacial Aquifer in the site area consists of clayey soils interbedded with irregular outwash (sands and gravel) aquifers. About half of the domestic wells located near the site obtain water from these sand and gravel aquifers. The most persistent aquifer within this unit is located at the base of the glacial drift section and directly overlies the Niagara Dolomite. This aquifer is not continuous at the site. Water wells in this aquifer are typically rated at approximately 1,000 gallons per hour [17 gallons per minute (gpm)]. (KPS 2007a, App. A)

The Niagara Dolomite is the upper most bedrock aquifer formation along the Lake Michigan coastline in eastern Michigan. Borings at and near the site indicate that the rock is dense, moderately fractured, and does not contain extensive solution cavities. About half of the domestic water wells of the area are within the Niagara Aquifer and are rated at approximately 800 gallons per hour (13 gpm). Heavy pumping within this aquifer has been known to adversely affect nearby wells. Most of the domestic wells in the area penetrate the Niagara Dolomite 30 to 60 feet. The aquifer is recharged by water percolating through the overlying glacial drift and by more direct infiltration of surface runoff in the areas of higher elevation to the west where infiltration time is shorter. Wells pumped near the shoreline may induce flow from the lake to enter the aquifer. (KPS 2007a, App. A)

The Deep Sandstone aquifer is comprised of Cambrian age sandstones that exist between depths of 1,200 and 1,700 feet. This aquifer includes the Dresbach, Franconia, and Trempealeu formations. These formations are separated from the Niagara Dolomite by about 800 feet of impermeable shale and dolomite strata. Water in the deep sandstone aquifer at the site is generally too saline to be considered potable. Many wells drilled into this aquifer in the region exhibit artesian flow. (KPS 2007a, App. A)

In addition to the three principal aquifers, the St. Peter Sandstone aquifer, located just above the Deep Sandstone aquifer, is of limited groundwater use locally.

Although Lake Michigan is the source of potable water for the cities of Two Rivers and Green Bay and most of its suburbs, groundwater provides potable water for smaller towns and rural residences in the vicinity of the site. Virtually all rural and village residents and at least nine municipalities within 20 miles of the site draw their water supply from groundwater aquifers (KPS 2007a, WDNR 2007b). These municipalities are listed in Table 2.3-1. Within six miles of the KPS site are four high capacity wells at the Point Beach Nuclear

Power Plant located south of KPS. These wells range in depth from 257 to 480 feet deep and have a total design yield of 210 gpm, but have a total average pumpage rate of 11,810 gallons per day (8.2 gpm). (NMC 2004, WDNR 2007c)

Two groundwater wells are used at KPS. The wells, BE601 and BE602, are at installed depths of 310 feet and 320 feet, respectively, and are used for cooling, stand-by cooling, and for the plant equipment water system. During the period from 1977 through 1989**,** the total average annual pumping rate for both wells was 3,339,176 gallons per year (6.4 gpm) (WDNR 2007d). The plant's groundwater withdrawal rate increased during 1995 when the plant's equipment water system became operational. Groundwater use as measured from 2006 through 2007 ranges from approximately 25 to 61 gpm (DEK 2008a).

## 2.4 Critical and Important Terrestrial Habits

KPS is located in the southeastern corner of the town of Carlton in Kewaunee County, Wisconsin. The total plant site encompasses 908 acres, and is bisected by Wisconsin State Route 42. Approximately 450 acres of the plant site, mostly west of Route 42, is leased to area farmers. Overall, the site slopes from approximately 100 feet above Lake Michigan to the shore, with steep bluffs along the northern and southern shorelines and more gradual sloping along the center shoreline where the power plant is located. The eastern boundary of the site is comprised of approximately two miles of Lake Michigan shoreline. Three creeks and one drainage ditch drain the KPS lands to the lake.

The KPS site was primarily farmland prior to plant construction and is now a mosaic of different habitat types. As stated above, approximately 50 percent of the site is leased farmland. The remainder of the site is a combination of small forested plots, fields in various stages of succession, small wetlands and water courses, and approximately 60 acres of industrial plant complex; including the facility buildings, parking areas, and switchyard.

Predominant trees associated with the stream drainages and woodlots include quaking aspen (*Populus tremuloides*), northern white cedar *(Thuja occidentalis*), eastern cottonwood (*Populus deltoides*), black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), American beech (*Fagus grandifolia*), and paper birch (*Betula papyrifera*). The woodlots are left in a natural state by KPS and are not actively managed. They provide food, cover, and nesting sites for a variety of wildlife species. The red osier dogwood (*Cornus stolonifera*), an important source of food and cover for numerous species of birds and mammals, is a prominent low-story shrub in these wooded areas. The Joe Krofta Memorial Forest, named for a previous landowner, is a 15-acre portion of the site planted in various tree species located in the southern half of KPS. It was previously used as an outdoor classroom by local schools, but access to this site is now restricted for security.

The shoreline of Lake Michigan on the KPS property consists mostly of narrow (0 to 100-feet-wide) lightly- to moderately-vegetated beaches leading from the water's edge to bluffs/cliffs created by years of fluctuating lake-level induced erosion. In the late 1980s, KPS placed rip-rap along the edges of the bluffs along the southern end of the site to combat cliff erosion. South of the plant, the beach is either narrow or non-existent; north of the plant, bare to moderately vegetated beach width varies from 20 feet to 80 feet, with most of it below 50 feet. The area between this beach width and the foot of the cliff is generally heavily vegetated with a mixture of low-lying growth, shrubs, and trees. The broadest portions of the beach (>80 feet) occur near the plant site where the slope to the lake is more gradual.

The terrestrial wildlife species that occur at KPS and the surrounding areas are those typically found in similar habitats throughout Wisconsin. Common mammals observed in recent wildlife surveys (KPS 2007b) included white-tailed deer (*Odocileus virginianus),* eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), fox squirrel (*Sciurus niger*), eastern chipmunk (*Tamias striatus*), and short-tailed shrew (*Blarina brevicauda*). Common avian species observed on KPS include red-winged blackbird (*Agelaius phoeniceus*), European starling (*Sturnus vulgaris*), American goldfinch (*Carduelis tristis*), clay-colored sparrow (*Spizella pallida*), American robin *(Turdus migra-*

*torius)*, ring-billed gull (*Larus delawarensis*), Canada goose (*Branta canadensis*), and mallards (*Anas platyrhynchos*) (KPS 2007b). Bank swallows (*Riparia riparia*) nest in the cliffs along the Lake Michigan shore. Additionally, several common amphibian species, including spring peepers (*Pseudacris crucifer*), green frogs (*Rana clamitans*), wood frogs (*Rana sylvatica*), American toads (*Bufo americanus)*, and chorus frogs (*Pseudacris triserata*) were observed or heard on the KPS site during recent surveys (KPS 2007b).

Section 3.1.6 describes the transmission lines built to connect KPS to the transmission grid system. As discussed in Section 1.3, ATC is the owner and operator of those transmission lines. These lines will remain an integral part of the transmission system, irrespective of the renewal of the KPS operating license. The principal land use categories of the areas crossed by transmission lines are agricultural (84 percent), woodland (7 percent), scrubland (7 percent) and wetlands (2 percent) (Section 3.1.6).

## 2.5 Threatened and Endangered Species

Table 2.5-1 indicates protected animal and plant species that are known to occur in counties within which KPS and associated transmission lines are located. The transmission lines are located in Brown, Kewaunee, Manitowoc, and Outagamie counties. Special-status species shown in Table 2.5-1 as occurring in these counties were taken from county records maintained by the U.S. Fish and Wildlife Service (USFWS 2006a) and the Endangered Resources Program of the Wisconsin Department of Natural Resources (WDNR 2004, WDNR 2007e). No federally listed species are known to occur at KPS or along the transmission lines.

Five species (one bird, two insects, and two plants) in Table 2.5-1 are federally listed as endangered or threatened. These are discussed below. The recently de-listed Bald Eagle is also discussed below.

**BIRDS**

*Bald Eagle*

The bald eagle (*Haliaeetus leucocephalus*) was recently de-listed as a federally threatened species, but will remain protected under the Bald and Golden Eagle Protection Act (USFWS 2007). Because of its local recovery, the bald eagle is not considered threatened or endangered under Wisconsin state law. The bald eagle has been reported for Brown, Kewaunee, Manitowoc, and Outagamie counties (USFWS 2006a, KPS 2007b), but is not known to nest on or near KPS facilities/properties. Eagles have been observed on or near KPS property sporadically by site employees over the last few years, suggesting the site's use as an intermittent feeding area (KPS 2007b).

*Piping Plover*

The Great Lakes region population of piping plover (*Charadrius melodus*) is listed as endangered by both federal and state agencies (WDNR 2003). Piping plovers are observed regularly in small numbers along the western Lake Michigan shoreline, but breeding pairs have not been documented in Wisconsin in over 50 years. Critical habitat (potential nesting areas) for this species includes approximately five miles of Lake Michigan shoreline within the Point Beach State Forest in Manitowoc County (USFWS 2001a), roughly seven miles south of KPS.

The KPS shoreline has not been designated as critical habitat for piping plover. Further, an evaluation of the KPS shoreline by Dominion indicated only marginal potential as habitat (KPS 2007b). Minimum piping plover nesting habitat requirements include: total shoreline length of at least 200 meters (660 feet) of gently sloping, sparsely vegetated (<50 percent herbaceous and low woody cover) sand beach with a total beach area of at least 2 hectares (5 acres); appropriately sized sites must have an area 50 meters (160 feet) in length where the beach width is at least 7 meters (23 feet) (USFWS 2003, KPS 2007b). The shoreline from the northern boundary to the intermittent stream south of the plant was deemed to have "marginal" potential as plover nesting habitat (KPS 2007b). South of this area, no potential piping plover habitat exists. Recent surveys of KPS for piping plovers have not documented the species on site (KPS 2007b).

**INSECTS**

*Hine's Emerald Dragonfly*

The Hine's emerald dragonfly (*Somatochlora hineana*) is listed as endangered by both federal and state agencies. It inhabits calcareous, spring-fed marshes and sedge meadows, and the loss and fragmentation of these habitats has placed this species at risk (USFWS 2006b). The Hine's emerald dragonfly's current range includes Illinois, Michigan, Missouri and Wisconsin. Of the counties containing KPS facilities and transmission lines, this dragonfly is reported only for Kewaunee County (USFWS 2006a). A small population was reported for the Black Ash swamp in northern Kewaunee County in 2001 (WDNR 2006a). Other references state that the species is limited to northern Door County, Wisconsin (Armstrong 1999, WDNR 2006b), a county not associated with Kewaunee facilities and transmission lines. Recent wildlife surveys on KPS lands did not detect the presence of Hine's emerald dragonflies (KPS 2007b).

*Karner Blue Butterfly*

The Karner blue butterfly (*Lycaeides melissa samuelis*) is listed as endangered by the U.S. Fish and Wildlife Service, but is presently not listed by the WDNR. It is found in seven states ranging from New Hampshire to Minnesota, but is most widespread in Wisconsin (USFWS 2002). Of the counties containing KPS facilities and transmission lines, this butterfly is reported only for Outagamie County (USFWS 2006a). The Karner blue butterfly prefers pine and oak savanna/barrens containing wild lupine (*Lupinus perennis*) and flowering plants. After hatching, their caterpillars feed only upon wild lupine leaves and thus they are limited to breed in habitats containing that plant species (Mitchell and Carnes 2006). These pine/oak savannas are diminishing and/or becoming fragmented due to development and restriction of the habitat disturbance (such as fire) needed to keep these areas open and supportive of wild lupine. Recent surveys on KPS lands did not detect the presence of Karner Blue Butterfly (KPS 2007b).

**PLANTS**

*Dune or Pitcher's Thistle*

The dune or Pitcher's thistle (*Cirsium pitcheri*) is listed as threatened by both federal and state agencies. It is a native thistle that grows on the beaches and grassland dunes of the Great Lakes (USFWS 2001b). Pitcher's thistle is most often found in unforested (no canopy), near-shore plant communities. It grows for 5 to 8 years before flowering a single time. It is found in Wisconsin, Indiana, Michigan, and Ontario (Canada) and has been re-introduced into Illinois. Of the counties containing KPS facilities and transmission lines, this thistle is reported only for Manitowoc County (WDNR 2004). Surveys for Pitcher's thistle on the KPS facilities in Kewaunee County documented no occurrences of this species (KPS 2007b).

*Dwarf Lake Iris*

The dwarf lake iris (*Iris lacustris*) is listed as threatened by both federal and state agencies. Dwarf lake iris is found only in Wisconsin, Michigan, and Ontario (Canada). It is a

miniature iris that occurs only on the northern shores of Lakes Huron and Michigan, preferring sandy or thin soil in semi-open habitats (e.g., openings in white cedar forests) on old beach ridges or behind dunes (USFWS 2006c). Of the counties containing KPS facilities and transmission lines, this iris is reported only for Brown County (USFWS 2006a). Surveys for dwarf lake iris on the KPS facilities in Kewaunee County documented no occurrences of the plant species (KPS 2007b).

*State Species*

Table 2.5-1 includes species that are listed by the State as threatened or endangered. A site terrestrial ecology survey conducted in 2006 – 2007 (KPS 2007b), and follow-up observations made in 2008, observed four state bird species in the vicinity of the KPS site. With these exceptions, described below, no state threatened or endangered species are known to occur on the KPS site. Based on consultation with ATC, the owner of the transmission lines, none are known to occur along the transmission corridors associated with KPS.

The peregrine falcon was removed from the federal endangered species list in 1999. It remains, however, on the Wisconsin endangered list. KPS has had a resident pair of breeding peregrines since 2001. The site has produced at least 14 fledglings.

The Caspian tern is also not federally listed, but is on the Wisconsin list as endangered. During the spring of 2006, approximately two dozen were observed on the shore directly adjacent to the plant. By the summer, almost all had left, and no evidence of nesting was observed. None were observed in the fall or winter. During a two-day observation period in May 2008, another state-listed species, Common terns, were observed migrating past the site.

The osprey, a state-listed threatened species, was observed flying past the site in May of 2006. Aside from this single observation, no ospreys were observed on site.

## 2.6 Regional Demography and Minority and Low-Income Populations

### 2.6.1 General

The Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants (GEIS) presents a population characterization method that is based on two factors: "sparseness" and "proximity" (NRC 1996, Section C.1.4). "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**

| | | 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**

| | | 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.

DEK used 2000 U.S. Census Bureau (USCB) data and geographic information system (GIS) software (ArcGIS 9.1) to determine demographic characteristics in the KPS vicinity. As derived from 2000 U.S. Census Bureau information, 86,224 people live within 20 miles of KPS resulting in a population density of 132 persons per square mile of land (TtNUS 2006). Applying the GEIS sparseness measures, KPS falls into the least sparse category, Category 4 (greater than or equal to 120 persons per square mile within 20 miles).

As estimated from 2000 USCB information, 723,900 people live within 50 miles of KPS. This equates to a population density of 202 persons per square mile of land within a 50-mile radius (TtNUS 2006). Applying the GEIS proximity measures, KPS is classified as Category 4 (greater than or equal to 190 persons per square mile within 50 miles). According to the GEIS sparseness and proximity matrix, KPS fall into sparseness, Category 4, and proximity, Category 4, resulting in the conclusion that KPS is located in a high population area.

The 50-mile radius includes all or parts of 12 counties and the Appleton-Oshkosh-Neenah Combined Statistical Area (CSA) containing two Metropolitan Statistical Areas (MeSAs): the Appleton and the Oshkosh-Neenah MeSAs (USCB 2003a). The Fond du Lac, Green Bay, and Sheboygan MeSAs, and the Manitowoc Micropolitan Statistical Area (MiSA) also fall within the 50-mile radius (USCB 2003b). Kewaunee County is part of the Green Bay MeSA, which had a 2000 population of 282,599, an increase of 16 percent from the 1990 population of 243,698 (USCB 2003b).

Manitowoc (18 miles south-southwest) is the population center nearest KPS, with a 2000 population of 34,053. Green Bay (30 miles west-northwest), Appleton (43 miles west), and Sheboygan (42 miles south) are the largest population centers within the 50-mile radius, with 2000 populations of 102,313, 70,087, and 50,792, respectively. (USCB 2003c)

Because approximately 95 percent of employees at KPS reside in Kewaunee, Manitowoc, and Brown counties, Wisconsin, they are the counties with the greatest potential to be socioeconomically affected by license renewal at KPS (see Section 3.4). Table 2.6-1 shows census population counts, population projections, and percent changes for these three counties. Values for the State of Wisconsin are provided for comparison. The table is based on USCB data for 1980 through 2000 and Wisconsin Department of Administration data for 2010 through 2030.

Over the last twenty years, all three counties and Wisconsin have experienced positive growth overall, and are projected to continue growing. Brown County is one of the fastest growing counties in Wisconsin because of the economic strength of the Green Bay metropolitan area and the county's availability of rural lands for suburban development (WDOA 2004a). Kewaunee and Manitowoc counties are also experiencing growth, but both are growing at a slower rate than the state of Wisconsin.

## 2.6.2 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 bound potential environmental impact sites and that the state was appropriate as the geographic area for comparative analysis. DEK has adopted this approach for identifying minority and low-income populations that could be affected by KPS operations.

DEK used 2000 USCB data with GIS software (ArcGIS 9.1) to determine the minority characteristics by block group. DEK included a block group if any part of its area lay within 50 miles of KPS. The 50-mile radius includes 580 block groups (Table 2.6-2).

### 2.6.2.1 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 states that (1) "other" may be considered a separate minority category, (2) multi-racial individuals should be considered in a separate minority category, and (3) the aggregate minority category should be considered in a separate minority category. The guidance indicates that a minority population exists if either of the following 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.

DEK selected the State of Wisconsin as the geographic area for comparative analysis of block groups, and calculated the percentages of each minority category for Wisconsin. 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 2006). For each of the 580 block groups within the 50-mile radius, DEK calculated the percent of the block group's population represented by each minority. Because all minority percentages are less than 30 percent, a 20 percentage point exceedance of the state average was the limiting criterion in all cases. Thus, if any block group percentage exceeded the corresponding state percentage by more than 20 percent points, a minority population was deemed to exist.

Table 2.6-2 presents the number of block groups in each county in the 50-mile radius that meet NRC criteria for minority populations. Figures 2.6-1 through 2.6-5 locate the minority block groups within the 50-mile radius. None are within 20 miles of KPS.

One census block group within the 50-mile radius contains a significant Black or African American population. This block group is located within the Green Bay metropolitan area (Figure 2.6-1), more than 20 miles from KPS.

Five census block groups within the 50-mile radius have American Indian or Alaska Native populations that meet NRC criteria. All block groups are located within the Oneida Nation Reservation just west of the Green Bay area (Figure 2.6-2). The Oneida Nation is a sovereign nation that was one of the five original nations of the Iroquois Confederacy in the 1500s. Oneida land holdings include 16,689 acres in both Brown and Outagamie counties with a tribal membership of 14,900 (Oneida Nation 2004). The Oneida Nation is the sixth largest employer in Brown County (WDOA 2006).

One census block group within the 50-mile radius, located in the Green Bay metropolitan area contains a significant Asian population (Figure 2.6-3).

Fifteen census block groups within the 50-mile radius have significant Aggregate populations. All are located within the Green Bay metropolitan area or the Oneida Indian Reservation (Figure 2.6-3).

Six census block groups within the 50-mile radius have significant Hispanic populations. All are located in the Green Bay metropolitan area ().

#### 2.6.2.2 Low-Income Populations

NRC guidance defines low-income population based on statistical poverty thresholds (NRC 2004) if either of the following conditions is 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.

DEK determined the percentage of low-income households per block group using 2000 USCB data. Using the State of Wisconsin as the geographical area chosen for comparative analysis for block groups within Wisconsin, DEK determined that 8.38 percent of Wisconsin households are low-income households (TtNUS 2006). Table 2.6-2 identifies the low-income block groups in the region of interest, based on NRC's criteria. Figure 2.6-5 locates the low-income block groups.

Based on the limiting criterion, two census block groups within the 50-mile radius contain a significant percentage of low-income households. Both are located in the Green Bay area (Figure 2.6-5).

## 2.7 Taxes

### Utility Taxes in Wisconsin

In the State of Wisconsin, utilities and large electricity generators are generally exempt from local property taxation and taxed instead by the State. These entities pay "gross revenue" taxes to the State in lieu of property taxes. Gross revenue taxes are combined with other revenue sources collected statewide and become part of the state's general purpose revenue, which funds, in part, various aid payments to local governments.

In general, Wisconsin localities receive up to three types of payments from the state including (i) Municipal and County Aid payments; (ii) expenditure restraint payments and (iii) utility aid payments. Only the utility aid payments are distributed to the host county and municipality based on factors that are dependent upon utility valuation or location.

Utility aid payments compensate local governments for costs they incur in providing services to utilities and electric generators which are exempt from local property taxes. Aid on production plants that became operational before 2004 is computed by applying a mill rate to the net book value of qualifying property. For plants operational or repowered after 2004, aid is based on the production plant's generating capacity.

Utility aid payments consist of six components – the ad valorem payment, spent nuclear fuel storage payment, the minimum payment, the per capita limit, megawatt-based payment and incentive payments.

Descriptions of the components that are applicable to KPS, as presented by the Wisconsin Department of Revenue, are listed below (WDOR 2007a).

### Ad Valorem Payment

This component is based on the "net book value" of "qualifying property" for "eligible utilities". The total payment is 9 mills on "net book value". For property in a town, such as Carlton, the town is paid 3 mills and the county is paid 6 mills. The total value of "qualifying property" in a municipality may not exceed $125 million per utility company or, if the property is owned by two or more utilities, $125 million for that specific property.

- "Net book value" is the original cost of the property minus depreciation. For deregulated companies, depreciation is generally reported on a straight-line basis.
- "Qualifying property" includes (a) production plants that were in operation on January 1, 2004 and not subsequently rebuilt or "repowered", (b) substations, and (c) general structures. The land on which such property is located is excluded. Electric utility production plant consists of generating station structures and improvements and associated boilers, reactors, reservoirs, dams, waterways, fuel holders; engines, prime movers, and generators. Electric utility substations are facilities that connect the local distribution lines to the interstate electric transmission system. Gas utility substations are facilities that connect the local distribution lines to interstate gas transmission pipelines. For any utility, general structures included office buildings, garages, maintenance facilities, and related structures.

- "Eligible utilities" include: (1) private companies that produce, transmit, or distribute electricity or gas in more than one municipality; (2) electric cooperatives; (3) municipal utilities (for the portion of their property located outside the municipality that owns the utility) (4) municipal electric association projects (multi-municipal entities that own electric plants and/or purchase and transmit electricity to their members); and (5) qualified wholesale electric companies (entities that sell 95% or more of their power at wholesale and have a total generating capacity of 50 megawatts or more).

When calculating payments, the net book value in a municipality may not be less than the net book value as of December 31, 1989, minus the value of property removed since that date. This is called the "value guarantee". In addition, if qualifying utility property is annexed, the municipality that lost the property continues to receive payments. The first year's payment after annexation equals the payment attributable to the annexed property. The payment is reduced to $0 in equal amounts over the next five years.

**Spent nuclear fuel storage**

A payment of $50,000 is made to any municipality and county in which spent nuclear fuel is stored on December 31 of the prior year. If the nuclear fuel storage facility is located within one mile of another municipality or county, the municipality or county where the fuel is stored is paid $40,000 and the nearby municipality or county is paid $10,000.

**Minimum payment**

This component applies only to electric generating plants with a rated capacity of 200 megawatts (MW) or more that were in operation on January 1, 2004 and not subsequently rebuilt or "repowered". The minimum payment to a municipality or county with such a plant may not be less than $75,000.

**Per capita limit**

The total payment from the ad valorem and minimum payments may not exceed $300 per capita for municipalities and $100 per capita for counties. Payments under the spent nuclear fuel storage component are exempt from this limit.

**Megawatt-based payment**

Through 2008, this component only applies to electric generating plants that began operation or were "repowered" after December 31, 2003. Beginning in 2009, this component may apply to KPS in lieu of the ad valorem payment. The payment is $2,000 per megawatt (MW) of name-plate generating capacity. For a plant in a town, one-third ($666.67) is paid to the town and two-thirds ($1,333.33) is paid to the county. For a plant in a village or city, two-thirds ($1,333.33) is paid to the village or city and one-third ($666.67) is paid to the county.

**Pending Utility Tax Changes**

Beginning in 2009, the Wisconsin Department of Revenue will change the methodology for computing the utility aid payment. For production plants that were in operation on January

1, 2004 and not subsequently rebuilt or "repowered", the payment will be the greater of (a) the amount calculated under the current net book value based payment, or (b) the amount that would be paid under the $2,000 per MW payment plus incentive payments for plants that use a renewable energy source. Once a payment is made under alternative (b), all future payments will be calculated under alternative (b) (WDOR 2007a).

The provision under which the net book value in a municipality may not be less than the net book value as of December 31, 1989, minus the value of property removed since that date, the "value guarantee", will be repealed effective with payments in 2009 (WDOR 2007a).

The per capita limitation on payments will increase. For municipalities, the per capita limit will increase by $125 to $425. For counties, the per capita limit will increase by $25 to $125 (WDOR 2007a).

**DEK Taxes**

In lieu of property tax on its electrical generating plant and other facilities, DEK pays to the State of Wisconsin a lump sum gross revenue tax. There is no direct correlation between the taxes paid by DEK (to the State of Wisconsin) and the distribution of state funds to local taxing jurisdictions under two of the three possible state aid payments – the municipal and county aid and expenditure restraint program. Therefore, the only analysis that may be meaningful for license renewal is the comparison between the local taxing jurisdictions' total tax revenues and the WSRP Utility payments to the jurisdictions.

Typically, Wisconsin state law dictates that the county of origin and the municipality of origin be the recipients of WSRP Utility payments. Therefore, the Town of Carlton and Kewaunee County are the recipients of the WSRP Utility payments attributed to KPS. Tables 2.7-1 through 2.7-5 present information about the Town of Carlton's and Kewaunee County's total tax revenues and the WSRP Utility payments to the Town of Carlton and Kewaunee County from the State of Wisconsin (for all utility property located in the Town of Carlton).

As is presented in Table 2.7-4, the WSRP Utility payments represent approximately 68.9 to 69.2 percent of the Town of Carlton's total tax revenues. Note: the vast majority of the payments are attributed to KPS. In fact, in 2004 and 2005, the Town of Carlton collected no general property tax from its residents (WDOR 2007b). Additionally, as shown in Table 2.7-5, the WSRP Utility payments to Kewaunee County for the utility property in the Town of Carlton represent approximately 3.4 to 3.8 percent of Kewaunee County's total tax revenues.

## 2.8 Land Use Planning

This section focuses on Kewaunee and Manitowoc counties because Kewaunee County receives Wisconsin Shared Revenues Utility Program payments from the state of Wisconsin because of KPS presence in the County (WDOR 2007b), and Kewaunee and Manitowoc are the only counties in which KPS employees represent more than 0.1% of the county population.

**Kewaunee County**

Kewaunee County has experienced small increases in population and housing over the last sixteen years (1990 to 2006). However, the number of housing units in Kewaunee County grew faster than the population growth. Table 2.8-1 displays data about population trends in Kewaunee County and in the state from 1970 to 2006. Table 2.8-2 presents information about the available housing stock in the County and in the state during the same period.

The state of Wisconsin has passed legislation (Section 66.1001 of the Wisconsin Statutes) mandating that, beginning in January 2010, a town, village, city, county, or regional planning commission engaging in official mapping, subdivision regulation, or zoning, must be consistent with the community's comprehensive plan (WDOA 2008). The purpose of this legislation is to guide future land use planning.

The Bay-Lake Regional Planning Commission (BLRPC) was formed to provide comprehensive land planning guidance to eight counties in northeastern Wisconsin, including Kewaunee County. The BLRPC prepared a comprehensive plan to serve as a framework for the development of county and local comprehensive plans throughout the region. This plan serves as a framework from which local and county plans can be carried out in greater detail and to meet the requirements of Wisconsin's comprehensive planning laws (BLRPC 2005).

In addition to the BLRPC document, a number of other land use guidance documents are used in Kewaunee County and/or its municipalities. These include: county and municipal comprehensive plans; specialized plans for parks and recreation, farmland preservation, and coastal issues management; and various county and municipal zoning and subdivision ordinances. (Kewaunee County 2007)

Kewaunee County and its municipalities either have or are in the process of developing comprehensive plans. In August, November, Kewaunee County issued its first comprehensive plan, the *Kewaunee County 20-Year Comprehensive Plan* (the Plan) (Kewaunee County 2007).

According to the Plan, Kewaunee County contains 219,980 acres of land area. Table 2.8-3 contains land use information for Kewaunee County, as it was determined through a land use inventory conducted from 2004 to 2006. Almost 93 percent of the county's land is undeveloped. The majority (84 percent) of the undeveloped acreage consists of croplands/pastures and woodlands. Croplands/pastures comprise nearly 63 percent of the county's total land area, while woodlands cover 21 percent of the total land area. Some of the larger woodland areas in the county include the Black Ash Swamp in the Town of

Lincoln, Duvall Swamp in Red River, and Lipsky Swamp in West Kewaunee. (Kewaunee County 2007)

Residential uses account for the largest developed land use, covering 2.6 percent of the County's total land area, while transportation and agricultural structures each account for approximately 1.6 percent. The largest concentrations of residential, commercial, and industrial land are found in and around the Cities of Algoma and Kewaunee, the Village of Casco, and the Town and Village of Luxemburg. (Kewaunee County 2007)

Approximately 23 percent of the KPS permanent workforce resides in Kewaunee County. Although some undeveloped land has been converted to accommodate new development, the County remains largely rural, and, specifically, agricultural. This is also supported by the fact that Kewaunee County had a population density per square mile of 58.9 persons in 2000, even though it is part of the Green Bay Metro Area (USCB 2008a).

The Plan also contains land use planning goals and objectives, land use issues and conflicts, existing land use trends, anticipated growth patterns, and a recommendation for a development strategy (Kewaunee County 2007). In summary, the Plan states, "Kewaunee County recommends a compact development pattern that encourages development to locate within well-defined growth areas, balancing development and the preservation of the county's valued agricultural land and natural resources" (Kewaunee County 2007). Residential and commercial growth is encouraged in the Cities of Algoma and Kewaunee, the Villages of Luxemburg and Casco, and the community of Dyckesville. Industrial development is encouraged in the Cities of Algoma and Kewaunee and the Village of Luxemburg. Concentrated rural mixed use areas are encouraged in unincorporated communities of Alaska, Curran, East Krok, Stangelville, Tisch Mills, and Walhain (Kewaunee County 2007).

KPS is located in the town of Carlton in Kewaunee County. The town limits of Carlton encompass an area of 35.6 square miles and the 1980, 1990 and 2000 populations were 1,140, 1,041 and 1,000, respectively (OA Undated). Carlton has experienced a slight decline in population. As is reflected by the relatively stable population, Carlton has also experienced relatively little land use change since KPS began operations. Approximately 97 percent of the land is agricultural or woodland and 3 percent is developed (Table 2.8-4). Dairy farming is the primary economic activity. Carlton is in the process of developing a land use plan. A draft, called the *Comprehensive Smart Growth Plan for the Village of Casco and the Towns of Carlton, Casco, Lincoln, Montpelier, and West Kewaunee*, has been issued. Currently, Carlton uses zoning to guide development. (OA Undated)

As discussed in Section 2.7, Taxes, the presence of KPS is significant. In the years, 2004 and 2005, the Town of Carlton collected no general property tax from its residents (WDOR 2007b).

**Manitowoc County**

Manitowoc County experienced small increases in population and housing over the last sixteen years (1990 to 2006), with the number of housing units growing faster than the population. However, from 2000 to 2006, the population in Manitowoc County declined by a small amount while the number of housing units increased. Table 2.8-1 displays data

about population trends in Manitowoc County and in the state from 1970 to 2006. Table 2.8-2 presents information about the available housing stock in the County and in the state during the same period.

Manitowoc County is one of the eight counties in northeastern Wisconsin that receives comprehensive land planning guidance from the BLRPC. The Manitowoc County multi-jurisdictional planning process, which began in August 2007, is a bottom-up approach with each of the participating communities developing their own detailed plans for adoption. These adopted local plans will then be incorporated into the county framework plan. As a result, the county will leave most land use decisions to local communities. The multi-jurisdictional planning process is scheduled to be completed in December of 2009 with the adoption of the Manitowoc County Comprehensive Plan. As part of the planning effort Manitowoc County is preparing a land use inventory. The land use inventory is scheduled to be completed in 2008. (BLRPC 2007)

## 2.9 Social Services and Public Facilities

### 2.9.1 Public Water Supply

Section 2.3 of this document provides a profile of water in the region. As stated in Section 2.3, Lake Michigan is the source of potable water for the cities of Two Rivers, Manitowoc, and Green Bay and groundwater provides potable water for smaller towns and rural residences in the vicinity of the KPS site. Groundwater reserves in Kewaunee, Manitowoc, and Brown Counties are held in four aquifers, which are described in Section 2.3.

Two groundwater wells are used at KPS. The wells (BE601 and BE602) are at installed depths of 310 feet and 320 feet, respectively, and are used for cooling, stand-by cooling, the plant equipment water system, and potable water. Therefore, KPS pumps groundwater for use as potable water and is not connected to a municipal system. The state has developed a strategy for ensuring an adequate supply of drinking water that is profiled in the Wisconsin Capacity Development Strategy (WDNR 2000). Table 2.9-1 identifies the major water suppliers in Brown, Kewaunee, and Manitowoc Counties, their average daily output, and their maximum daily capacities. At the present time, the water supply systems in Kewaunee, Brown, and Manitowoc Counties are operating below their maximum capacities. Below, are brief descriptions of the water supply systems in the three counties.

**Kewaunee County**

Kewaunee County's major public water systems serve the majority of residential, commercial, and industrial users and are located in the cities of Kewaunee and Algoma, and the Village of Luxemburg. These three municipal water systems are supplied from groundwater through community wells. County planners state that these systems are considered adequate for the cities' and village's present and future growth; however maintenance will continue on aging portions of the systems. Future expansion needs will be determined by storage capacities and the densities of future developments. Given the size of future growth, long-term drinking water supplies and quality could be a concern. (Kewaunee County 2007)

The Village of Casco and ten towns within the county, not serviced by public systems, have individual or shared wells that are owned and maintained by the property owner(s). Prevention of groundwater contamination and protection of supplies for future use are concerns for all communities. (Kewaunee County 2007)

The City of Green Bay obtains drinking water supplies from Lake Michigan by means of the Green Bay water pipeline. Two raw water pipelines cross through the central portion of Kewaunee County to supply potable water to the City of Green Bay and several of its suburbs. At this time, none of the communities in Kewaunee County has any plans of utilizing this utility for their water needs (Kewaunee County 2007).

**Manitowoc County**

The cities of Manitowoc and Two Rivers are the two largest municipal water suppliers in Manitowoc County (Table 2.9-1). Both cities obtain their municipal water from Lake Michigan. All other water systems in the County rely on groundwater as their source (BLRPC 2005).

**Brown County**

The City of Green Bay obtains its water by pipeline from Lake Michigan (BCPC 2004). However, as the Green Bay Metropolitan Area has grown and expanded, there were declining groundwater level concerns in the central portion of the County. The Central Brown County Water Authority (CBCWA) was created, in 1999, to address this groundwater supply issue. The CBCWA, which includes the Villages of Allouez, Bellevue and Howard, the City of De Pere, and the Towns of Lawrence and Ledgeview, determined that the best solution to this problem is to obtain Lake Michigan water for the area's long-term potable water needs. (BCPC 2004) In July of 2004, members of the CBCWA signed an agreement to purchase Lake Michigan water from the City of Manitowoc. In December 2007, a 30-mile water pipeline was completed from Manitowoc to these suburbs of Green Bay. The villages of Hobart, Francis Creek and Denmark have agreed to hook into the pipeline and other communities near the pipeline corridor may have the opportunity to connect to the system. (BLRPC 2005, CBCWA 2007a, CBCWA 2007b) Local community infrastructures continue to be used and existing wells are used for backup purposes (BCPC 2004).

Groundwater is the source of all drinking water and other water uses within the remainder of Brown County. The groundwater is located within two shallow aquifers, as well as two deeper aquifers. Most private wells in Brown County obtain water from the two shallow aquifers, while most public wells obtain water from the deeper St. Peter Sandstone aquifer (BCPC 2004).

### 2.9.2 Transportation

Employees enter the KPS site gate after exiting State Highway 42 to the west. State Highway 42 has a north-south orientation and runs near the Lake Michigan shoreline in Kewaunee County. Workers from Ahnapee and Pierce would likely travel south on State Highway 42; employees from Red River, Lincoln, Luxemburg, and Casco could travel along County Highway C to the intersection with State Highway 42 and then continue south; those in Montpelier and West Kewaunee, Franklin, and Carlton would likely choose one of the east-west roads, travel east to the State Highway 42 intersection and then continue south. Employees commuting from Manitowoc County would also use State Highway 42, but travel northward. County Highway BB is just south of the station and the state-maintained Nuclear Road terminates on State Highway 42 near the plant entrance. State and county roads in this part of Wisconsin were laid out in grids on true north-south axes with accommodations for naturally occurring geographical boundaries. Thus, Nuclear Road, County Highway BB, and many other east-west roads leading to KPS are perpendicular to State Highway 42.

In NUREG-1437 (NRC 1996), the NRC provides guidance for performing transportation analyses for license renewal. In the document, significance levels of transportation impacts are based on the Transportation Research Board's level of service (LOS) definitions (NRC 1996). LOS is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists. A general definition of each LOS is provided below.

A Free flow of the traffic stream; users are unaffected by the presence of others.

B Stable flow in which the freedom to select speed is unaffected but the freedom to maneuver is slightly diminished.

C Stable flow that marks the beginning of the range of flow in which the operation of individual users is significantly affected by interactions with the traffic stream.

D High-density, stable flow in which speed and freedom to maneuver are severely restricted; small increases in traffic will generally cause operational problems.

E Operating conditions at or near capacity level causing low but uniform speeds and extremely difficult maneuvering that is accomplished by forcing another vehicle to give way; small increases in flow or minor perturbations will cause breakdowns.

F Defines forced or breakdown flow that occurs wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. This situation causes the formation of queues characterized by stop-and-go waves and extreme instability.

LOS A and B are associated with small impacts because the operation of individual users is not substantially affected by the presence of other users. At this level, no delays occur and no improvements are needed. LOS C and D are associated with moderate impacts because the operation of individual users begins to be severely restricted by other users and at level D small increases in traffic cause operational problems. Consequently, upgrading of roads or additional control systems may be required. LOS E and F are associated with large impacts because the use of the roadway is at or above capacity level, causing breakdowns in flow that result in long traffic delays and a potential increase in accident rates. Major renovations of existing roads or additional roads may be needed to accommodate the traffic flow (NRC 1996).

The Wisconsin Department of Transportation (WDOT) has calculated LOS projections for State Highway 42 for the year 2008. Table 2.9-2 lists the intersections of State Highway 42, in Kewaunee and Manitowoc Counties, that have projected LOS determinations of C or greater. All other intersections of State Highway 42, within the two counties, have LOS determinations of A or B. The sections of State Highway 42 that have LOS ratings of C or higher tend to be located near urban areas, such as the Towns of Manitowoc, Two Rivers, Kewaunee, and Algoma. Only one section is not and it is located near the entrance of KPS.

Additionally, the annual average daily traffic volume along the State Highway 42 in Kewaunee County, in 2006, ranged from 2,400 vehicles to 6,800 vehicles at the various intersections (WDOT 2007a). The annual average daily traffic sampling location nearest the intersection of Nuclear Road and State Highway 42 was 2,600 vehicles (WDOT 2007a). In 2005, the annual average daily traffic volume along the State Highway 42 in Manitowoc County ranged from 1,900 vehicles to 21,500 vehicles at the various intersections (WDOT 2007a). The section of State Highway 42 where the 21,500 vehicles were recorded is the section where State Highway 42 and Interstate Highway 43 share the same road (just west of Manitowoc) (WDOT 2007a).

From a durability perspective, the roads that serve the region are designed and engineered to accommodate a maximum level of traffic. The maximum total capacity of a two-lane, two-way highway (such as State Highway 42) is 2,000 vehicles per hour in both lanes, regardless of traffic distribution by direction (Kewaunee County 2007).

Transportation planning in the three-county area is the responsibility of the Bay-Lake Regional Planning Commission. Identification of issues and recommendations for transportation are a part of the *Bay-Lake Regional Planning Commission's Regional Comprehensive Plan* (BLRPC 2005).

## 2.10 Meteorology and Air Quality

KPS is located in Kewaunee County, Wisconsin, along the eastern border of the state on Lake Michigan. The climate of the region is generally influenced by storms that move eastward along the northern tier of the United States and from the southwestern portion of the country that are moving northeast toward the Great Lakes. The local weather is influenced by the conditions of Lake Michigan. Average rainfall for the region is 28 inches per year and average snowfall is approximately 45 inches per year (KPS 2007a).

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). Particulate matter with aerodynamic diameters of 10 microns or less are identified as $PM_{10,}$ particulate matter with aerodynamic diameters of 2.5 microns or less are identified as $PM_{2.5.}$ 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.

In October 2006, the EPA issued a final rule that revises the 24-hour $PM_{2.5}$ standard and revokes the annual $PM_{10}$ standard (EPA 2006b). Nonattainment designations for the $PM_{10}$ are not affected by the new rule, but additional nonattainment areas could be designated under the new $PM_{2.5}$ standard (EPA 2006c).

Kewaunee County is part of the Lake Michigan Interstate Air Quality Control Region (AQCR) (40 CFR 81.67). Within the Lake Michigan AQCR, Door, Manitowoc, and Sheboygan Counties are designated as non-attainment areas with respect to the 8-hour Ozone NAAQS (40 CFR 81.350). Kewaunee County became a maintenance area under the 8-hour Ozone standards on May 21, 2008 when the EPA re-designated the county from non-attainment to attainment (EPA 2008a).

Wisconsin 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 2008b). The CAIR is projected to reduce Wisconsin's sulfur dioxide and nitrogen oxide emissions by 32 and 61 percent, respectively, by 2015. On July 11, 2008, the D.C. Circuit Court of Appeals vacated the CAIR, and remanded the rule back to the EPA for further action.

## 2.11 Historic and Archaeological Resources

### Area History in Brief

Glaciers last flowed into Wisconsin roughly 25,000 years ago and reached their greatest extent 14,000 to 16,000 years ago, covering approximately two-thirds of the State. The retreat of the ice front was interrupted a number of times by re-advances, but the last glacier touched Wisconsin approximately 10,000 years ago. Historic records indicate that, at that time, Paleo Indians entered Wisconsin as they hunted woolly mammoth, mastodon, and bison. These large mammals lived on the abundant vegetation that began to grow as the glaciers retreated northward. Approximately 8,000 years ago, during the Archaic Period, the climate grew warmer and dryer and the large Ice Age mammals were replaced by the animals presently found in the State. People lived in small family groups in caves, rock shelters, along rivers, and around lakes and wetlands. They harvested wild plants, nuts, and acorns and hunted smaller animals, such as elk and deer. Approximately 3,000 years ago, during the Woodland Period, people lived in large villages and began to use bows and arrows to hunt. It was during this time period that many mounds, including effigies or mounds built in the shapes of turtles, birds, and bears were built throughout the State. The mounds served the dual purposes of being both sacred areas and burial sites. The Mississippian Period began approximately 1,000 years ago. (WHS 2006) Wisconsin inhabitants during this period were called the Oneota Indians. The Oneota lived in villages marked by an abundance of bell-shaped storage pits utilized for storing perishable foods as well as some personal items. They practiced a mixed economy, relying on agriculture, plant gathering, and hunting for subsistence. Maize was the staple crop, but squash and beans were also planted in gardens. Some plants that are now considered weeds were also gathered as a dietary supplement. Bison and deer were the primary sources of meat, subsidized with other mammals, birds, and fish. (Fishel 1996)

The Historic Period began in the early 1600s with the Ho Chunk (Winnebago), Potawatomi, Menominee, and Chippewa Indians inhabiting the region as the first European explorers arrived. Jean Nicolet, a French explorer, arrived in Green Bay, Wisconsin, in 1634 (WHS 2006). Green Bay was one of the first French settlements, and there was a flourishing fur trade in the area. The region was lost to the English during the French and Indian Wars, but later regained during the American Revolution. However, the official transfer of ownership was completed only after the War of 1812 (AEC 1972).

Scattered Indian trading posts were established during the 1700s. By 1800, there were approximately 200 settlers and fewer than 15,000 Indians in Wisconsin. In the 1830s, the region was heavily forested and significant settlement began when lumbering was started and the streams were dammed for water power. The vast forests of pine and larchwood led to shipbuilding. In 1848, Wisconsin became a state. Toward the end of the 19$^{th}$ century, farm settlement in the region followed the lumber industry (AEC 1972).

### Pre-Operation Historic/Archaeological Analysis

According to the *Final Environmental Statement for the Kewaunee Nuclear Power Plant* (AEC 1972) there were seven archaeological sites in the region of the KPS property that were included on the National Register of Historic Places, but none were located in the immediate vicinity of the plant. One of the seven sites, the Oconto Site, identified as a

prehistoric copper culture, was designated as a National Historic Landmark. The Oconto Site is located approximately 43 miles from the plant. The next nearest National Landmark was the Ridges Sanctuary, located in Door County approximately 60 miles from the plant. (AEC 1972)

There were no archeological sites documented within the site boundaries but evidence of Indian habitation was discovered in the Town of Kewaunee and the Township of Ahnapee. Additionally, the KPS site is situated over a vast forested area that was buried by the Valderan Glacier approximately 12,400 years ago. The forest extends for many miles and is not unique to the plant site and is known to underlie the Point Beach Nuclear Power Station. (AEC 1972)

**Current Historic/Archaeological Analysis**

As of 2006, 19 properties in Manitowoc County and 9 properties in Kewaunee County have been listed in the National Register of Historic Places. Of these 28 properties, none fall within a 6-mile radius of KPS (NPS 2006a and 2006b).

According to the Wisconsin Archaeological and Historic Resource Database (WisAHRD) there are 14 archaeological sites reported in the Carlton Township; five of those sites are cemeteries, eight are pre-contact aboriginal sites, and one is labeled Historic Indian. A 2007 archaeological survey of the KPS property (AVD 2007) noted that three of these sites are located within one mile of KPS, but none of these sites would be affected by the proposed action.

- A campsite or village of an unknown prehistoric identity lies about a half mile south of the KPS site boundary,
- Sandy Bay Cemetery is a Euro-American cemetery that was founded in 1869, was turned over to the Town of Carlton in 1969, and is located off of Highway 42 on the KPS site,
- And an area of 40 acres on which the exact location of an archeological site is unknown, which overlaps the northern boundary of the KPS property.

Archaeological field testing techniques of shovel testing, surface collection, and hand coring were used to survey approximately 80 percent of the KPS site. Items found included a scattering of nineteenth-twentieth century artifacts at a location of a former farmstead, five arrowheads, and three pieces of potential stone artifacts. These eight pre-contact Native American stone artifacts are considered isolated finds without any historic context and are not significant in terms of National Register of Historic Places criteria. The conclusion of this archaeological survey states that further archaeological work at any of these locations would not likely yield information important to history or prehistory.

Approximately 1-mile south of KPS, the National Park Service established the Two Creeks Buried Forest Unit of the Ice Age National Scientific Reserve. The Reserve is a national park system affiliate and provides public access to the Ice Age National Scenic Trail and remnants of a prehistoric buried forest. The Ice Age National Scenic Trail is 1,200 miles long and covers the entire length of the moraines marking the furthest advance of the last glacier in Wisconsin. (NPS 2006c)

**History of the KPS Site**

The Potawatomi tribe lived in the area that is presently Door, Kewaunee, and Manitowoc Counties for hundreds of years before Europeans began settling in Wisconsin. A major village, Ma-kah-da-we-kah-mich-(cock), also known as Black Earth, was located approximately three and one-half miles west of the plant site, on what is now the East Twin River. It was there that members of the tribe, numbering as many as 1000 at one time, arrived in the spring to plant crops of corn, beans, pumpkins, and squash. The burial ground for the tribe was also located here. (KCHS 2002)

In the spring, Potawatomis from Black Earth would establish a camping ground in Sandy Bay Creek, located in the northern edge of the KPS property. Here, they would come in the spring to fish during the annual spawning runs, primarily for suckers (Bach 1933; KCHS 2005). They were forced to leave the area in 1862 for non-payment of taxes (KCHS 2002).

In the mid-1850s, Kewaunee County was established, and was divided into three towns. The southernmost town, Sandy Bay, was "named for the little indenture in the shore of Lake Michigan." The town originally consisted of the present-day limits of Carlton and Franklin (Kewaunee County undated). In 1857, the town was divided into Franksville (now known as Franklin) and Carlton. The area in the vicinity of Sandy Bay Creek (the northern portion of KPS property), now part of Carlton, continued to be known as Sandy Bay.

During the mid to late 1800s, Sandy Bay was a thriving village, with a productive sawmill (using a dam erected on Fischer Creek), a general store, cheese factory, post office, and hotel (KCHS 2002). A large pier at Sandy Bay was a center for shipping in the area, where lumber, bark (for tanning), and farmers' crops were shipped to Milwaukee and Chicago. By 1891, "the settlement had all but disappeared. D.B. Harrington wrote, 'The other week I rode through the southern Carlton Township and visited Sandy Bay. Once a thriving center of commerce, the pier has rotted away nor is there any store or saloon and the Blue Ribbon Hall is deserted' " (KCHS 2002). Today, the only remnants in the area of the community are a number of rotting pilings from the pier, which can be seen from the shore by the mouth of Sandy Bay Creek.

During Sandy Bay's heyday, the site included St. John's Lutheran Church and cemetery, and the Sandy Bay School. The church, which was founded in 1869 and disbanded in 1947, was located on Route 42, in front of the cemetery plot, a Wisconsin Historical Resource, is currently owned by the Town of Carlton (KCGH 2007). There is no evidence remaining of what was the church; however, the cemetery, alternately known as St. John's Lutheran Cemetery and Sandy Bay Cemetery, still exists, and is cared for by the town (KCGH 2007). Sandy Bay School was located across Route 42 from the church, and was in use until the 1960s. There is no evidence remaining of the school.

For most of the rest of the site's history, the majority of it was used for agriculture. During the 1960s, land was acquired from 12 families — primarily farmers — to build KPS. With one exception, described below, buildings on site, including Sandy Bay School, were removed (AEC 1972, page IV-1). The only other remnants on site from the farms are stretches of old barbed wire scattered around the site, part of the back end of an old threshing machine, a farm bridge north of the plant, and a bridge of unknown origin southwest of the plant.

During the early to mid-1900s, Joe Krofta owned land approximately one quarter-mile south of the KPS plant. He planted a grove of trees in the area, and in 1931, built a small cabin. When KPS went into operation, the previous owners established the Kewaunee School Forest, which was used as an outdoor classroom for the county's schools. It included not only the cabin, but two nature trails. During the 1980s, however, the lake water reached historic high levels. Due to the resulting erosion, the cabin was about to collapse into the Lake Michigan. The plant's owner at the time was able to salvage the front façade of the cabin and move it to its current location, further away from the shore of the lake. In 1987, the forest was renamed Joe Krofta Memorial Forest (WPSC 1987). The forest was closed for outside use in the early 2000s for security.

## 2.12 Known or Reasonably Foreseeable Projects in the KPS Vicinity

KPS is located in Kewaunee County approximately one mile north of the Manitowoc County line. KPS is located in a rural area with the nearest city being Kewaunee, which is approximately seven miles away. The nearest metropolitan area is Green Bay, located approximately 30 miles west-northwest of KPS. More information on the KPS vicinity is found in Sections 2.6, 2.7, 2.8, and 2.9.

### EPA-Permitted Discharges to Air, Water, and Soil

In the "Envirofacts Warehouse" online database, the U.S. Environmental Protection Agency identifies discharges to air, water, and soil. A search of Kewaunee County, Wisconsin determined that eleven industries produce and release air pollutants; eight facilities have reported toxic releases; 79 facilities have reported hazardous waste activities; and six facilities are permitted to discharge to waters of the United States. There is one Superfund site in Kewaunee County, the Algoma Municipal Landfill (EPA 2008c).

A search of Manitowoc County, Wisconsin determined that 57 industries produce and release air pollutants; 46 facilities have reported toxic releases; 359 facilities have reported hazardous waste activities; and 25 facilities are permitted to discharge to waters of the United States. There are seven documented contaminated sites in Manitowoc County: Former Petroleum Conservation Inc. Tank, Lemberger Landfill, Lemberger Transport and Recycling, Petroleum Conservation Incorporated, U.S. Army Reserve, Wisconsin Public Service Corporation Manitowoc Manufactured Gas Plant, and Wisconsin Public Service Corporation Two Rivers Manufactured Gas Plant. (EPA 2008d)

### Federal Facilities in the Vicinity of KPS

There are no known federal facilities in the vicinity of KPS.

### Industries in the Vicinity of KPS

There are three industrial parks located in Kewaunee County, comprising a total acreage of 172 acres. There are seven industrial parks located in Manitowoc County, comprising a total acreage of 988 acres (BLRPC 2006). Kewaunee is home to many manufacturing facilities including ones that fabricate small (e.g., cookware) to very large (construction vehicle body parts) metal equipment (WDOC 2003; Kewaunee Fabrications 2008; Vollrath 2006).

### Energy Utilities in the Vicinity of KPS

To the south of KPS is the other nuclear generating station located in Wisconsin, Point Beach Nuclear Plant (PBNP). PBNP is a two-unit pressurized-water reactor power plant located on the western shore of Lake Michigan in Manitowoc County, Wisconsin, approximately 4.5 miles south of KPS (Figure 2.1-2). Site structures include: two reactor containments and associated auxiliary service; a 20 MW combustion turbine; office buildings; switchyard; pumphouse; cooling water intake and discharge structures; and an independent spent fuel storage installation (NMC 2004).

NRC evaluated the cumulative impacts from operation of both PBNP and KPS in the Supplemental Environmental Impact Statement for the Point Beach License Renewal (NRC 2005). DEK incorporates by reference and adopts the conclusions of NRC 2005 regarding cumulative impacts.

## Table 2.3-1. Municipal Water Wells within 20 Miles of the Kewaunee Power Station

| Municipality | Well Number | Well Depth (feet) | Well Production Normal Pumpage (gpd) | Air miles and direction from KPS |
|---|---|---|---|---|
| Algoma | BG094 | 1,334 | 216,000 | 19 miles north |
| | BG096 | 504 | 172,000 | |
| | BG097 | 472 | 142,000 | |
| | CS309 | 480 | 346,000 | |
| Denmark | BF181 | 456 | 70,000 | 15 miles west |
| | BF182 | 210 | 135,000 | |
| Kellnersville | BG237 | 450 | 180,000 | 15 miles southwest |
| Kewaunee | BG098 | 167 | 612,000 | 8 miles north |
| | BG099 | 700 | 540,000 | |
| | EK450 | 335 | 360,000 | |
| Luxemburg [a] | AY363 | 365 | 108,000 | 17 miles southwest |
| | BG100 | 410 | 108,000 | |
| | BG101 | 412 | 108,000 | |
| Manitowoc | BG251 [b] | 66.5 | 4,000,000 | 17 miles southwest |
| | BG252 [b] | 86 | 4,000,000 | |
| | BG253 [b] | 510 | 4,000,000 | |
| Maribel | BG241 | 436 | 288,000 | 14 miles west-southwest |
| Mishicot | BG243 | 130 | 396,000 | 9 miles southwest |
| | KY566 | 202 | 360,000 | |
| Whitelaw | BG250 | 495 | 414,000 | 19 miles southwest |

Source: WDNR (2008)
[a] = Luxemburg is developing a new municipal supply well
[b] = Ranney well
gpd = gallons per day

## Table 2.5-1. Threatened and Endangered Species Recorded in the Counties Associated with the Kewaunee Power Station and Transmission Lines

| Common Name | Scientific Name | State Status | Federal Status | Counties |
|---|---|---|---|---|
| **Plants** | | | | |
| Clustered broomrape | *Orobanche fasciculata* | T | — | Manitowoc |
| Dune thistle | *Cirsium pitcheri* | T | T | Manitowoc |
| Dwarf lake iris | *Iris lacustris* | T | T | Brown |
| Handsome sedge | *Carex formosa* | T | — | Brown, Outagamie |
| Harbinger-of-spring | *Erigenia bulbosa* | E | — | Kewaunee |
| March valerian | *Valeriana sitchensis ssp* | T | — | Outagamie |
| Pale green orchid | *Platanthera flava* var. *herbiola* | T | — | Brown |
| Purple false oats | *Trisetum melicoides* | E | — | Brown |
| Ram's-head lady's slipper | *Cypripedium arietinum* | T | — | Outagamie |
| Sand dune willow | *Salix cordata* | E | — | Manitowoc |
| Sand reed-grass | *Calamovilfa longifolia* var. *magna* | T | — | Kewaunee, Manitowoc |
| Seaside crowfoot | *Ranunculus cymbalaria* | T | — | Brown, Manitowoc |
| Shore sedge | *Carex lenticularis* | T | — | Manitowoc |
| Snow trillium | *Trillium nivale* | T | — | Brown, Manitowoc, Outagamie |
| Sticky false-asphodel | *Tofieldia glutinosa* | T | — | Manitowoc |
| Thickspike | *Elymus lanceolatus* ssp *psammophilus* | T | — | Manitowoc |
| White lady-slipper | *Cypridedium candidum* | T | — | Outagamie |
| Hairy wild-petunia | *Ruella humilis* | E | — | Outagamie |
| Yellow gentian | *Gentiana alba* | T | — | Brown, Outagamie |
| **Birds** | | | | |
| Acadian flycatcher | *Empidonax virescens* | T | — | Manitowoc, Outagamie |
| Bald eagle | *Haliaeetus leucocephalus* | — | DL | Brown, Manitowoc, Outagamie |
| Barn owl | *Tyto alba* | E | — | Kewaunee, Manitowoc, Outagamie |
| Caspian tern | *Sterna caspia* | E | — | Manitowoc, Outagamie |
| Cerulean warbler | *Dendroica cerulea* | T | — | Manitowoc, Outagamie |
| Common tern | *Sterna hirundo* | E | — | Brown |
| Forster's tern | *Sterna forsteri* | E | — | Brown |
| Great egret | *Ardea alba* | T | — | Brown |
| Henslow's Sparrow | *Ammodramus henslowii* | T | — | Manitowoc, Outagamie |
| Hooded warbler | *Wilsonia citrina* | T | — | Manitowoc |

**Table 2.5-1. Threatened and Endangered Species Recorded in the Counties Associated with the Kewaunee Power Station and Transmission Lines (Continued)**

| Common Name | Scientific Name | State Status | Federal Status | Counties |
|---|---|---|---|---|
| Osprey | *Pandion haliaetus* | T | — | Brown, Kewaunee, Manitowoc, Outagamie |
| Peregrine falcon | *Falco peregrinus* | E | — | Kewaunee |
| Piping plover | *Charadrius melodus* | E | E | Manitowoc |
| Red-shouldered hawk | *Buteo lineatus* | T | — | Manitowoc, Outagamie |
| Snowy egret | *Egretta thula* | E | — | Brown |
| **Fish** | | | | |
| Greater redhorse | *Moxostoma valenciennesi* | T | — | Brown, Kewaunee, Manitowoc |
| Pugnose shiner | *Notropis anogenus* | T | — | Kewaunee |
| Longear sunfish | *Lepomis megalotis* | T | — | Brown, Kewaunee |
| Redfin shiner | *Lythrurus umbratilis* | T | — | Brown, Manitowoc |
| **Mussels** | | | | |
| Buckhorn | *Tritogonia verrucosa* | T | — | Outagamie |
| Ellipse | *Venustaconcha ellipsiformis* | T | — | Manitowoc |
| Monkeyface | *Quadrula metanevra* | T | — | Manitowoc |
| Salamander mussel | *Simpsonaias ambigua* | T | — | Outagamie |
| Slippershell mussel | *Alasmidonta viridis* | T | — | Manitowoc |
| Snuffbox | *Epioblasma triquetra* | E | — | Outagamie |
| **Amphibians** | | | | |
| Blanchard's cricket frog | *Acris crepitans blanchardi* | E | — | Brown, Manitowoc |
| **Snails** | | | | |
| Cherrystone drop | *Hendersonia occulta* | T | — | Brown, Kewaunee, Manitowoc |
| Midwestern pleistocene vertigo | *Vertigo hubrichti* | E | — | Brown, Manitowoc |
| **Insects** | | | | |
| Hine's emerald dragonfly | *Somatochlora hineana* | E | E | Kewaunee |
| Karner blue butterfly | *Lycaeides Melissa samuelis* | — | E | Outagamie |
| **Reptiles** | | | | |
| Blanding's turtle | *Emydoidea blandingii* | T | — | Brown, Kewaunee, Manitowoc, Outagamie |
| Wood turtle | *Clemmys insculpta* | T | — | Brown, Outagamie |

Sources: USFWS (2006a), USFWS (2007), WDNR (2004), WDNR (2007e)
[a] Status: DL = De-listed, but still under federal protection
E = Endangered
T = Threatened
— = Not Listed

## Table 2.6-1. Decennial Populations, Projections, and Percentage Growth

| | Brown County | | Kewaunee County | | Manitowoc County | | Wisconsin | |
|---|---|---|---|---|---|---|---|---|
| Year | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| 1980[a] | 175,280 | N/A | 19,539 | N/A | 82,918 | N/A | 4,705,642 | N/A |
| 1990[a] | 194,594 | 11.02% | 18,878 | -3.38% | 80,421 | -3.01% | 4,891,769 | 3.95% |
| 2000[a] | 226,778 | 16.54% | 20,187 | 6.93% | 82,887 | 3.07% | 5,363,675 | 9.65% |
| 2010[b] | 248,529 | 9.59% | 21,343 | 5.73% | 86,307 | 4.13% | 5,751,470 | 7.23% |
| 2020[b] | 269,812 | 8.56% | 22,457 | 5.22% | 89,860 | 4.12% | 6,110,878 | 6.25% |
| 2030[b] | 291,862 | 8.17% | 23,266 | 3.60% | 91,327 | 1.63% | 6,415,923 | 4.99% |

[a] USCB (2003c)
[b] WDOA (2004b)

## Table 2.6-2. Minority and Low-Income Population Census Block Groups

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brown | Wisconsin | 168 | 1 | 2 | 1 | 0 | 0 | 0 | 12 | 6 | 2 |
| Calumet | Wisconsin | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Door | Wisconsin | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fond Du Lac | Wisconsin | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kewaunee | Wisconsin | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Manitowoc | Wisconsin | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Marinette | Wisconsin | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oconto | Wisconsin | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Outagamie | Wisconsin | 111 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| Shawano | Wisconsin | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sheboygan | Wisconsin | 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Winnebago | Wisconsin | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | TOTALS | 580 | 1 | 5 | 1 | 0 | 0 | 0 | 15 | 6 | 2 |
| Wisconsin Percentages | | | 5.75 | 0.89 | 1.68 | 0.03 | 1.60 | 1.26 | 11.21 | 3.64 | 8.38 |

Note: Highlighted counties are completely contained within the 50-mile radius

## Table 2.7-1. Wisconsin Shared Revenue Utility Payments to the Town of Carlton for Utility Property in the Town of Carlton, 2004 to 2008

| Item | 2004 | 2005 | 2006 | 2007 (estimated) | 2008 (estimated) |
|---|---|---|---|---|---|
| **Utility Property: Net Book Value:** | | | | | |
| Wisconsin Power & Light | 48,276,451 | 44,689,234 | 6 | 6 | 6 |
| Wisconsin Public Service | 70,717,380 | 73,240,209 | 0 | 240,250 | 230,640 |
| Dominion Energy Kewaunee | 0 | 0 | 75,773,083 | 36,556,659 | 41,860,383 |
| American Transmission | 1,310,499 | 1,281,173 | 1,872,469 | 2,209,085 | 2,120,722 |
| Total | 120,304,330 | 119,210,616 | 77,643,558 | 39,006,000 | 44,211,745 |
| Value Guarantee | 1,093,714 | 0 | 17,062,594 | 55,702,152 | 50,496,407 |
| **Total Value** | **121,398,044** | **119,210,616** | **94,708,152** | **94,708,152** | **94,708,152** |
| | | | | | |
| **Payment:** | | | | | |
| Payment Rate | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |
| Payment – Rate X Total Value | 364,194.13 | 357,631.85 | 284,124.46 | 284,124.46 | 284,124.46 |
| Population | 1,032 | 1,037 | 1,031 | 1,034 | 1,036 |
| Payment Limit – Per Capita | 300.00 | 300.00 | 300.00 | 300.00 | 300.00 |
| Maximum Payment | 309,600.00 | 311,100.00 | 309,300.00 | 310,200.00 | 310,800.00 |
| Value-Based Payment | 309,600.00 | 311,100.00 | 284,124.46 | 284,124.46 | 284,124.46 |
| Spent Nuclear Fuel Payment | 50,000.00 | 50,000.00 | 50,000.00 | 50,000.00 | 50,000.00 |
| **Total Utility Payment** | **359,600.00** | **361,100.00** | **334,124.46** | **334,124.46** | **334,124.46** |

Source: WDOR (2007c); DEK (2008b)
Note: The shared revenue payment is funded from general state revenues; it is not paid by the utilities in the town. It is a payment for the presence of the utilities in the town and county.

## Table 2.7-2. Wisconsin Shared Revenue Utility Payments to Kewaunee County for Utility Property in the Town of Carlton, 2004 to 2008

| Item | 2004 | 2005 | 2006 | 2007 (estimated) | 2008 (estimated) |
|---|---|---|---|---|---|
| **Utility Property: Net Book Value:** | | | | | |
| Wisconsin Power & Light | 48,276,451 | 44,689,234 | 6 | 6 | 6 |
| Wisconsin Public Service | 70,717,380 | 73,240,209 | 0 | 240,250 | 230,640 |
| Dominion Energy Kewaunee | 0 | 0 | 75,773,083 | 36,556,659 | 41,860,383 |
| American Transmission | 1,310,499 | 1,281,173 | 1,872,469 | 2,209,085 | 2,120,722 |
| Total | 120,304,330 | 119,210,616 | 77,643,558 | 39,006,000 | 44,211,745 |
| Value Guarantee | 1,093,714 | 0 | 17,062,594 | 55,702,152 | 50,496,407 |
| **Total Value** | **121,398,044** | **119,210,616** | **94,708,152** | **94,708,152** | **94,708,152** |
| | | | | | |
| **Payment:** | | | | | |
| Payment Rate | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |
| Payment – Rate x Total Value | 728,388.26 | 715,263.70 | 568,248.91 | 568,248.91 | 568,248.91 |
| Population | 20,648 | 21,082 | 21,157 | 21,198 | 21,339 |
| Payment Limit – Per Capita | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Maximum Payment | 2,064,800.00 | 2,108,200.00 | 2,115,700.00 | 2,119,800.00 | 2,133,900.00 |
| Value-Based Payment | 728,388.26 | 715,263.70 | 568,248.91 | 568,248.91 | 568,248.91 |
| Spent Nuclear Fuel Payment | 50,000.00 | 50,000.00 | 50,000.00 | 50,000.00 | 50,000.00 |
| **Total Utility Payment** | **778,388.26** | **765,263.70** | **618,248.91** | **618,248.91** | **618,248.91** |

Source: WDOR (2007c); DEK (2008b)
Note: The shared revenue payment is funded from general state revenues; it is not paid by the utilities in the town. It is a payment for the presence of the utilities in the town and county.

## Table 2.7-3. Wisconsin Shared Revenue Utility Payments to the Town of Carlton and Kewaunee County for Utility Property in the Town of Carlton, Projected for 2009

| Item | Town of Carlton | Kewaunee County | Combined Total |
|---|---|---|---|
| **Utility Property: Net Book Value:** | | | |
| Wisconsin Power & Light ($) | 6 | 6 | 6 |
| Wisconsin Public Service ($) | 221,414 | 221,414 | 221,414 |
| Dominion Energy Kewaunee ($) | 62,102,524 | 62,102,524 | 62,102,524 |
| American Transmission ($) | 2,035,893 | 2,035,893 | 2,035,893 |
| Total ($) | 64,359,837 | 64,359,837 | 64,359,837 |
| Value Guarantee | Repealed | Repealed | Repealed |
| **Total ($)** | **64,359,837** | **64,359,837** | **64,359,837** |
| Payment Rate | 0.003 | 0.006 | 0.009 |
| **Value-Based Payment ($)** | **193,079.51** | **386,159.02** | **579,238.53** |
| **Megawatt-Based Payment:** | | | |
| $ per MW of Capacity | 666.6667 | 1,333.3333 | 2,000.0000 |
| MW Capacity | 560 | 560 | 560 |
| **MW-Based Payment ($)** | **373,333.33** | **746,666.67** | **1,120,000.00** |
| **Greater of the Two Payments ($)** | **373,333.33** | **746,666.67** | **1,120,000.00** |
| **Maximum Payment:** | | | |
| Population | 1,036 | 21,339 | N/A |
| Payment Limit – Per Capita ($) | 425.00 | 125.00 | N/A |
| **Maximum Payment ($)** | **440,300.00** | **2,667,375.00** | **3,107,675.00** |
| Payment For Utility Plant ($) | 373,333.33 | 746,666.67 | 1,120,000.00 |
| Spent Nuclear Fuel Payment ($) | 50,000.00 | 50,000.00 | 100,000.00 |
| **Total Utility Payment ($)** | **423,333.33** | **796,666.67** | **1,220,000.00** |

Source: WDOR (2007c)
N/A – not applicable
Note: The shared revenue payment is funded from general state revenues; it is not paid by the utilities in the town. It is a payment for the presence of the utilities in the town and county.

**Table 2.7-4. Town of Carlton – WSRP Utility Payments and Total Town Revenues, 2004 to 2008**

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Revenues ($) | 522,200 | 522,100 | NA | NA | NA |
| WSRP Utility Payment ($) | 359,600 | 361,100 | 334,124 | 334,124 (estimated) | 334,124 (estimated) |
| Percent of Total Revenues | 68.9 | 69.2 | NA | NA | NA |

Sources: WDOR (2007b; 2007c)
NA = Not yet available.

**Table 2.7-5. Kewaunee County – WSRP Utility Payments and Total County Revenues, 2004 to 2008**

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Revenues ($) | 20,376,900 | 22,597,300 | NA | NA | NA |
| WSRP Utility Payment ($) | 778,388 | 765,264 | 618,249 | 618,249 | 618,249 |
| Percent of Total Revenues | 3.8 | 3.4 | NA | NA | NA |

Sources: WDOR (2007b; 2007c)
NA = Not yet available.

**Table 2.8-1. Population Trends in Kewaunee County and the State of Wisconsin**

| Population | Kewaunee County | Manitowoc County | Wisconsin |
|---|---|---|---|
| 1970 Population | 18,961 | 82,294 | 4,417,821 |
| 1980 Population | 19,539 | 82,918 | 4,705,642 |
| 1990 Population | 18,878 | 80,421 | 4,891,769 |
| 2000 Population | 20,187 | 82,887 | 5,363,675 |
| Percent Change, 1990 to 2000 | 6.9% | 3.1% | 9.7% |
| 2006 Population | 20,832 | 81,911 | 5,556,506 |
| Percent Change, 2000 to 2006 | 3.2% | -1.2% | 3.6% |

Sources: USCB (2003c; 2008a; 2008b)

**Table 2.8-2. Housing Trends in Kewaunee County and the State of Wisconsin**

| Housing | Kewaunee County | Manitowoc County | Wisconsin |
|---|---|---|---|
| Housing Units 1990 | 7,544 | 31,843 | 2,055,774 |
| Housing Units 2000 | 8,221 | 34,651 | 2,321,144 |
| Percent Change, 1990 to 2000 | 9.0% | 8.8% | 12.9% |
| Housing Units 2006 | 9,015 | 36,526 | 2,534,075 |
| Percent Change, 2000 to 2006 | 9.7% | 5.4% | 9.2% |

Sources: USCB (2003c; 2008a; 2008b)

## Table 2.8-3. Kewaunee County Land Use, 2004 to 2006

| LAND USE TYPE | Amount (acres) | Percent of Developed Land | Percent of Total Land |
|---|---|---|---|
| Developed | | | |
| Residential | 5,788.3 | 36.42 | 2.63 |
| Single Family | 5,489.2 | 34.54 | 2.50 |
| Two Family | 25.9 | 0.16 | 0.01 |
| Multi-Family | 58.2 | 0.37 | 0.03 |
| Mobile Homes | 166.8 | 1.05 | 0.08 |
| Vacant Residential | 48.3 | 0.30 | 0.02 |
| Commercial | 447.9 | 2.82 | 0.20 |
| Industrial | 1,050.9 | 6.61 | 0.48 |
| Transportation | 3,537.7 | 22.26 | 1.61 |
| Communications/Utilities | 234.1 | 1.47 | 0.11 |
| Institutional/Governmental | 379.8 | 2.39 | 0.17 |
| Recreational | 989.6 | 6.23 | 0.45 |
| Agricultural Structures | 3,464.0 | 21.80 | 1.57 |
| **Total Developed Acres** | **15,892.3** | **100.00** | **7.22** |
| | | | |
| Undeveloped | | | |
| Croplands/Pasture | 138,470.8 | 67.85 | 62.95 |
| Woodlands | 46,444.4 | 22.76 | 21.11 |
| Other Natural Areas | 18,156.9 | 8.90 | 8.25 |
| Water Features | 1,016.1 | 0.50 | 0.46 |
| **Total Undeveloped Acres** | **204,088.2** | **100.00** | **92.78** |
| | | | |
| **TOTAL LAND AREA** | **219,980.4** | | **100.00** |

Source: Kewaunee County (2007)

## Table 2.8-4. Town of Carlton Land Use, 2004

| Land Use Type | Amount (acres) | Percent of Total Land |
|---|---|---|
| Agricultural/Woodlands | 22,061.34 | 96.68 |
| Single-Family Residential | 617.86 | 2.71 |
| Utilities (Nuclear Power Plant) | 113.74 | 0.59 |
| Recreational | 3.04 | 0.01 |
| Roads | 3.03 | 0.01 |
| **TOTAL** | **22,799.01** | **100** |

Source: OA (2007)

## Table 2.9-1. Largest[a] Public Water Supply Systems[b] in Brown, Kewaunee, and Manitowoc County

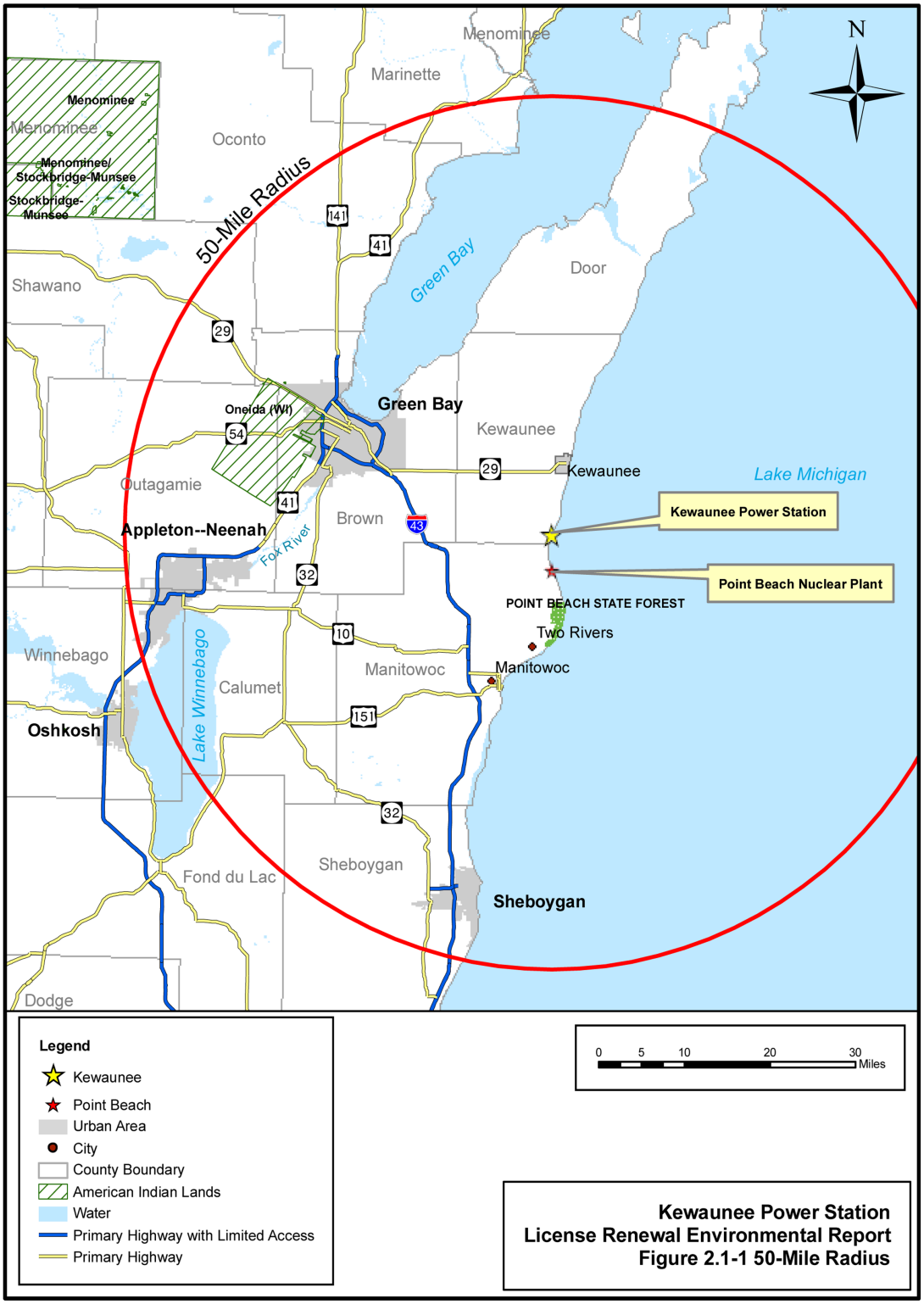
| Public Water System | Population Served | Source of Water | Average Daily Output (gpd) | Maximum Capacity (gpd) |
|---|---|---|---|---|
| **Brown County** | | | | |
| Allouez Waterworks | 14,443 | PSW | 1,100,000 | 4,000,000 |
| Ashwaubenon Waterworks | 17,625 | PSW | 3,449,000 | 6,000,000 |
| Bellevue Waterworks | 14,500 | PSW | 1,000,000 | 4,000,000 |
| De Pere Water Department | 22,310 | PSW | 2,600,000 | 6,000,000 |
| Denmark Waterworks | 2,076 | Groundwater | 252,000 | NA |
| Green Bay Waterworks | 103,018 | Surface Water | 20,000,000 | 42,000,000 |
| Hobart Waterworks Service Area #1 | 1,600 | Groundwater | 864,000 | 1,400,000 |
| Howard Waterworks | 14,543 | PSW | 1,860,000 | 4,200,000 |
| Lawrence Utility District | 1,200 | PSW | 1,050,000 | 4,320,000 |
| Ledgeview Sanitary District #2 | 3,518 | PSW | 300,000 | NA |
| Pulaski Waterworks | 3,305 | Groundwater | NA | NA |
| Scott Water Utility District | 1,500 | PSW | 42,000,000 | NA |
| Suamico Waterworks | 3,960 | Groundwater | 1,400,000 | NA |
| Wrightstown Waterworks | 2,578 | Groundwater | 220,000 | 1,000,000 |
| **Kewaunee County** | | | | |
| Algoma Waterworks | 3,357 | Groundwater | 261,000 | 1,584,000 |
| Kewaunee Waterworks | 2,887 | Groundwater | 362,000 | 2,592,000 |
| Luxemburg Waterworks | 2,292 | Groundwater | 257,000 | 590,400 |
| **Manitowoc County** | | | | |
| Cleveland Waterworks | 1,410 | Groundwater | 75,000 | 1,500,000 |
| Kiel Waterworks | 3,630 | Groundwater | 500,000 | 4,532,000 |
| Manitowoc Waterworks | 34,500 | Surface Water | 8,000,000 | 31,000,000 |
| Mishicot Waterworks | 1,422 | Groundwater | 1,404,000 | 1,440,000 |
| Reedsville Waterworks | 1,200 | Groundwater | 100,000 | 500,000 |
| Two Rivers Waterworks | 13,354 | Surface Water | 1,500,000 | 4,000,000 |

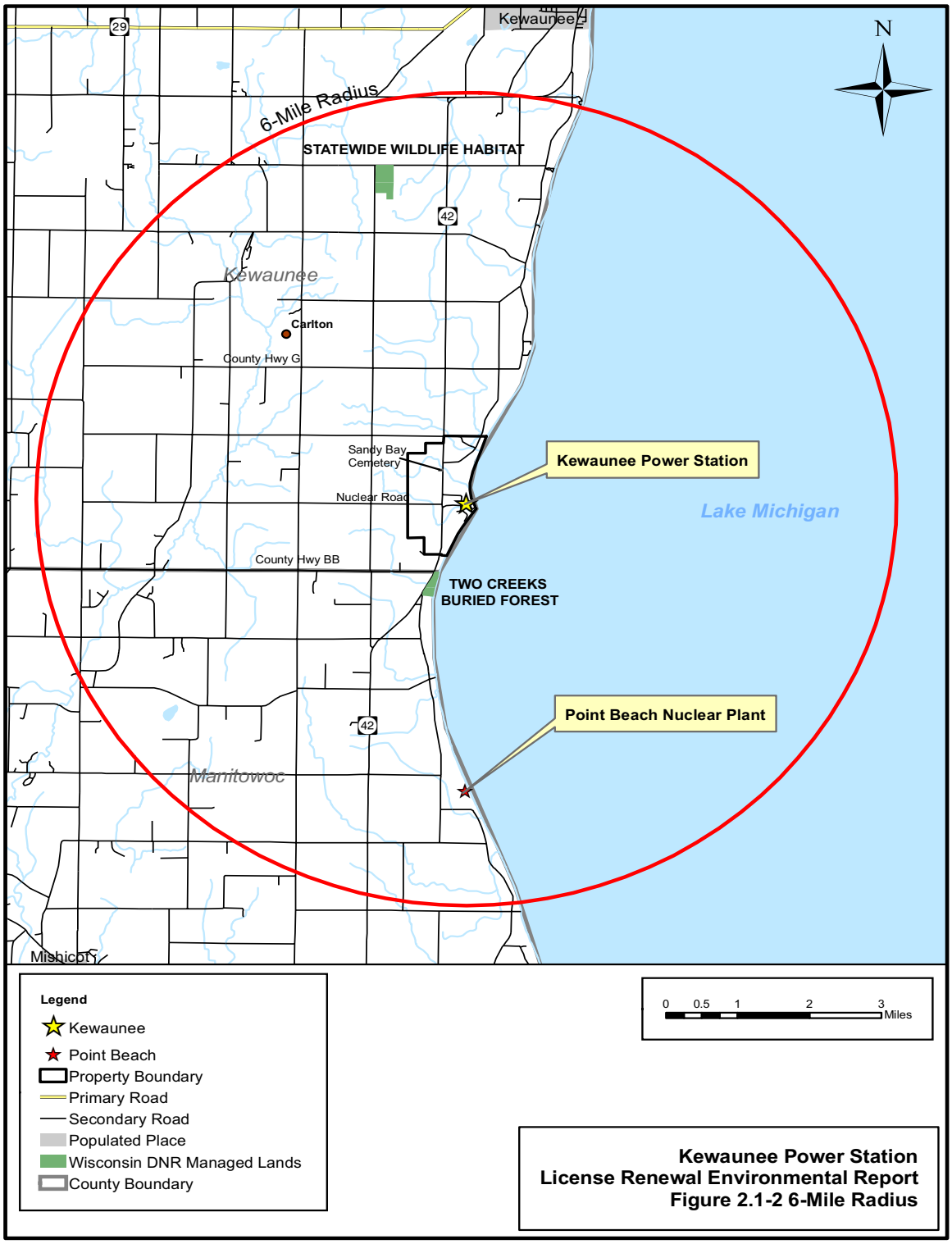
Sources: KCLWCD (2007); TtNUS (2008); WDNR (2007f)
[a] Systems serving 1,000 or more people
[b] Community water systems – water systems that serve the same people year-round (e.g., in homes or businesses)
[c] PSW = Purchased Surface Water

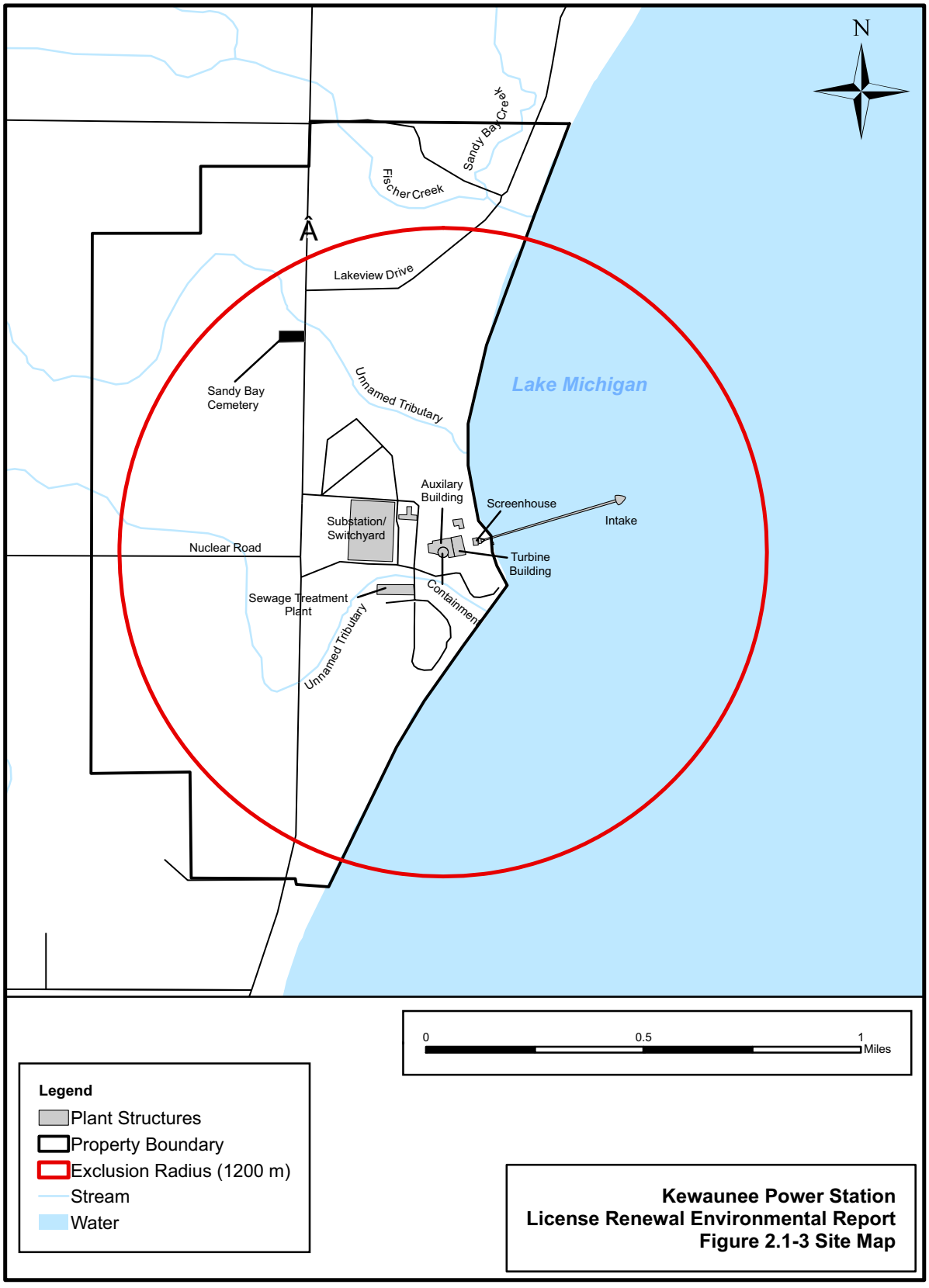
## Table 2.9-2. Level of Service Data

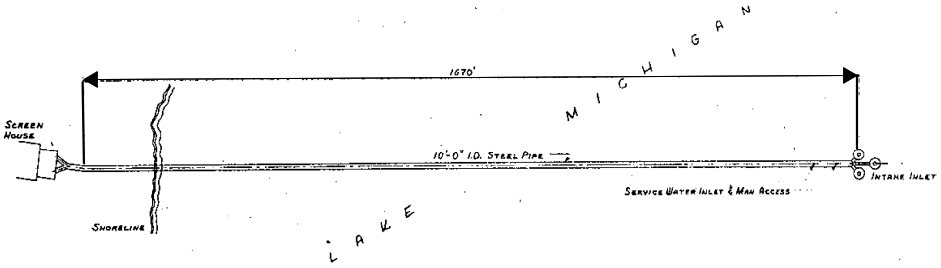
| Highway | Intersection | LOS 2008 |
|---|---|---|
| State Highway 42 | Fricke Drive | D |
| State Highway 42 | State Highway 42 Southbound | D |
| State Highway 42 | US Highway 10 Eastbound | F |
| State Highway 42 | State Highway 310 | C |
| State Highway 42 | State Highway 147 Northbound | C |
| State Highway 42 | South East River Street | C |
| State Highway 42 | Jackson Street | C |
| State Highway 42 | County Highway BB | C |
| State Highway 42 | Nuclear Road | C |
| State Highway 42 | Sandy Bay Road | C |
| State Highway 42 | Lakeshore Road | C |
| State Highway 42 | Tatonka Drive | C |
| State Highway 42 | County Highway E | D |
| State Highway 42 | Duvall Street | C |
| State Highway 42 | County Highway F | C |
| State Highway 42 | 1st Road | C |
| State Highway 42 | County Highway O | C |
| State Highway 42 | 4th Road | C |
| State Highway 42 | County Highway D | C |
| State Highway 42 | Lakeshore Drive | C |
| State Highway 42 | 8th Road | C |
| State Highway 42 | 10th Road | C |
| State Highway 42 | County Highway K | C |
| State Highway 42 | Feld Street | C |

Source: WDOT (2007b)

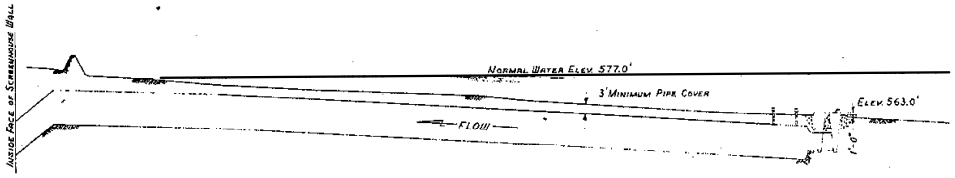

N
Menominee
Marinette
Oconto
Menominee
Menominee/
Stockbridge-Munsee
Stockbridge-
Munsee
50-Mile Radius
141
41
Green Bay
Door
Shawano
29
Oneida (WI)
54
Green Bay
Kewaunee
29
Kewaunee
Lake Michigan
Outagamie
41
Brown
43
Kewaunee Power Station
Appleton--Neenah
Fox River
32
Point Beach Nuclear Plant
POINT BEACH STATE FOREST
Two Rivers
10
Winnebago
Manitowoc
Manitowoc
Calumet
Lake Winnebago
151
Oshkosh
32
Sheboygan
Fond du Lac
Sheboygan
Dodge
Legend
Kewaunee
Point Beach
Urban Area
City
County Boundary
American Indian Lands
Water
Primary Highway with Limited Access
Primary Highway
0 5 10 20 30
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.1-1 50-Mile Radius


Kewaunee
29
6-Mile Radius
STATEWIDE WILDLIFE HABITAT
42
Kewaunee
Carlton
County Hwy G
Sandy Bay Cemetery
Nuclear Road
Kewaunee Power Station
Lake Michigan
County Hwy BB
TWO CREEKS BURIED FOREST
Point Beach Nuclear Plant
42
Manitowoc
Mishicot
N
Legend
Kewaunee
Point Beach
Property Boundary
Primary Road
Secondary Road
Populated Place
Wisconsin DNR Managed Lands
County Boundary
0 0.5 1 2 3
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.1-2 6-Mile Radius

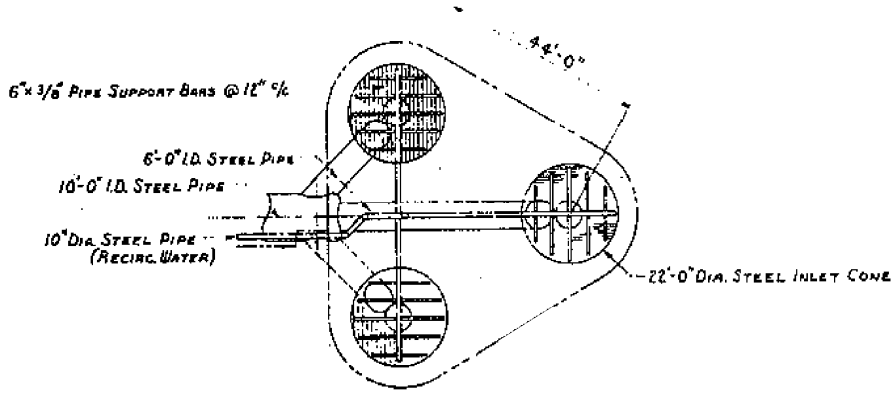

N
Sandy Bay Creek
Fischer Creek
Lakeview Drive
Sandy Bay Cemetery
Unnamed Tributary
Lake Michigan
Auxilary Building
Screenhouse
Intake
Substation/ Switchyard
Nuclear Road
Turbine Building
Sewage Treatment Plant
Containment
Unnamed Tributary
0
0.5
1
Miles
Legend
Plant Structures
Property Boundary
Exclusion Radius (1200 m)
Stream
Water
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.1-3 Site Map




PLAN

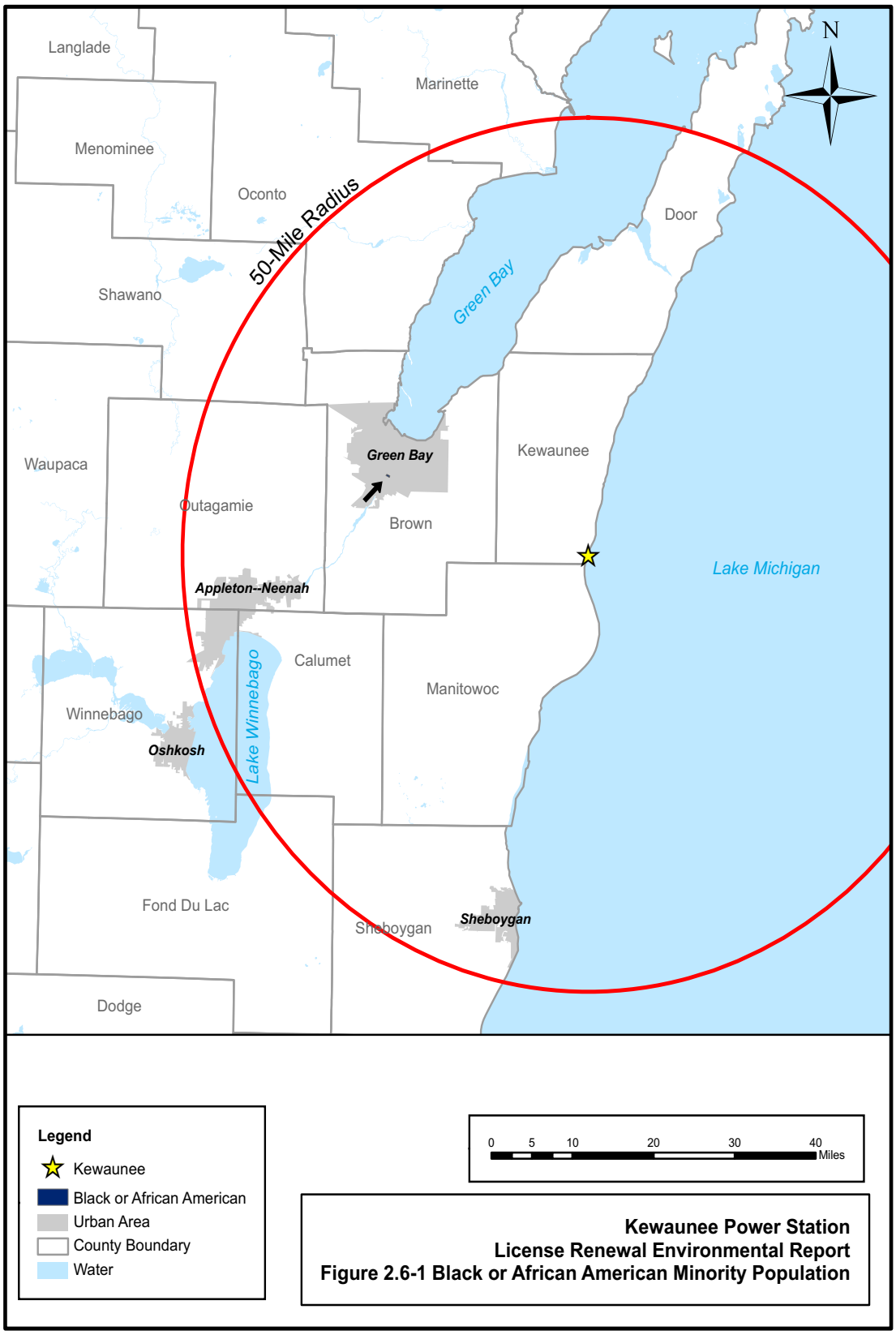


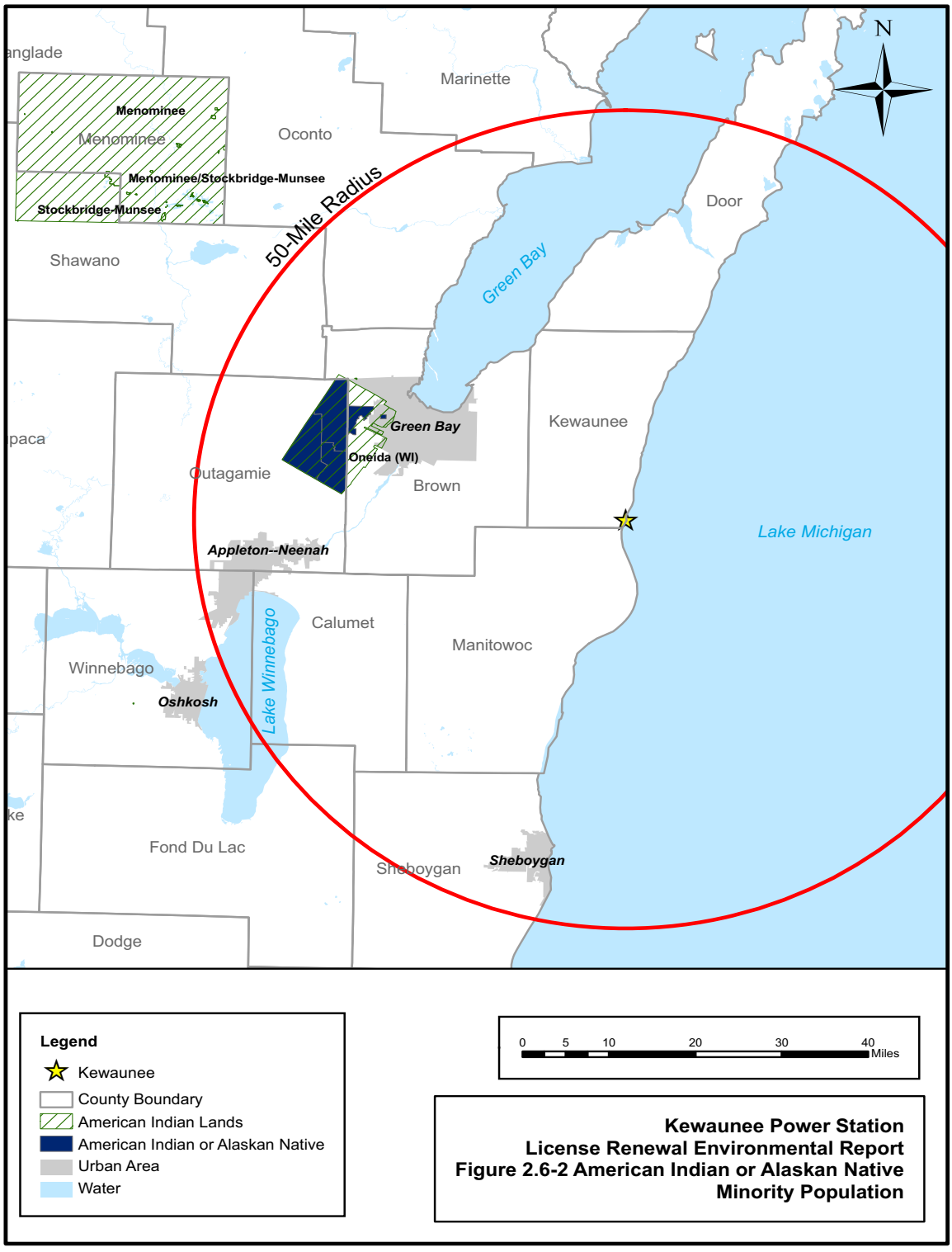

PROFILE

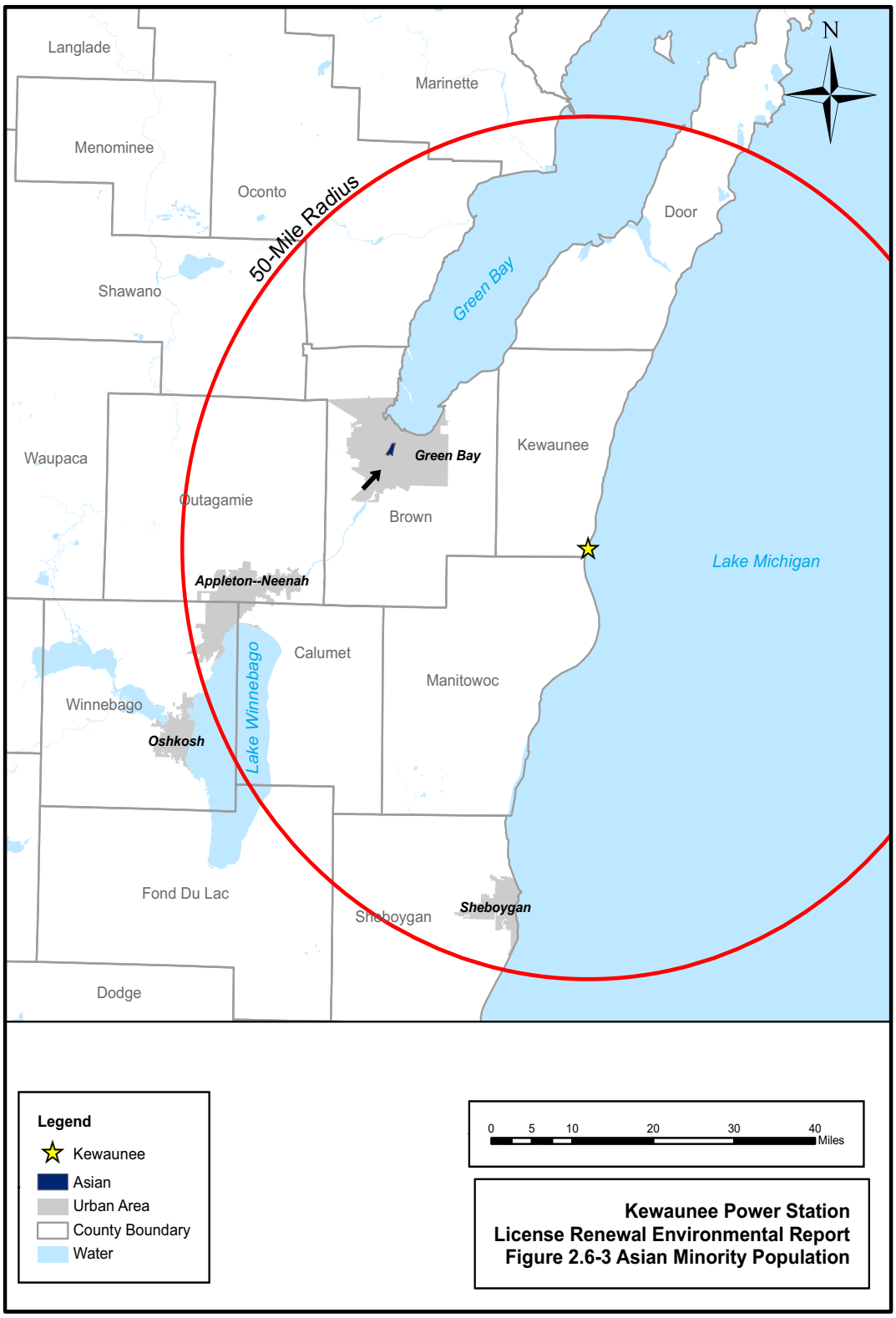


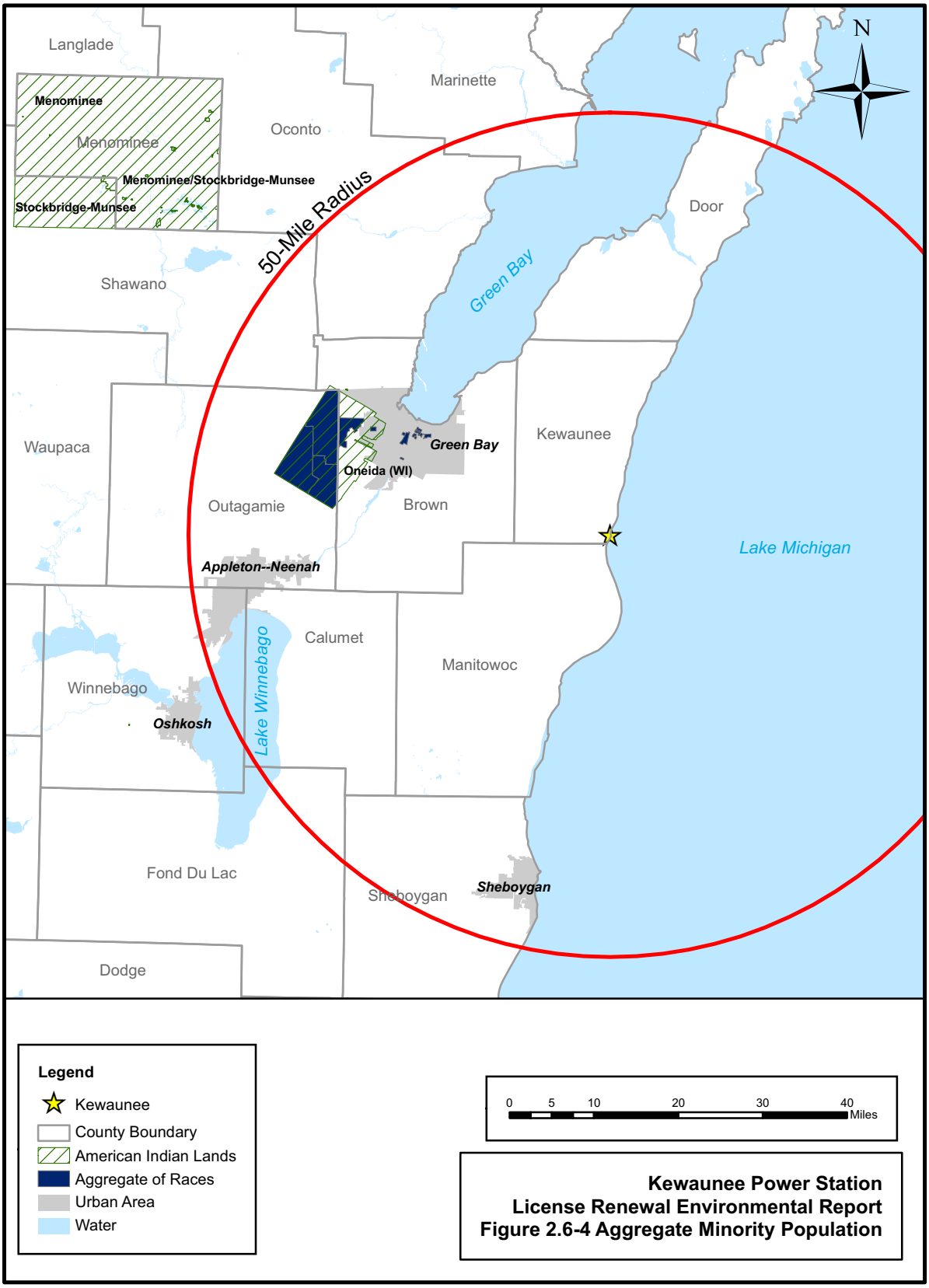

DETAIL - INTAKE INLET

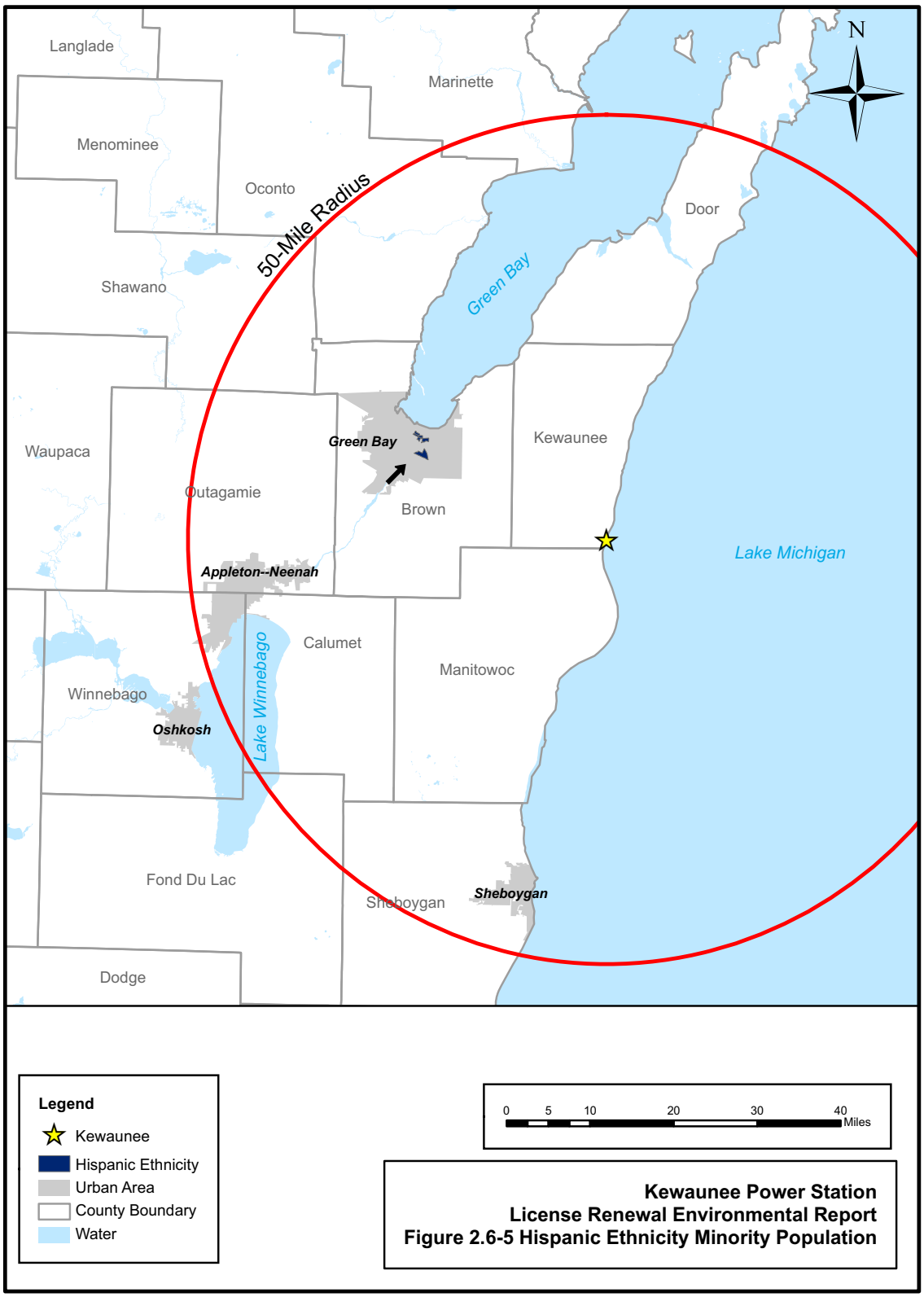
**Kewaunee Power Station**
**License Renewal Environmental Report**
**Figure 2.1-4 Intake Diagram**

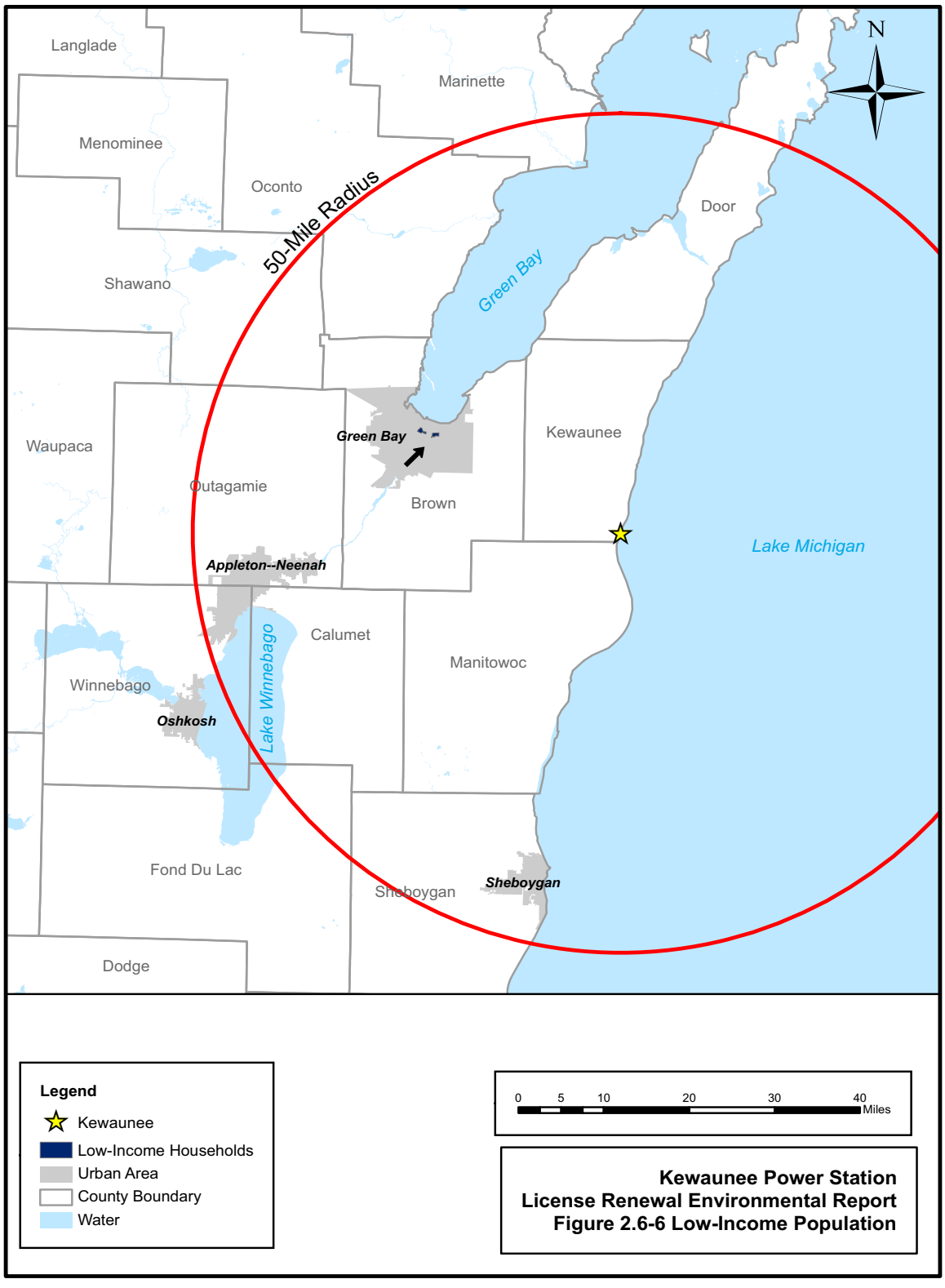

N
Langlade
Marinette
Menominee
Oconto
50-Mile Radius
Door
Green Bay
Shawano
Waupaca
Green Bay
Kewaunee
Outagamie
Brown
Lake Michigan
Appleton--Neenah
Calumet
Manitowoc
Winnebago
Lake Winnebago
Oshkosh
Fond Du Lac
Sheboygan
Sheboygan
Dodge
Legend
Kewaunee
Black or African American
Urban Area
County Boundary
Water
0 5 10 20 30 40
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.6-1 Black or African American Minority Population


N
anglade
Marinette
Menominee
Menominee
Oconto
Menominee/Stockbridge-Munsee
Stockbridge-Munsee
50-Mile Radius
Door
Shawano
Green Bay
Green Bay
Oneida (WI)
Kewaunee
paca
Outagamie
Brown
Lake Michigan
Appleton--Neenah
Calumet
Manitowoc
Winnebago
Lake Winnebago
Oshkosh
ke
Fond Du Lac
Sheboygan
Sheboygan
Dodge
Legend
Kewaunee
County Boundary
American Indian Lands
American Indian or Alaskan Native
Urban Area
Water
0 5 10 20 30 40
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.6-2 American Indian or Alaskan Native
Minority Population


N
Langlade
Marinette
Menominee
Oconto
50-Mile Radius
Door
Green Bay
Shawano
Waupaca
Green Bay
Kewaunee
Outagamie
Brown
Lake Michigan
Appleton--Neenah
Calumet
Manitowoc
Winnebago
Lake Winnebago
Oshkosh
Fond Du Lac
Sheboygan
Sheboygan
Dodge
Legend
Kewaunee
Asian
Urban Area
County Boundary
Water
0 5 10 20 30 40
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.6-3 Asian Minority Population


Langlade
Marinette
Menominee
Oconto
Menominee
Menominee/Stockbridge-Munsee
Stockbridge-Munsee
50-Mile Radius
Door
Green Bay
Shawano
Waupaca
Green Bay
Kewaunee
Oneida (WI)
Outagamie
Brown
Lake Michigan
Appleton--Neenah
Calumet
Manitowoc
Winnebago
Lake Winnebago
Oshkosh
Fond Du Lac
Sheboygan
Sheboygan
Dodge
N
Legend
Kewaunee
County Boundary
American Indian Lands
Aggregate of Races
Urban Area
Water
0 5 10 20 30 40
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.6-4 Aggregate Minority Population


N
Langlade
Marinette
Menominee
Oconto
50-Mile Radius
Door
Green Bay
Shawano
Waupaca
Green Bay
Kewaunee
Outagamie
Brown
Lake Michigan
Appleton--Neenah
Calumet
Manitowoc
Winnebago
Lake Winnebago
Oshkosh
Fond Du Lac
Sheboygan
Sheboygan
Dodge
Legend
Kewaunee
Hispanic Ethnicity
Urban Area
County Boundary
Water
0 5 10 20 30 40
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.6-5 Hispanic Ethnicity Minority Population


Langlade
Marinette
Menominee
Oconto
Door
50-Mile Radius
Green Bay
Shawano
Waupaca
Green Bay
Kewaunee
Outagamie
Brown
Lake Michigan
Appleton--Neenah
Calumet
Manitowoc
Winnebago
Lake Winnebago
Oshkosh
Fond Du Lac
Sheboygan
Sheboygan
Dodge
N
Legend
Kewaunee
Low-Income Households
Urban Area
County Boundary
Water
0 5 10 20 30 40
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.6-6 Low-Income Population

## 2.13 References

AEC (U.S. Atomic Energy Commission) 1972. *Final Environmental Statement Related to Operation of Kewaunee Nuclear Power Plant*. Docket No 50-305. Directorate of Licensing. Washington, DC. December. NRC ADAMS Accession Number 3000007089.

Armstrong, P. K. 1999. *Hine's Emerald Dragonfly: A Globally Rare Gem*. Chicago Wilderness Magazine Available online at http://chicagowildernessmag.org/issues/summer1999/hines.html. Accessed on November 21, 2007.

AVD (AVD Archaeological Services, Inc.) 2007. *Phase I Archaeological survey at the Kewaunee Power Station in Kewaunee County, Wisconsin*. Union Grove, WI. August.

Bach, W.H. 1933. *60 years ago—Some Reminiscences by W.H. Bach, and Old Time Resident*. Kewaunee Enterprise. Available online at http://www.wisconsinhistory.org/wlhba/articleView.asp?pg=1&id=7853&hdl=&np=Kewaunee+Enterprise&adv=yes&ln=&fn=&q=&y1=&y2=&ci=&co=&mhd=&shd=. Accessed on February 22, 2007.

BCPC (Brown County Planning Commission) 2004. *Brown County Comprehensive Plan*. Adopted October 20, 2004. Amended May 23, 2007.

BLRPC (Bay-Lake Regional Planning Commission). 2005. *Bay-Lake Regional 2030 Regional Comprehensive Plan*. Available online at http://www.baylakerpc.org/REGIONALPLAN/Final/Bay-Lake%20Regional%202030%20Comprehensive%20Plan.pdf. Accessed on November 12, 2007.

BLRPC (Bay-Lake Regional Planning Commission). 2006. 2006 Comprehensive Economic Development Strategy (CEDS) Annual Report. Available online at: http://www.baylakerpc.org/Documents/Region/2006CEDS.pdf. Accessed on June 3,2008.

BLRPC (Bay-Lake Regional Planning Commission). 2007. *Manitowoc County Comprehensive Planning*. Available online at http://www.baylakerpc.org/MANITOWO/CountyPlan/Intro_County.html. Accessed on March 4, 2008.

CBCWA (Central Brown County Water Authority) 2007a. *Authority Asks Residents To Help Environment During Celebration*, December 3. Available online at http://www.cbcwaterauthority.com/ConstructionUpdates/put_down_the_water_bottles.pdf. Accessed on March 4, 2008.

CBCWA (Central Brown County Water Authority) 2007b. *Authority Communities Approve Hobart Emergency Connect*, December 13. Available online at http://www.cbcwaterauthority.com/ConstructionUpdates/hobartconnect.pdf. Accessed on March 4, 2008.

Crawford, S. S. 2001. *Salmonine Introductions to the Laurentian Great Lakes: An Historical Review and Evaluation of Ecological Effects*. Canadian Special Publication of Fisheries and Aquatic Sciences 132. National Research Council Canada Monograph Series, NRC Research Press, Ottawa. Summary available online at http://www.uoguelph.ca/%7Escrawfor/research/research_greatlakes/research_greatlakes_fisheries/research_greatlakes_fisheries_issues/research_greatlakes_fisheries_issues_salmon_monograph.shtml. Accessed on November 21, 2007.

DEK (Dominion Energy Kewaunee) 2008a. *Groundwater Usage at KPS*. Memo to Richard Gallagher – DEK Environmental Lead Kewaunee License Renewal Project from Thomas Hooker DEK Nuclear Projects on January 11, 2008.

DEK (Dominion Energy Kewaunee) 2008b. *DEK Net Book Value Data.* Email to Amy Stanford and Anne Lovell – TtNUS from Richard Gallagher – DEK Environmental Lead Kewaunee License Renewal Project on May 2, 2008.

Door County 2008. *Door County Wisconsin Visitor Bureau.* Available online at http://doorcounty.com. Accessed on June 3, 2008.

Eggold, B. and J. Zinuticz. 2006. *Sport Fishing Effort and Harvest at Lake Michigan Management Reports*. Wisconsin Department of Natural Resources. Available online at http://dnr.wi.gov/fish/lakemich/Great%20Lakes%20Fishery%20Commission%20Report%202006.pdf. Accessed on February 13, 2007.

EPA (U.S. Environmental Protection Agency). 1995. *The Great Lakes: An Environmental Atlas and Resource Book (Third Edition). Factsheet 1*. Jointly produced by the Government of Canada and the U.S. Environmental Protection Agency. Available online at http://www.epa.gov/glnpo/atlas/gl-fact1.html. Accessed on November 21, 2007.

EPA (U.S. Environmental Protection Agency). 2006a. *Lake Michigan Lakewide Management Plan 2006*. Chicago, Illinois. Available online at http://www.epa.gov/glnpo/lakemich/2006. Accessed on November 21, 2007.

EPA (U.S. Environmental Protection Agency). 2006b. *National Ambient Air Quality Standards for Particulate Matter; Final Rule*. Federal Register, Vol. 71, No. 200, pp. 61144-61233. October 17.

EPA (U.S. Environmental Protection Agency). 2006c. *PM Standards Revision-2006*. Available online at http://www.epa.gov/oar/particlepollution/naaqsrev2006.html. Accessed on June 4, 2008.

EPA (U.S. Environmental Protection Agency). 2008a. *Approval and Promulgation of Implementation Plans and Designation of Areas for Air Qulaity Planning Purposes; Wisconsin; Redesignation of Kewuanee County to Attaiment of Ozone; Final Rule*. Federal Register, Vol. 73, No. 99, pp. 29436-29444. May 21.

EPA (U.S. Environmental Protection Agency). 2008b. *Clean Air Interstate Rule*. Available online at http://www.epa.gov/cair/index.html. Accessed on June 4, 2008.

EPA (Environmental Protection Agency). 2008c. *Envirofacts Data Warehouse for Kewaunee County, Wisconsin*. Available online at http://www.epa.gov/enviro/ Accessed on June 4, 2008.

EPA (Environmental Protection Agency). 2008d. *Envirofacts Data Warehouse for Manitowoc County, Wisconsin*. Available online at http://www.epa.gov/enviro/. Accessed on June 4, 2008.

Fishel, R. 1996. *The Oneota Culture*. The University of Iowa. Iowa City, Iowa. Available online at http://www.uiowa.edu/~osa/learn/prehistoric/oneota.htm. Accessed on November 27, 2007.

Fleischer, G., T. DeSorcie, and J. Holuszko, 2001. *Lake-Wide Distribution of Dreissena in Lake Michigan, 1999*. Journal of Great Lakes Research (2001) 27(2): 252-257. Available online at http://sgnis.org/publicat/papers/fleideso.pdf. Accessed on November 27, 2007.

Fuller, P., E. Maynard, and D. Raikow, 2007. *Alosa pseudoharengus (alewife)*. USGS Nonindigenous Aquatic Species Database, Gainesville, Florida. Available online at http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=490. Accessed on November 26, 2007.

Fuller, P., L. Nico, and E. Maynard, 2007. *Petromyzon marinus (sea lamprey)*. USGS Nonindigenous Aquatic Species Database, Gainesville, Florida. Available online at http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=836. Accessed on November 26, 2007.

KCGH (Kewaunee County Genealogy and History) 2007. *St. John's Lutheran Cemetery*. Transcriptions from the book "Cemetery Transcriptions of Kewaunee County" written in 1978. Available online at http://www.rootsweb.com/~wikewaun/cem4.htm. Accessed on November 7, 2007.

KCHS (Kewaunee County Historical Society) 2002. *Background for Historical Markers*. Compiled information by Donna Urban (KCHS). March 2002.

KCHS (Kewaunee County Historical Society) 2005. *Historic and Archeological Resources in the Vicinity of KPS*. Phone call to Richard J. Gallagher – DEK Environmental Lead Kewaunee License Renewal Project from Thomas Schuller – KCHS President on November 30, 2005.

KCLWCD (Kewaunee County Land & Water Conservation Department). 2007. *Kewaunee County Farmland Preservation Plan, 2007 Update*. Available online at http://www.kewauneeco.org/LWCD_Web_Site/Ag%20Pres%20Plan.htm, 2007. Accessed on March 4, 2008

Kewaunee County undated. *Kewaunee History*. Available online at http://www.kewauneeco.org/subpages/History/history.htm. Accessed on November 21, 2007.

Kewaunee County. 2007. *Kewaunee County 20-Year Comprehensive Plan*. Available online at http://www.baylakerpc.org/Documents/Kewaunee_County/Kewaunee_County_Comp_Plan_November_2007.pdf. Accessed on June 12, 2008.

Kewaunee Fabrications. 2008. *About Us*. Available online at http://www.kewauneefabrications.com/about/index.html. Accessed on June 5, 2008.

KPS (Kewaunee Power Station) 2007a. *Kewaunee Power Station Updated Safety Analysis Report*, Revision 20. April 19.

KPS (Kewaunee Power Station) 2007b. *Kewaunee Power Station Terrestrial Ecology Site Survey, 2006-2007*.

Madenjian, C. P., D. B. Bunnell, T. J. DeSorcie, J. D. Holuszko, and J.V. Adams. 2006. *Status and Trends of Prey Fish Populations in Lake Michigan, 2005*. Presented at Annual Lake Michigan Committee Meeting of Great Lakes Fishery Commission. Windsor, Ontario. March 23. Available online at http://www.glsc.usgs.gov/_files/reports/2005LakeMichiganReport.pdf. Accessed on February 13, 2007.

Makarewicz, J. C., T. Lewis, and P. Bertram. 1994. *Epilimnetic Phytoplankton and Zooplankton Biomass and Species Composition in Lake Michigan, 1983 to 1992*. U.S. Environmental Protection Agency, Great Lakes Program Office. Chicago. Available online at http://www.epa.gov/greatlakes/monitoring/plankton/mich83-92/michplankton83-92-01x.pdf. Accessed on November 21, 2007.

Mitchell, K., and C. Carnes. 2006. *Wild Lupine and Karner Blue Butterflies*. U.S. Fish and Wildlife Service, Ft. Snelling, MN. Available online at http://www.fws.gov/Midwest/endangered/insects/kbb/lupine.html. Accessed on October 20, 2006.

Moy, P. 2001. *Why are the alewives dying?* From Fish of the Great Lakes. Wisconsin Sea Grant. Available online at http://www.seagrant.wisc.edu/greatlakesfish/textonly/alewifenews.html. Accessed on November 21, 2007.

Nalepa, T. F., D. J. Hartson, D. C. Fanslow, G. A. Lang, and S. J. Lozano. 1998. *Declines in Benthic Macroinvertebrate Populations in Southern Lake Michigan, 1980-1993*. Canadian Journal of Fisheries and Aquatic Sciences 55: 2402-2413. Available online at http://www.glerl.noaa.gov/pubs/fulltext/1998/19980005.pdf. Accessed on November 21, 2007.

NES (Nalco Environmental Sciences). 1976. *Kewaunee Nuclear Power Plant 316(a) Demonstration – Type I: Absence of Prior Appreciable Harm*. Prepared by Nalco Environmental Sciences, Northbrook, Illinois, for Wisconsin Public Service Corporation, Green Bay, Wisconsin.

NMC (Nuclear Management Company) 2004. *Applicant's Environmental Report – Operating License Renewal Stage Point Beach Nuclear Plant, Units 1 and 2*. February. NRC ADAMS Accession Number ML040580025.

NPS (National Park Service) 2006a. *National Register of Historic Places Information System. Manitowoc County*. Available online at www.nr.nps.gov. Accessed on November 27, 2006.

NPS (National Park Service) 2006b. *National Register of Historic Places Information System. Kewaunee County*. Available online at www.nr.nps.gov. Accessed on November 27, 2006.

NPS (National Park Service) 2006c. *Ice Age National Scenic Trail*. Available online at www.nr.nps.gov. Accessed on November 27, 2006.

NRC (U.S. Nuclear Regulatory Commission). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)*. Volumes 1 and 2. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

NRC (U.S. Nuclear Regulatory Commission). 2004. *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues*. Appendix D. NRR Office Instruction No. LIC-203, Revision 1. May 24. NRC ADAMS Accession Number ML033550003.

NRC (U.S. Nuclear Regulatory Commission). 2005. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 23, Regarding Point Beach Nuclear Plant Units 1 and 2*. August. NRC ADAMS Accession Number ML052230490.

OA (OMNNI Associates). 2007. *Land Use Percentages in the Town of Carlton*. Email to Nicole Hill – TtNUS from Kris Lyons – OMNNI Associates on November 15, 2007.

OA (OMNNI Associates). Undated. *Draft Comprehensive Smart Growth Plan for the Village of Casco and the Towns of Carlton, Casco, Lincoln, Montpelier, and West Kewaunee*. Available online at http://www.omnni.com/ActiveProjects/Carlton.htm. Accessed on November 7, 2007.

Oneida Nation. 2004. *Official Website of the Sovereign Oneida Nation of Wisconsin*. Available online at http://www.oneidanation.org. Accessed on December 6, 2006.

Peeters, P. 1998. *Into Lake Michigan's Waters*. Wisconsin Natural Resources Magazine. June 1998. Available online at http://www.wnrmag.com/stories/1998/jun98/mich.htm. Accessed on November 21, 2007.

Schloesser, D. W., T. F. Nalepa, and G. L. McKie. 1996. *Zebra Mussel Infestation of Unionid Bivalves (Unionidae) in North America*. American Zoologist 36: 300-310. Available online at http://sgnis.org/publicat/papers/zool_36.pdf. Accessed on November 21, 2007.

TtNUS (Tetra Tech NUS, Inc.). 2006. *Calculation Package for Population Density and Environmental Justice included in ER Section 2.6 Regional Demography*. Aiken, South Carolina. December 6.

TtNUS (Tetra Tech NUS, Inc.). 2008. *Public Water Supply Systems Capacity and Average Daily Use*. Multiple Utility Contacts by Tetra Tech NUS, Inc. Aiken, South Carolina. April 8.

USCB (U.S. Census Bureau). 2003a. *Table 7. Population in Combined Statistical Areas (CSAs) and Their Component Metropolitan and Micropolitan Statistical Areas in Alphabetical Order and Numerical and Percent Change for the United States and Puerto Rico: 1990 and 2000*. Available online at http://www.census.gov/population/www/cen2000/phc-t29.html. Accessed on December 1, 2006.

USCB (U.S. Census Bureau). 2003b. *Table 2a. Population in Metropolitan and Micropolitan Statistical Areas and Their Geographic Components in Alphabetical Order and Numerical and Percent Change for the United States and Puerto Rico: 1990 and 2000*. Available online at http://www.census.gov/population/www/cen2000/phc-t29.html. Accessed on December 1, 2006.

USCB (U.S. Census Bureau). 2003c. *Wisconsin: 2000 Census of Population and Housing, Population and Housing Unit Counts*. U.S. Department of Commerce. Economics and Statistics Administration. Washington DC. August. Available on line at http://www.census.gov/prod/cen2000/phc-3-51.pdf. Accessed April 18, 2008.

USCB (U.S. Census Bureau). 2008a. *State and County QuickFacts – Kewaunee County, Wisconsin*. Available online at http://quickfacts.census.gov/qfd/states/55/55061.html. Accessed on June 6, 2008.

USCB (U.S. Census Bureau). 2008b. *State and County QuickFacts – Manitowoc County, Wisconsin*. Available online a http://quickfacts.census.gov/qfd/states/55/55071.html. Accessed on June 6, 2008.

USFWS (U.S. Fish & Wildlife Service). 2001a. *Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the Great Lakes Breeding Population of the Piping Plover; Final Rule*. Federal Register, Vol. 66, No. 88, pp. 22938-22969. May 7.

USFWS (U.S. Fish & Wildlife Service). 2001b. *Fact sheet: Pitcher's Thistle (Cirsium pitcheri)*. US Fish and Wildlife Service, Ft. Snelling, MN. Available online at http://midwest.fws.gov/endangered. Accessed on October 20, 2006.

USFWS (U.S. Fish & Wildlife Service). 2002. *Endangered Species Fact Sheet: Karner Blue Butterfly*. U.S. Fish and Wildlife Service, Ft. Snelling, MN. Available online at http://www.fws.gov/Midwest/endangered/insects/kbb/lupine.html. Accessed on October 20, 2006.

USFWS (U.S. Fish & Wildlife Service). 2003. *Recovery plan for the Great Lakes Piping Plover (Charadrius melodus)*. U.S. Fish and Wildlife Service, Ft. Snelling, MN. Available online at http://www.fws.gov/northeast/nyfo/es/GLplover03.pdf. Accessed on November 21, 2007.

USFWS (U.S. Fish & Wildlife Service). 2006a. *Endangered Species in Wisconsin: County Distribution of Federally-Listed Endangered, Threatened, Proposed and Candidate Species*. U.S. Fish and Wildlife Service, Ft. Snelling, MN. Available online at http://www.fws.gov/midwest/endangered/lists/wisc-cty.pdf. Accessed on October 20, 2006.

USFWS (U.S. Fish & Wildlife Service). 2006b. *Threatened and Endangered Species: Hine's Emerald Dragonfly (Somatochlora hineana)*. U.S. Fish and Wildlife Service, Ft. Snelling, MN. Available online at http://www.fws.gov/midwest/endangered/insects/hed/hins_fct.html. Accessed on October 20, 2006.

USFWS (U.S. Fish & Wildlife Service). 2006c. *Fact Sheet: Dwarf Lake Iris (Iris lacustris)*. U.S. Fish and Wildlife Service, Ft. Snelling, MN. Available online at http://www.fws.gov/midwest/endangered/plants/dwarflak.html. Accessed on October 20, 2006.

USFWS (U.S. Fish & Wildlife Service). 2007. *Endangered and Threatened Wildlife and Plants' Removing The Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Species; Final Rule*. Federal Register, Vol. 72, No. 130, pp. 37345-37372. July 9.

USGS (U.S. Geological Survey), 2007. *Invasive Species: Sea Lamprey*. Prepared by U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. Available online at http://www.umesc.usgs.gov/invasive_species.html. Accessed on November 26, 2007.

Vollrath 2006. *About Us*. Available online at http://vollrathoem.com/about.htm. Accessed on October 30, 2006.

WDNR (Wisconsin Department of Natural Resources). 2000. *Wisconsin's Capacity Development Strategy*. Available online at http://dnr.wi.gov/org/water/dwg/CapDevl/Capacity%20Development.ps.pdf. Accessed on December 15, 2006.

WDNR (Wisconsin Department of Natural Resources). 2003. *Piping Plover (Charadrius melodus)*. Available online at http://dnr.wi.gov/org/land/er/factsheets/birds/plover.htm. Accessed on December 10, 2006.

WDNR (Wisconsin Department of Natural Resources). 2004. *Wisconsin Endangered and Threatened Species Laws & Lists*, PUBL ER-001. Wisconsin Department of Natural Resources, Endangered Resources Program, Madison, WI. Available online at http://dnr.wi.gov/org/land/er. Accessed on November 21, 2007.

WDNR (Wisconsin Department of Natural Resources). 2006a. *Coastal Wetlands of Wisconsin's Great Lakes: Northern Lake Michigan, M14 – Black Ash Swamp Area*. Available online at http://www.dnr.state.wi.us/Org/land/er/publications/cw/NLMich/index.asp?mode=detail&RecID=1E8D9229F9C. Accessed on November 21, 2007.

WDNR (Wisconsin Department of Natural Resources). 2006b. *Hine's Emerald Somatochlora hineana Williamson*. Available online at http://www.dnr.state.wi.us/org/land/er/invertebrates/dragonflies/hinesemerald.htm. Accessed on October 24, 2007.

WDNR (Wisconsin Department of Natural Resources). 2007a. *Nuisance Algae (Cladophora) In Lake Michigan*. Available online at http://www.dnr.state.wi.us/org/water/greatlakes/cladophora. Accessed on February 27, 2007.

WDNR (Wisconsin Department of Natural Resources). 2007b. *Municipal Supply Wells in Brown, Kewaunee, and Manitowoc Counties*. Downloaded from the DNR Drinking Water System: High Capacity Wells Database. Available online at http://prodmtex00.dnr.state.wi.us/pls/inter1/hicap$.startup. Accessed on November 30, 2007.

WDNR (Wisconsin Department of Natural Resources). 2007c. *FPL Energy Point Beach, LLC High Capacity Well Data*. Downloaded from the DNR Drinking Water System: High Capacity Wells Database. Available online at http://prodmtex00.dnr.state.wi.us/pls/inter1/hicap$.startup. Accessed on November 30, 2007.

WDNR (Wisconsin Department of Natural Resources). 2007d. *Dominion Energy Kewaunee, Inc. High Capacity Well Data*. Downloaded from the DNR Drinking Water System: High Capacity Wells Database. Available online at http://prodmtex00.dnr.state.wi.us/pls/inter1/hicap$.startup. Accessed on November 30, 2007.

WDNR (Wisconsin Department of Natural Resources). 2007e. *Natural Heritage Inventory County Maps*. Available online at http://www.dnr.state.wi.us/org/land/er/nhi/CountyMaps. Accessed on November 26, 2007.

WDNR (Wisconsin Department of Natural Resources). 2007f. *Public Water Systems.* Revised January 12, 2007. Available online at http://prodoasext.dnr.wi.gov/inter1/pws2$.startup. Accessed on December 7, 2007.

WDNR (Wisconsin Department of Natural Resources). 2008. *High Capacity Wells in Brown, Kewaunee, and Manitowoc Counties*. Downloaded from the DNR Drinking Water System: High Capacity Wells Database. Available online at http://prodoasext.dnr.wi.gov/inter1/hicap$.startup. Accessed on March 11, 2008.

WDOA (Wisconsin Department of Administration). 2004a. *Wisconsin Population 2030: A Report of Projected State, County, and Municipal Populations and Households for the Period 2000-2030*. Demographic Services Center, Division of Intergovernmental Relations. Available online at http://www.doa.state.wi.us/pagesubtext_detail.asp?linksubcatid=105. Accessed on December 1, 2006.

WDOA (Wisconsin Department of Administration). 2004b. *Final Population Projections for Wisconsin Counties by Sex: 2000-2030*. Demographic Services Center, Division of Intergovernmental Relations. Available online at http://www.doa.state.wi.us/pagesubtext_detail.asp?linksubcatid=105. Accessed on December 1, 2006.

WDOA (Wisconsin Department of Administration). 2006. *Tribes of Wisconsin*. Division of Intergovernmental Relations. February.

WDOA (Wisconsin Department of Administration). 2008. *Wisconsin's Comprehensive Planning Legislation – Revised April 2008*. Available online at http://www.doa.state.wi.us/docview.asp?docid=5436&locid=9. Accessed on June 6, 2008.

WDOC (Wisconsin Department of Commerce) 2003. *County Economic Profile: Kewaunee County*. July. Available online at http://commerce.wi.gov/BDdocs/BD-profile-kewaunee.pdf. Accessed on December 7, 2007.

WDOR (Wisconsin Department of Revenue). 2007a. *Draft Shared Revenue Utility Payments*. Available online at http://www.revenue.wi.gov/. Accessed on December 4, 2007.

WDOR (Wisconsin Department of Revenue). 2007b. *County and Municipal Revenues and Expenditures – 2000 (Published February 2001) through 2005 (Published February 2007)*. Available online at http://www.revenue.wi.gov/report/r.html. Accessed on June 6, 2008.

WDOR (Wisconsin Department of Revenue) 2007c. *Utility Shared Revenues for the Town of Carlton*. Email to Nicole Hill – TtNUS from Daniel Huegel – WDOR Sales and Property Tax Policy Team on November 30, 2007.

WDOT (Wisconsin Department of Transportation). 2007a. *Travel Information – Traffic Count Maps by County*. Available online at http://www.dot.wisconsin.gov/travel/counts/index.htm. Accessed on November 9, 2007.

WDOT (Wisconsin Department of Transportation) 2007b. *Level of Service Information for Kewaunee and Manitowoc Counties*. Email to Nicole Hill – TtNUS from Anne Ebent – WDOT NE Region Planning on November 28, 2007.

WHS (Wisconsin Historical Society). 2006. *An Overview of Cultural Periods in Wisconsin Archaeology*. Available online at www.wisconsinhistory.org. Accessed on November 27, 2006.

WPSC (Wisconsin Public Service Corporation) 1987. *Forest Dedicated – Krofta's Dream Becomes Memorial*. Shoreline Newsline. Fall 1987.

# 3.0 PROPOSED ACTION

**NRC**

**"The report must contain a description of the proposed action…" 10 CFR 51.53(c)(2)**

Dominion Energy Kewaunee (DEK) proposes that NRC renew the operating license for Kewaunee Power Station (KPS) for an additional 20 years beyond the current license's expiration date of December 21, 2013. Renewal of the operating license would give DEK and the State of Wisconsin the option of relying on KPS to meet future electricity needs. Section 3.1 discusses the major features of the plant and the operation and maintenance practices directly related to the license renewal period. Sections 3.2 through 3.4 address potential changes that could occur as a result of license renewal.

## 3.1 General Plant Information

General information about the plant is available in several documents. In 1972, the U.S. Atomic Energy Commission, the predecessor agency of NRC, prepared a *Final Environmental Statement Related to Operation of Kewaunee Nuclear Power Plant* (AEC 1972). The *NRC Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (NRC 1996, pg. A-36) describes KPS features. An Updated Safety Analysis Report has been maintained for KPS (KPS 2007). DEK has referred to each of these documents while preparing this environmental report for license renewal.

### 3.1.1 Reactor and Steam-Electric Systems

KPS is a two-loop closed-cycle pressurized water nuclear reactor with a turbine-generator, both of which were furnished by Westinghouse Electric Corporation. The remainder of the unit was designed and constructed with engineering support from Pioneer Services and Engineering. The original steam generators were replaced in 2001. The reactor is housed in a double containment consisting of a cylindrical steel shell which is surrounded by a reinforced concrete cylindrical shield building (KPS 2007).

KPS fuel is slightly enriched (less than 5 weight percent) uranium dioxide with an average burnup for the peak rod of 17,500 megawatt days per metric ton uranium (KPS 2007).

KPS was originally licensed for a thermal output of 1,650 Megawatts-thermal (MWt) and gross electrical output of 535 Megawatts-electric (MWe). In 2004, the plant received a license amendment that increased the thermal output to 1,772 MWt (KPS 2007). The generating capacity for the plant was increased to 590 megawatts gross electrical power (NRC 2004).

Engineered Safety Features (ESF) are provided to mitigate the consequences of postulated accidents, including loss-of-cooling accidents. Engineered safety features provide protection to the public and plant personnel against the release of radioactive products from the reactor system, particularly as the result of a loss-of-cooling accident. ESF localize, control, mitigate, and terminate such accidents to

hold exposure levels below the applicable limits of 10 CFR 100. (KPS 2007) Figure 3.1-1 shows the plant layout.

### 3.1.2 Cooling and Auxiliary Water Systems

KPS utilizes a once-through cooling system that withdraws water from and discharges to Lake Michigan. The cooling system removes waste heat from the condensers, as well as other plant equipment, and discharges through a structure into the shallow bottom of Lake Michigan. (KPS 2007) The normal flow rate at the condenser, with two circulating water pumps running, is approximately 400,000 gallons per minute (gpm) (WDNR 2005).

The circulating water intake system is designed to provide a reliable supply of Lake Michigan water, regardless of weather or lake conditions, to the suction of two circulating water pumps, four service water pumps and two fire pumps. The intake structure is located approximately 1,600 feet from the shore in a water depth of 15 feet (KPS 2007). The intake consists of a submerged cluster of three vertical 22-foot diameter inlets with trash grilles of 2 feet by 2 feet. The trash grilles are provided with recirculated water to remove any ice formations (DEK 2007a). The three inlet cones are reduced to 6-foot diameter steel pipes which join at a trifurcation into one 10-foot diameter steel pipe which is buried a minimum of 3 feet below lake floor. The velocity at the surface of the intakes at the full plant load is <1 foot per second (fps) (KPS 2007). Figure 3.1-2 illustrates the configuration of the intake.

The plant intake is also equipped with two auxiliary water intake tees 50 and 100 feet shoreward of the intake crib. Each tee has a 30-inch opening rising vertically to one foot above the lake bottom. Special screened cover plates are suspended 12 inches above the intake openings to exclude entrainment of debris. Each auxiliary water intake can supply water in excess of 24,000 gpm (KPS 2007).

The 10-foot diameter steel intake pipe carries the water to a 56.5-foot by 25-foot forebay with an overflow weir whose crest is at Elevation 582.5 feet. The weir has a bottom length of 38.5 feet and side slopes of 45°. The forebay normal water surface with two circulating water pumps in operation at normal lake levels is 570 feet and with one pump in operation it is 575 feet. From the forebay, water passes through four 10-foot wide by 36-foot long traveling screens with a mesh size of 3/8 inch. Two of the screens are powered from the emergency safeguards buses. The screens are provided with automatic back washing. Fish and debris that are washed off these screens are returned to the lake via the discharge tunnel. The water is then pumped by two vertical dry-pit circulating water pumps; each designed to supply 210,000 gpm at a total differential head of 27.5 feet. (KPS 2007)

Normal operation is with one or two circulating water pumps and three to four service water pumps operating (Dominion 2008, NMC 2004). Normally, only one circulating water pump is required during the winter months. Intake velocity is less than one foot per second. Water velocity through the traveling water screens at design flow is less than 2.4 feet per second at low water depth (KPS 2007).

Circulating water is returned to the lake from the discharge tunnel by a 10-foot diameter concrete pipe to a discharge structure with sheet piling walls and a concrete floor slab. Recirculating water for de-icing the inlet grilles is taken from the 10-foot diameter discharge line by a recirculating water pump. Traveling screen backwash water, fish, and debris are returned to this line. A 30-inch recirculating water line is provided to recirculate water directly to the traveling screen inlet to prevent ice formation and to provide an auxiliary intake to support operation of both service water trains if the normal intake is unavailable. (KPS 2007)

A hypochlorinating system is provided to intermittently inject sodium hypochlorite into the condenser inlet waterboxes to prevent the build-up of bacterial slime on the condenser tubes and zebra mussels within the system (KPS 2007).

### 3.1.3 Wastewater Treatment

The current sewage treatment plant (STP) was installed in 1986. The system is capable of handling 20,000 gallons of raw sewage per day. Normal plant operations require handling of approximately 11,000 gallons per day. Water makes up approximately 99.95 percent of the sewage processed by the STP; the remaining 0.05 percent is sludge and must be properly treated. After treatment, the treated solids are transported offsite to an approved disposal facility. Approximately 11,000 gallons of water per day are discharged from the system, roughly approximating the sewage flow into the STP (NMC 2003).

### 3.1.4 Radioactive Waste Systems

#### 3.1.4.1 Liquid Radioactive Waste Systems

The Liquid Waste Disposal System collects, processes, stores and disposes of radioactive liquid waste originating in the plant. To facilitate storage, processing and disposal, the system is designed to segregate various waste streams at their point of collection into three categories; these categories are discussed below.

Boron recycled distillates (deaerated waste) either flow into holdup tanks or are collected and transferred in a closed system that drains to a series of processing tanks. The deaerated liquids are then pumped into monitor tanks where they are sampled and analyzed to determine radioactive concentrations. The liquid wastes are then processed as required for reuse or discharged to the environment. (KPS 2007)

The miscellaneous rad waste drain liquids (aerated waste) are collected by gravity and pumps to the aerated waste sump tank or waste holdup tank. The tanks' contents are pumped by the waste evaporator feed pump to a processing system for treatment and removal of radioactivity and eventual release to the environment. (KPS 2007)

The laundry and hot shower area waste liquids are collected in their designated tanks, monitored, processed (if required), and stored pending either

proper release to the environment or routed to the waste hold-up tank for radwaste processing. These liquid's activity levels are usually low enough to permit discharge from the site without processing. (KPS 2007)

Liquids are discharged under controlled conditions and in accordance with applicable limits of 10 CFR 20. Although the radiochemical analysis forms the basis for recording activity in liquid releases, the waste radiation monitor provides surveillance and control over the operation by automatically closing the discharge valve if the liquid activity level exceeds a preset value. (KPS 2007)

#### 3.1.4.2 Gaseous Radioactive Waste Systems

During plant operations, gaseous wastes originate from:

- Degassing reactor coolant discharge to the Chemical Volume Control System,
- Displacement of cover gases as liquids accumulate in various tanks,
- Miscellaneous equipment vents and relief valves, and
- Sampling operations and automatic gas analysis for hydrogen and oxygen in cover gases.

Waste gases are collected and sampled to verify that concentrations of radioactive material are below those specified in 10 CFR 20 for release to the environment (KPS 2007).

#### 3.1.4.3 Solid Radioactive Waste Systems

The solid radiological waste system is designed to package and provide temporary shielded storage facilities for solid wastes prior to shipment from the plant for off-site processing or disposal. The system is designed to meet the requirements of 10 CFR 20, 10 CFR 71, and 49 CFR 170-189. (KPS 2007)

Solid wastes consist mainly of dry active waste (DAW) such as contaminated paper, plastic, wood, metals, and spent resin. Spent resin originates in any of several system ion exchangers which are flushed to a spent resin storage tank. Periodically, the spent resin is transferred to approved packages, de-watered, and stored in a shielded area until they can be analyzed, packaged and shipped. Solid wastes are collected, analyzed, packaged, and shipped from the site per Kewaunee's Solid Radioactive Waste Process Control Program. Solid wastes received at disposal sites must meet the requirements of 10 CFR 61 relating to waste form and classification as well as disposal site-specific regulations. (KPS 2007)

#### 3.1.4.4 Spent Nuclear Fuel Storage

KPS has two storage pools inside the plant with storage capacity for 990 fuel assemblies. DEK has constructed a dry fuel storage facility in

accordance with a general license issued by the NRC. The dry fuel site is north of the plant.

### 3.1.5 Non-Radioactive Waste Systems

KPS generates a number of different waste streams that are all monitored in order to help monitor environmental stewardship in support of the Dominion Environmental Policy. Waste minimization goals are set annually across the Dominion nuclear fleet. Table 3.1-1 tracks the Station's performance towards those goals.

The volume of solid and hazardous wastes generated at Kewaunee varies, depending on outage schedules and ongoing projects. Major construction projects at the site have the potential to increase the amount of both solid and hazardous wastes while normal plant operations generate relatively small amounts. Annual waste generation is not expected to increase as a result of license renewal. (DEK 2008a)

#### General Plant Trash

General plant trash, such as paper, garbage, construction waste and other items, is collected in dumpsters. The majority of it is collected in a compactor dumpster to reduce the volume and number of loads shipped. The dumpster is transported approximately once per month to the Kewaunee County landfill located in the Town of West Kewaunee.

There are also several other smaller dumpsters (garbage and recyclables) to provide service to other parts of the plant. These dumpsters are consolidated into one truck weekly to transport the material to a transfer station for processing. All recyclable metal is collected in barrels and/or dumpsters and sent for recycling.

In 2006/2007, the total amount of trash created at the site averaged approximately 13.1 tons per month. This included approximately 0.7 tons per month of recycled metal and 6.2 tons per month of other recycled material (e.g., paper, cardboard, plastic and glass) (see Table 3.1-1). (DEK 2008a)

#### Used Oil

Used oil is collected and recycled by introducing it into a vendors fuels program for energy recovery. In 2006, 17,835 gallons of used oil was shipped. The majority (12,333 gallons) was used oil removed from the turbine during the plant's refueling outage. Refueling outages and associated maintenance are conducted approximately every 18 months. Not all outages generate this amount of used oil. In 2007, 2,200 gallons of oil was shipped for recycling. (DEK 2008a)

#### Hazardous and Universal Waste

KPS produces both hazardous and universal wastes. Hazardous waste is typically generated in very small amounts (typically less than 100 pounds per month). However, during 2006, some legacy wastes were identified and disposed of on a one-time basis, which raised the total volume of hazardous waste generated for the year.

Universal waste, consisting primarily of lamps and batteries is collected and recycled and is included in the recycled material totals in Table 3.1-1.

Both of these waste streams are stored until a vendor arrives to transport the waste and process as needed. (DEK 2008a)

### 3.1.6 Transmission Lines

In 1999, the Wisconsin legislature passed Act 9, which encouraged utilities with service areas in Wisconsin to transfer ownership and operation of transmission assets to an independent transmission company. In response to the Act, Wisconsin Public Service Corporation and Wisconsin Power and Light Company (owners of KPS at the time) transferred ownership of their transmission lines to the American Transmission Company (ATC).

ATC, DEK, and Midwest Independent Transmission System Operator (MISO) have a three-party Generator to Transmission Interconnection Agreement for KPS filed with the Federal Energy Regulatory Commission (FERC 2004), whereby ATC transferred operation of its facilities to the MISO. In doing so, ATC acts in the capacity of the transmission system operator and MISO is the independent system operator (Dominion 2006).

Four transmission lines connect KPS to the grid:

- Line F-84 – a 138kV transmission line connects KPS to the East Krok Substation (8.2 miles)
- Line Y-51 – a 138 kV transmission line connects KPS to the Shoto Substation (16.2 miles)
- Line R-304 – 345 kV transmission line connects to the North Appleton substation (50.6 miles)
- Line Q-303 – a 345 kV transmission line connects to the Point Beach Nuclear Plant substation (5.6 miles)

ATC plans to maintain these lines indefinitely, as they are an integral part of the transmission system. The lines will remain in place irrespective of renewal of the KPS operating license.

These transmission lines are contained in approximately 75 miles of corridor, accounting for an area of approximately 1,270 acres. The substation, switchyards, and transmission towers occupy approximately 10 acres. Land along the transmission right-of-way is approximately 84 percent farmland, 7 percent woodland, 2 percent wetlands, and 7 percent scrubland (AEC 1972, page V-3; DEK 2007b). Figure 3.1-3 illustrates the transmission system.

## 3.2 Refurbishment Activities

**NRC**

**"The report must contain a description of…the applicant's plans to modify the facility or its administrative control procedures…This report must describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment…" 10 CFR 51.53(c)(2)**

**"…The incremental aging management activities carried out to allow operation of a nuclear power plant beyond the original 40-year license term will be from one of two broad categories…(2) major refurbishment or replacement actions, which usually occur fairly infrequently and possibly only once in the life of the plant for any given item…" (NRC 1996, Section 2.6.3.1)**

DEK has addressed refurbishment activities in this environmental report in accordance with NRC regulations and complementary information in the NRC GEIS for license renewal (NRC 1996, Section 2.6.2). NRC requirements for the renewal of operating licenses for nuclear power plants include the preparation of an integrated plant assessment (IPA) (10 CFR 54.21). The IPA must identify and list systems, structures, and components subject to an aging management review. Items that are subject to aging and might require refurbishment include, for example, the reactor vessel, piping, supports, and pump casings (see 10 CFR 54.21 for details), as well as those that are not subject to periodic replacement.

In turn, NRC regulations for implementing the National Environmental Policy Act require environmental reports to describe in detail and assess the environmental impacts of refurbishment activities such as planned modifications to systems, structures, and components or plant effluents [10 CFR 51.53(c)(2)]. Resource categories to be evaluated for impacts of refurbishment include terrestrial resources, threatened and endangered species, air quality, housing, public utilities and water supply, education, land use, transportation, and historic and archaeological resources.

The GEIS (NRC 1996) provides helpful information on the scope and preparation of refurbishment activities to be evaluated in this environmental report. It describes major refurbishment activities that utilities might perform for license renewal that would necessitate changing administrative control procedures and modifying the facility. The GEIS analysis assumes that an applicant would begin any major refurbishment work shortly after NRC grants a renewed license and would complete the activities during five outages, including one major outage at the end of the 40th year of operation. The GEIS refers to this as the refurbishment period.

GEIS Table B.2 lists license renewal refurbishment activities that NRC anticipated utilities might undertake. In identifying these activities, the GEIS intended to encompass actions that typically take place only once, if at all, in the life of a nuclear plant. The GEIS analysis assumed that a utility would undertake these activities solely for the purpose of extending plant operations beyond 40 years, and would undertake them during the refurbishment period. The GEIS indicates that many plants will have undertaken various refurbishment activities to support the current license period, but that some plants might undertake such tasks only to support extended plant operations.

The KPS IPA that Dominion conducted under 10 CFR 54 has not identified the need to undertake any major refurbishment or replacement actions to maintain the functionality of important systems, structures, and components during the KPS license renewal period or any other facility modifications associated with license renewal. Dominion has included the IPA as part of this application.

## 3.3 Programs and Activities for Managing the Effects of Aging

**NRC**

**"The report must contain a description of…the applicant's plans to modify the facility or its administrative control procedures…This report must describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment…" 10 CFR 51.53(c)(2)**

**"…The incremental aging management activities carried out to allow operation of a nuclear power plant beyond the original 40-year license term will be from one of two broad categories: (1) SMITTR actions, most of which are repeated at regular intervals, and (2) major refurbishment or replacement actions, which usually occur fairly infrequently and possibly only once in the life of the plant for any given item." NRC 1996, Section 2.6.3.1, pg. 2-41. ("SMITTR" is defined in NRC 1996, Section 2.4, pg. 2-30, as surveillance, monitoring, inspections, testing, trending, and recordkeeping.)**

The IPA required by 10 CFR 54.21 identifies the programs and inspections for managing aging effects at KPS. These programs are described in the *Application for Renewed Operating License, Kewaunee Power Station, Appendix B*. Other than implementation of the programs and inspections identified in the IPA, there are no planned modifications of KPS administrative control procedures associated with license renewal.

## 3.4 Employment

### Current Workforce

DEK employs a nuclear-related permanent workforce of approximately 705 permanent FTE (full time equivalent) employees and fewer than 30 long term contract employees (DEK 2008b). This is within the range of 600 to 800 personnel per reactor unit estimated in the GEIS (NRC 1996, Section 2.3.8.1). Table 3.4-1 provides permanent employee data for KPS. Approximately 39.7 percent of the permanent KPS employees live in Manitowoc County and 22.6 percent live in Kewaunee County. An additional 32.3 percent live in Brown County. The remaining 5.4 percent of the permanent workforce is distributed across the rest of Wisconsin and in other states (DEK 2008b).

KPS is on an 18 month refueling cycle (KPS 2007). During refueling outages, nuclear related site employment increases by approximately 600-700 workers for varying periods during each outage, which typically lasts 30 to 40 days. These numbers are within the GEIS range of 200 to 900 additional workers per reactor outage.

### License Renewal Increment

Performing the license renewal activities described in Sections 3.2 and 3.3 could necessitate increasing KPS staff workload by some increment. The size of this increment would be a function of the schedule within which DEK must accomplish the work and the amount of work involved. Having determined that major refurbishment activities are unnecessary for license renewal (Section 3.2), DEK focused its analysis of license renewal employment increment on programs and activities for managing the effects of aging (Section 3.3).

The GEIS (NRC 1996, Section 2.6.2.7) assumes that NRC would renew a nuclear power plant license for a 20-year period, plus the duration remaining on the current license, and that NRC would issue the renewal approximately 10 years prior to license expiration. Thus, the renewed license would be in effect for approximately 30 years. The GEIS further assumes that the utility would initiate SMITTR activities at the time of issuance of the new license and would conduct license renewal SMITTR activities throughout the remaining 30-year life of the plant, sometimes during full-power operation (NRC 1996, Section B.3.1.3), but mostly during normal refueling and the 5-and 10-year in-service refueling outages (NRC 1996, Table B.4).

DEK has determined that the GEIS scheduling assumptions are reasonably representative of KPS incremental license renewal workload scheduling. Many KPS license renewal SMITTR activities would have to be performed during outages. Although some KPS license renewal SMITTR activities would be one-time efforts, others would be recurring periodic activities that would continue for the life of the plant.

The GEIS estimates that the most additional personnel needed to perform license renewal SMITTR activities would typically be 60 persons during a 10-year in-service refueling. Having established this upper value for what would be a single event in 20 years, the GEIS uses this number as the expected number of additional permanent workers needed per unit attributable to license renewal. GEIS Section C.3.1.2 uses this approach in order to "...provide a realistic upper bound to potential population-driven impacts…"

DEK has identified no need for significant new aging management programs or significant modifications to existing programs. DEK expects that existing "surge" capabilities for routine activities will enable DEK to perform the increased SMITTR workload with existing staff. Only one additional non-outage position, the License Renewal Coordinator, would be required to support KPS operations during the license renewal term. Historically, this person has been transferred from the License Renewal Project Team. Thus, actual site employment would not be increased at all. The additional work load necessitated by license renewal requirements would not be expected to impact normal employment variations at KPS. Refueling and maintenance outages typically have a duration of approximately 30 to 40 days and, as described above, result in a large, temporary increase in employment at KPS. DEK believes that increased SMITTR tasks can be performed within this schedule and employment level. Therefore, DEK has no plans to add outage employees for license renewal term outages.

## Table 3.1-1. Kewaunee Non-Radioactive Wastes, 2006/2007

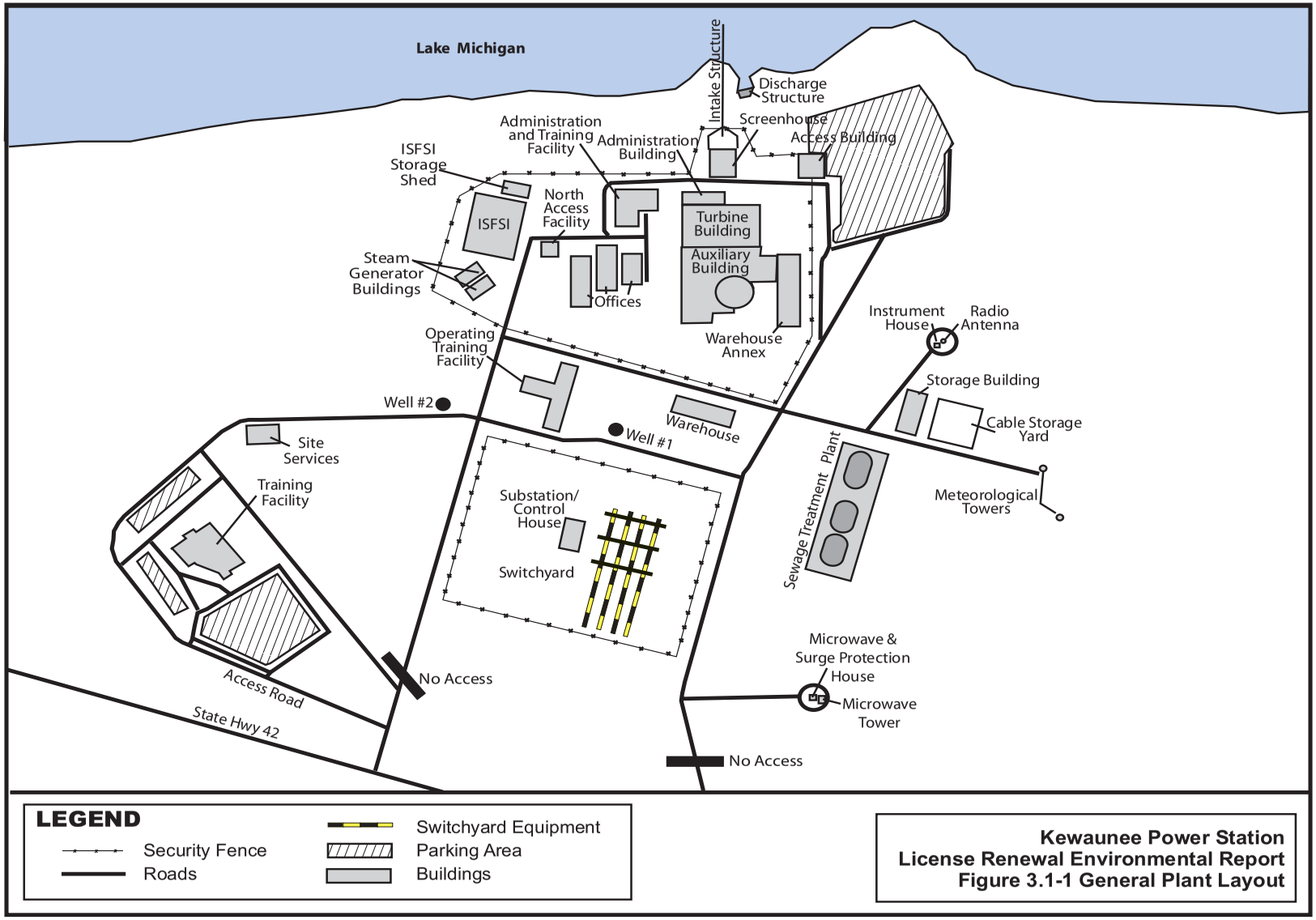
| Waste Type | 2006 Annual Generation | 2007 Annual Generation | 2006/2007 Monthly Average |
|---|---|---|---|
| Universal Waste | 2.4 tons | 0.7 tons | 0.13 tons |
| Hazardous Waste | 2477 lbs | 693 lbs | 132.1 lbs |
| Total Trash | 147.4 tons | 167 tons | 13.1 tons |
| Recycled Metal | 10.8 tons | 6.5 tons | 0.72 tons |
| Recycled Material[a] | 33.5 tons | 115.6 tons | 6.2 tons |
| Used Oil | 17,835 gals | 2,200 gals | 835 gals |

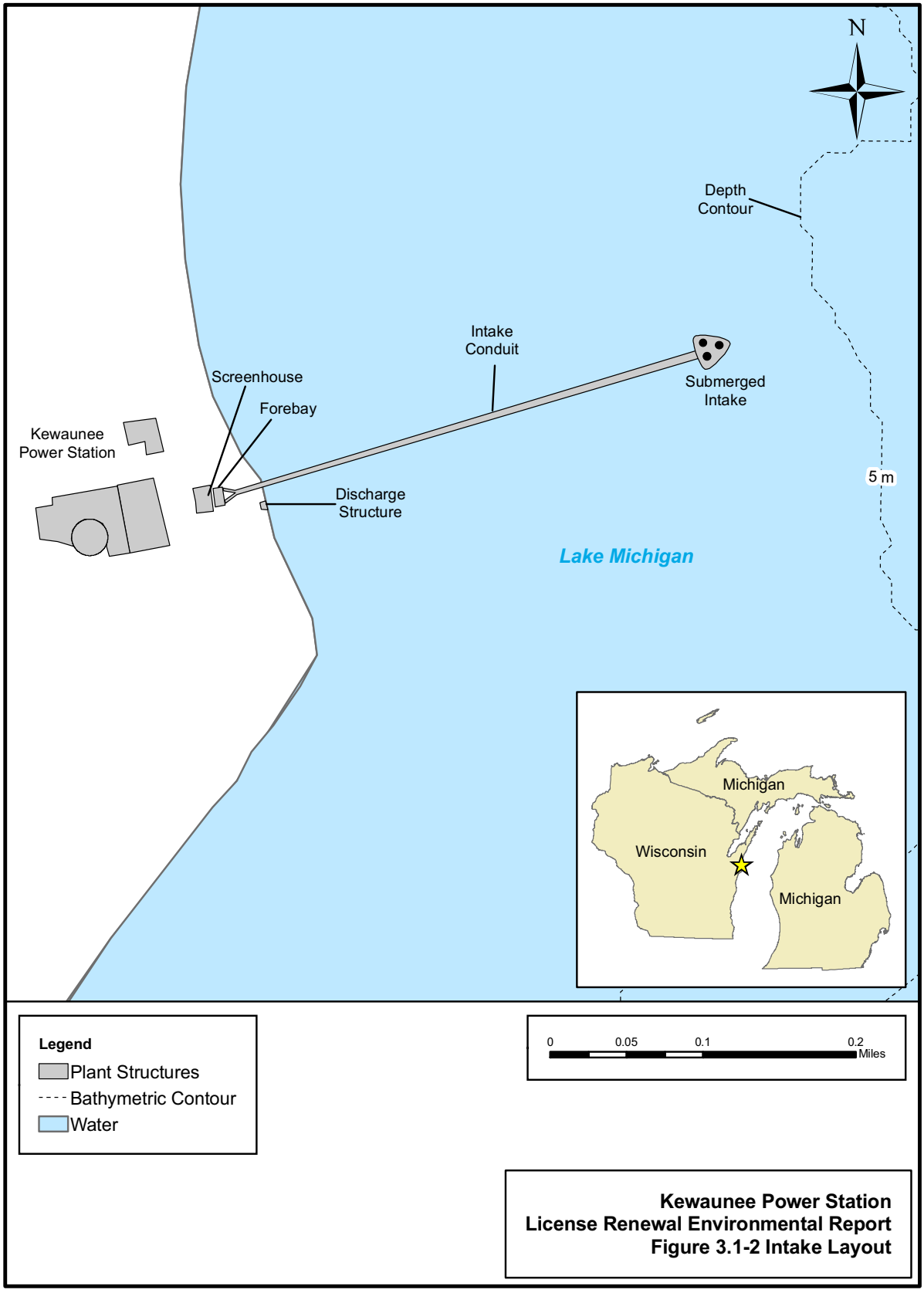
[a] Includes recycled universal waste, paper, cardboard, plastic, glass, and electronic equipment.
Source: DEK (2008a)
lbs = pounds
gals = gallons

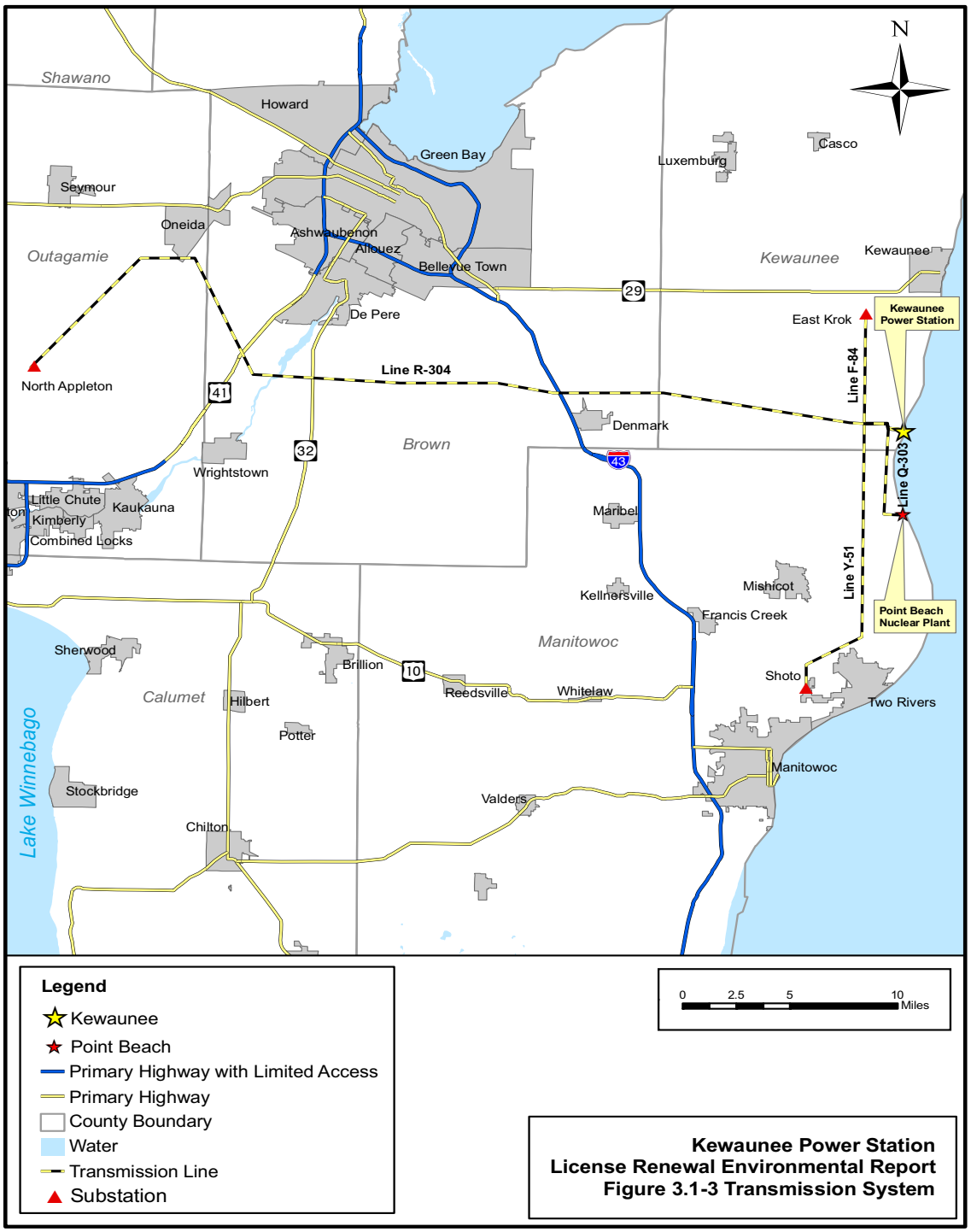
## Table 3.4-1. Counties of Residence for Permanent Workforce, December 2007

| County | State | Number of Employees | Percentage of Workforce | County Population, 2000 | Percentage of County Population |
|---|---|---|---|---|---|
| Brown | WI | 228 | 32.3% | 226,778 | 0.1% |
| Calumet | WI | 1 | 0.1% | 40,631 | <0.1% |
| Dane | WI | 1 | 0.1% | 426,526 | <0.1% |
| Door | WI | 11 | 1.6% | 27,961 | <0.1% |
| Kenosha | WI | 1 | 0.1% | 149,577 | <0.1% |
| Kewaunee | WI | 159 | 22.6% | 20,187 | 0.8% |
| LaCrosse | WI | 2 | 0.3% | 107,120 | <0.1% |
| Manitowoc | WI | 280 | 39.7% | 82,887 | 0.3% |
| Marinette | WI | 1 | 0.1% | 43,384 | <0.1% |
| Outagamie | WI | 4 | 0.6% | 160,971 | <0.1% |
| Sauk | WI | 1 | 0.1% | 55,225 | <0.1% |
| Sheboygan | WI | 4 | 0.6% | 112,646 | <0.1% |
| Waukesha | WI | 1 | 0.1% | 360,767 | <0.1% |
| Other | Out of State | 11 | 1.6% | N/A | N/A |
| Total | -- | 705 | 100.0% | -- | -- |

Source: DEK (2008b); USCB (2003)
< = less than


Lake Michigan
Intake Structure
Discharge Structure
Screenhouse
Access Building
Administration and Training Facility
Administration Building
ISFSI Storage Shed
ISFSI
North Access Facility
Turbine Building
Auxiliary Building
Steam Generator Buildings
Offices
Warehouse Annex
Instrument House
Radio Antenna
Operating Training Facility
Storage Building
Well #2
Warehouse
Well #1
Cable Storage Yard
Site Services
Training Facility
Substation/ Control House
Switchyard
Sewage Treatment Plant
Meteorological Towers
Microwave & Surge Protection House
Microwave Tower
Access Road
No Access
State Hwy 42
No Access
LEGEND
Security Fence
Roads
Switchyard Equipment
Parking Area
Buildings
Kewaunee Power Station
License Renewal Environmental Report
Figure 3.1-1 General Plant Layout


N
Depth Contour
Intake Conduit
Submerged Intake
Screenhouse
Forebay
Kewaunee Power Station
Discharge Structure
5 m
Lake Michigan
Michigan
Wisconsin
Michigan
Legend
Plant Structures
Bathymetric Contour
Water
0
0.05
0.1
0.2
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 3.1-2 Intake Layout


N
Shawano
Howard
Green Bay
Luxemburg
Casco
Seymour
Oneida
Ashwaubenon
Allouez
Bellevue Town
Outagamie
Kewaunee
Kewaunee
29
De Pere
East Krok
Kewaunee Power Station
Line R-304
North Appleton
41
Line F-84
Denmark
Brown
32
43
Wrightstown
Line Q-303
Little Chute
Kaukauna
Kimberly
Combined Locks
Maribel
Kellnersville
Mishicot
Line Y-51
Francis Creek
Point Beach Nuclear Plant
Manitowoc
Sherwood
Brillion
10
Shoto
Calumet
Hilbert
Reedsville
Whitelaw
Two Rivers
Potter
Manitowoc
Stockbridge
Valders
Lake Winnebago
Chilton
Legend
Kewaunee
Point Beach
Primary Highway with Limited Access
Primary Highway
County Boundary
Water
Transmission Line
Substation
0 2.5 5 10 Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 3.1-3 Transmission System

## 3.5 References

AEC (U.S. Atomic Energy Commission). 1972. *Final Environmental Statement Related to Operation of Kewaunee Nuclear Power Plant*. Docket No 50-305. Directorate of Licensing. Washington, DC. December. NRC ADAMS Accession Number 3000007089.

DEK (Dominion Energy Kewaunee). 2007a. *Intake Screen Size*. Email to Amy Stanford – TtNUS from Richard Gallagher – DEK Environmental Lead Kewaunee License Renewal Project on November 29 2007.

DEK (Dominion Energy Kewaunee). 2007b. *Comment on Transmission Line Mileage from American Transmission Company*. Email to Amy Stanford – TtNUS from Richard Gallagher – DEK Environmental Lead Kewaunee License Renewal Project on November 29 2007.

DEK (Dominion Energy Kewaunee). 2007c. *KPS Employees*. Email to Anne Lovell – TtNUS from Richard Gallagher – DEK Environmental Lead Kewaunee License Renewal Project on December 20, 2007.

DEK (Dominion Energy Kewaunee). 2008a. *Non-Radiological Waste Generation*. Email to Anne Lovell – TtNUS from Richard Gallagher – DEK Environmental Lead Kewaunee License Renewal Project on May 19, 2008.

DEK (Dominion Energy Kewaunee). 2008b. *Employment at KPS*. Email to Anne Lovell – TtNUS from Richard Gallagher – DEK Environmental Lead Kewaunee License Renewal Project on May 29, 2006.

Dominion. 2006. *Response to Generic Letter 2006-02, Grid Reliability and the Impact of Plant Risk and the Operability of Offsite Power*. April 3. NRC ADAMS Accession Number ML060950094.

Dominion (Dominion Resources Services) 2008. *Information Requirements Related to Cooling Water Intake Structures – WPDES Permit WI-0001571-07*. Letter to D. Hantz – Wisconsin Department of Natural Resources Wastewater Engineer from P.F. Faggart – Dominion Vice President and Chief Environmental Officer on January 4, 2008.

FERC (Federal Energy Regulatory Commission). 2004. *Order Conditionally Accepting Amended Interconnection Agreement Regarding American Transmission Co, LLC*. Docket No. ER04-754. June 4. FERC Accession Number 20040604-4000.

KPS (Kewaunee Power Station). 2007. *Kewaunee Power Station Updated Safety Analysis Report*, Revision 20. April 19.

NMC (Nuclear Management Company). 2003. *Sewage Treatment Plant (SDP) System Description*. Revision 1. March 17.

NMC (Nuclear Management Company). 2004. *Circulating Water System (CW) System Description*.

NRC (U.S. Nuclear Regulatory Commission). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)*. Volumes 1 and 2. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

NRC (US Nuclear Regulatory Commission). 2004. *NRC Approves Power Uprate for Kewaunee Nuclear Power Plant*. March 2. NRC ADAMS Accession Number ML040620117.

USCB (U.S. Census Bureau). 2003. *Wisconsin: 2000 Census of Population and Housing, Population and Housing Unit Counts*. U.S. Department of Commerce. Economics and Statistics Administration. Washington DC. August. Available on line at http://www.census.gov/prod/cen2000/phc-3-51.pdf. Accessed April 18, 2008.

WDNR (Wisconsin Department of Natural Resources). 2005. *Transmitting WPDES Permit and Permit Fact Sheet*. Letter from Russell Rasmussen – WDNR to Pamela Faggert – Dominion. July 18, 2005.

# 4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND MITIGATING ACTIONS

**NRC**

**"The report must contain a consideration of alternatives for reducing adverse impacts…for all Category 2 license renewal issues…" 10 CFR 51.53(c)(3)(iii)**

**"…The environmental report shall include an analysis that considers…the environmental effects of the proposed action…and alternatives available for reducing or avoiding adverse environmental effects.…" 10 CFR 51.45(c) as adopted by 10 CFR 51.53(c)(2) and 10 CFR 51.53(c)(3)(iii)**

**The environmental report shall discuss "The impact of the proposed action on the environment. Impacts shall be discussed in proportion to their significance;" 10 CFR 51.45(b)(1) as adopted by 10 CFR 51.53(c)(2)**

**"…The information submitted…should not be confined to information supporting the proposed action but should also include adverse information." 10 CFR 51.45(e) as adopted by 10 CFR 51.53(c)(2)**

Chapter 4 presents an assessment of the environmental consequences and potential mitigating actions associated with the renewal of Kewaunee Power Station's (KPS) operating license. The assessment supplements NRC's Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS) (NRC 1996a), which identifies and analyzes 92 environmental issues that NRC considers to be associated with nuclear power plant license renewal. In its analysis and rules, NRC designated each of the 92 issues as Category 1, Category 2, or NA (not applicable) and requires plant-specific analysis of only the Category 2 issues.

NRC designated an issue as Category 1 if, based on the result of its analysis, the following criteria were met:

- the environmental impacts associated with the issue were determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristic,
- a single significance level (i.e., small, moderate, or large) was assigned to the impacts that would occur at any plant, regardless of which plant was being evaluated (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal), and
- mitigation of adverse impacts associated with the issue were considered in the analysis, and it was determined that additional plant-specific mitigation measures are likely to be not sufficiently beneficial to warrant implementation.

NRC rules do not require analyses of Category 1 issues, because NRC resolved them using generic findings presented in 10 CFR 51, Appendix B, Table B-1. An applicant may reference the generic findings or GEIS analyses for Category 1 issues.

If the NRC analysis concluded that one or more of the Category 1 criteria could not be met, the issue was assigned as Category 2. NRC requires plant-specific analyses for Category 2 issues. NRC designated two issues as "NA" (Issues 60 and 92), signifying that the categorization and impact definitions do not apply to these issues. Attachment A of this report lists the 92 issues and identifies the environmental report section that addresses each issue and, where appropriate, references supporting analyses in the GEIS.

## Category 1 License Renewal Issues

**NRC**

**"The environmental report for the operating license renewal stage is not required to contain analyses of the environmental impacts of the license renewal issues identified as Category 1 issues in Appendix B to subpart A of this part." 10 CFR 51.53(c)(3)(i)**

**"…[A]bsent new and significant information, the analysis for certain impacts codified by this rulemaking need only be incorporated by reference in an applicant's environmental report for license renewal…" (NRC 1996b, pg. 28483)**

Dominion Energy Kewaunee, Inc. (DEK) has determined that, of the 69 Category 1 issues, 14 do not apply to KPS because they apply to design or operational features that do not exist at the facility (see Attachment A, Table A-1). In addition, because DEK does not plan to conduct any refurbishment activities, the NRC findings for the seven Category 1 issues that pertain only to refurbishment do not apply to this application. As discussed in Section 5.0, DEK is aware of no new and significant information that would make the NRC findings inapplicable to KPS. Therefore, DEK adopts by reference the NRC findings for these Category 1 issues.

## Category 2 License Renewal Issues

**NRC**

**"The environmental report must contain analyses of the environmental impacts of the proposed action, including the impacts of refurbishment activities, if any, associated with license renewal and the impacts of operation during the renewal term, for those issues identified as Category 2 issues in Appendix B to subpart A of this part…" 10 CFR 51.53(c)(3)(ii)**

**"The report must contain a consideration of alternatives for reducing adverse impacts, as required by § 51.45(c), for all Category 2 license renewal issues…" 10 CFR 51.53(c)(3)(iii)**

NRC designated 21 issues as Category 2. Sections 4.1 through 4.20 address each of these issues (Section 4.17 addresses two issues), beginning with a statement of the issue. As is the case with Category 1 issues, some Category 2 issues apply to operational features that KPS does not have. In addition, some Category 2 issues apply only to refurbishment activities or to scenarios involving additional employment for managing plant aging. DEK does not plan any refurbishment or additional employment. If an issue does not apply to KPS, the section explains the basis for inapplicability.

For the 11 Category 2 issues that DEK has determined to be applicable to KPS, analyses are provided. These analyses include conclusions regarding the significance of the impacts relative to the renewal of the operating license for KPS and, as appropriate, discuss potential mitigative alternatives. DEK has identified the significance of the impacts associated with each issue as either small, moderate, or large, consistent with the criteria that NRC established in 10 CFR 51, Appendix B, Table B-1, Footnote 3, as follows:

> SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.
>
> MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource.
>
> LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

In accordance with National Environmental Policy Act practice, DEK considered ongoing and potential additional mitigation in proportion to the significance of the impact to be addressed (i.e., impacts that are small receive less mitigative consideration than impacts that are large).

## "NA" License Renewal Issues

NRC determined that its categorization and impact-finding definitions did not apply to two issues (Issues 60 and 92); however, DEK included these issues in Attachment A. Applicants currently do not need to submit information on chronic effects from electromagnetic fields (10 CFR 51, Appendix B, Table B-1, Footnote 5). For environmental justice, NRC does not require information from applicants, but noted that it will be addressed in individual license renewal reviews (10 CFR 51, Appendix B, Table B-1, Footnote 6). DEK has included minority and low-income demographic information in Section 2.6.2.

## 4.1 Water Use Conflicts (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a Small River with Low Flow)

**NRC**

**"If the applicant's plant utilizes cooling towers or cooling ponds and withdraws make-up water from a river whose annual flow rate is less than $3.15\times10^{12}$ $ft^3$ / year ($9\times10^{10}$ $m^3$/year), an assessment of the impact of the proposed action on the flow of the river and related impacts on instream and riparian ecological communities must be provided. The applicant shall also provide an assessment of the impacts of the withdrawal of water from the river on alluvial aquifers during low flow." 10 CFR 51.53(c)(3)(ii)(A)**

**"…The issue has been a concern at nuclear power plants with cooling ponds and at plants with cooling towers. Impacts on instream and riparian communities near these plants could be of moderate significance in some situations…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 13**

NRC made surface water use conflicts a Category 2 issue because consultations with regulatory agencies indicate that water use conflicts are already a concern at two closed-cycle plants (Limerick and Palo Verde) and may be a problem in the future at other plants. In the GEIS, NRC notes two factors that may cause water use and availability issues to become important for some nuclear power plants that use cooling towers. First, some plants equipped with cooling towers are located on small rivers that are susceptible to droughts or competing water uses. Second, consumptive water loss associated with closed-cycle cooling systems may represent a substantial proportion of the flows in small rivers (NRC 1996a, Section 4.3.2.1).

As discussed in Section 3.1.2, KPS withdraws cooling water from Lake Michigan and, in a once-through system, returns it directly to Lake Michigan. Therefore, this issue does not apply because KPS does not use cooling towers or cooling ponds and does not withdraw water from a small river.

## 4.2 Entrainment of Fish and Shellfish in Early Life Stages

**NRC**

**"If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of current Clean Water Act 316(b) determinations…or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from…entrainment." 10 CFR 51.53(c)(3)(ii)(B)**

**"…The impacts of entrainment are small at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems. Further, ongoing efforts in the vicinity of these plants to restore fish populations may increase the numbers of fish susceptible to intake effects during the license renewal period, such that entrainment studies conducted in support of the original license may no longer be valid…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 25**

NRC made impacts on fish and shellfish resources from entrainment a Category 2 issue because it could not assign a single significance level (small, moderate, or large) to the issue. The impacts of entrainment are small at many facilities, but may be moderate or large at others. Also, ongoing restoration efforts may increase the number of fish susceptible to intake effects during the license renewal period (NRC 1996a, Section 4.2.2.1.2). Information needing to be ascertained includes (1) type of cooling system (whether once-through or cooling pond), and (2) status of Clean Water Act (CWA) Section 316(b) determination or equivalent state documentation.

As Section 3.1.2 describes, KPS has a once-through heat dissipation system. It withdraws condenser cooling water from Lake Michigan and discharges heated effluent to the same body of water. As discussed in the paragraphs that follow, KPS has state documentation equivalent to a CWA 316(b) determination.

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

As a condition of the original Wisconsin Pollutant Discharge Elimination System (WPDES) Permit (No. WI-0001571) issued to KPS, Wisconsin Public Service Corporation (WPSC) was required to perform a one-year study to evaluate the environmental impact of the KPS cooling water intake structure (NES 1976). Nalco Environmental Sciences (NES), under contract to WPSC, conducted studies of entrainment and impingement over the April 1, 1975 through March 31, 1976 timeframe. NES summarized the results of the 316(b) study as follows:

> "The overall conclusion of the 316(b) Demonstration is that impingement of fish and entrainment of eggs and larvae at Kewaunee Nuclear Power Plant (KNPP) had no major environmental impact on the fish community of Lake

> Michigan near KNPP. Therefore, the present cooling water intake system reflects 'best available technology.'"

Based on its review of the study, the Wisconsin Department of Natural Resources (WDNR) determined that the location and operation of the KPS intake structure had "minimal environmental impact," adding that "…no modifications of the cooling water intake structure or operations (are) required for compliance…" (WDNR 1977). WPDES permits issued subsequent to this (1977) determination contained no monitoring requirements and no conditions related to entrainment or impingement.

EPA issued regulations in 2004 regarding the design and operation of cooling water intake structure (CWIS) at large existing ("Phase II") power-generating facilities, like KPS, designed to withdraw 50 million gallons a day or more of cooling water (EPA 2004a). These regulations implementing Section 316(b) of the Clean Water Act were intended to ensure that the "location, design, construction, and capacity of cooling water intake structures reflect the best technology available to protect aquatic organisms from being killed or injured by impingement…or entrainment…" (EPA 2004b). Prior to 2004, state NPDES permitting authorities relied on draft Section 316(b) regulations issued, but never promulgated, in 1976 or made decisions on a "case-by-case, site-specific basis" (see EPA 2004a, p. 41584).

The current KPS WPDES permit contains a list of required submittals and schedule of compliance relating to the 2004 Phase II regulation. DEK was required to submit a Proposal for Information Collection (PIC) for review and comment "prior to the start of information collection activities described in such proposal." The PIC, which included possible options to achieving compliance with the rule and plans for biological studies, was submitted in October 2005. DEK notified WDNR in February 2006 that it was modifying the scope of the planned biological studies (e.g., increasing frequency of gill netting and beach seining) in response to WDNR comments on the PIC (Dominion 2006). A field study was initiated that same month in accordance with the approved PIC (EA Engineering 2007).

In January 2007, the U.S. Court of Appeals for the Second Circuit decided large portions of EPA's rule did not comply with the Clean Water Act. Most significantly, the Second Circuit questioned the EPA's determination of Best Technology Available. In March 2007, EPA Assistant Administrator Grumbles sent a memo to Regional EPA Administrators announcing that the Phase II Rule had been suspended, and directing staff to evaluate permit applications for Phase II facilities on the basis of Best Professional Judgment (EPA 2007a). On July 9, 2007, EPA published a notice in the Federal Register (EPA 2007b) formally suspending the Phase II regulation. In addition, the U.S. Supreme Court has agreed to review the decision by the U.S. Circuit Court of Appeals for the Second Circuit related to whether cost/benefit analyses are allowed in 316(b) determinations. A Supreme Court decision could occur in 2009.

As a result of the suspension, the WDNR modified the submittal requirements contained in the permit (WDNR 2007). Results of the impingement and entrainment field study continued to be a requirement.

EA Engineering submitted its "Impingement Mortality and Entrainment Characterization Report, Kewaunee Power Station, March 2006 – February 2007" to Dominion Resources in August 2007. With respect to entrainment, the report noted that the vast majority of organisms entrained at KPS were invertebrates (EA Engineering 2007). Smaller numbers of ichthyoplankton were entrained, primarily eggs and larvae of burbot, common carp, alewife, and rainbow smelt. Species whose eggs and larvae were entrained were largely those that spawn in shallow, inshore areas.

On January 4, 2008, Dominion submitted a letter containing the "Information Requirements Related to Cooling Water Intake Structures, WPDES Permit WI-000-071571" (Dominion 2008), including a copy of the Characterization Report. The submittal concluded that:

"The information provided in [the study] suggests that differences noted in impingement and entrainment estimates between 1975 – 1976 and 2006 – 2007 are attributed to differences in fish abundance near the KPS as a reflection of fish community changes in Lake Michigan in the years between the studies. Any environmental impacts to Lake Michigan fishes are still considered minimal with no additional structural or operational actions necessary at this time, pending new rule development…"

Based on the existing 316(b) demonstration and determination, and as supported by the results of the recent studies, DEK concludes that any environmental impact from entrainment of fish and shellfish in early life stages at KPS is SMALL and does not require further mitigation.

## 4.3 Impingement of Fish and Shellfish

**NRC**

**"If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of current Clean Water Act 316(b) determinations…or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from…impingement…" 10 CFR 51.53(c)(3)(ii)(B)**

**"…The impacts of impingement are small at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 26**

NRC made impacts on fish and shellfish resources from impingement a Category 2 issue, because it could not assign a single significance level to the issue. Impingement impacts are small at many facilities, but might be moderate or large at other plants (NRC 1996a, Section 4.2.2.1.3). As Section 3.1.2 describes, KPS has a once-through heat dissipation system, equipped with a traveling screen system that washes impinged debris and fish to the lake via the discharge tunnel. Section 4.2 discusses the CWA Section 316(b) demonstration that was conducted for KPS, including the state of Wisconsin's determination that the location and operation of the KPS intake structure had "minimal environmental impact," and that "…no modifications of the cooling water intake structure or operations (are) required for compliance…"

As discussed in Section 4.2, the current WPDES permit for KPS contains a list of required submittals and schedule of compliance relating to the 2004 Phase II regulation. DEK was required to submit a Proposal for Information Collection (PIC) for review and comment "prior to the start of information collection activities described in such proposal." The PIC, which included possible options to achieving compliance with the rule and plans for biological studies, was submitted in October 2005. DEK notified WDNR in February 2006 that it was modifying the scope of the planned biological studies (e.g., increasing frequency of gill netting and beach seining) in response to WDNR comments on the PIC (Dominion 2006). A field study was initiated that same month in accordance with the approved PIC (EA Engineering 2007).

As discussed in Section 4.2, a January 25, 2007 decision by the U.S. Court of Appeals for the Second Circuit remanded substantive parts of the Phase II cooling water intake structures rule to EPA. This led the EPA to suspend the Phase II regulation on July 9, 2007 (72 FR 130). As a result of the suspension, the WDNR modified the submittal requirements contained in the permit (WDNR 2007). Results of the impingement and entrainment field study continued to be a requirement.

EA Engineering submitted its "Impingement Mortality and Entrainment Characterization Report, Kewaunee Power Station, March 2006 – February 2007" to Dominion Resources in August 2007. With respect to impingement, the report noted that the majority of fish impinged were "smaller, younger individuals" (EA Engineering 2007). The overwhelming majority of fish impinged (99.7 percent) were alewives. The alewife, a non-native species, is regarded as a nuisance species by many Great Lakes fishery managers because it

competes with more-desirable native fish species such as the whitefish and lake herring. Ninespine stickleback, rainbow smelt, yellow perch, and mottled sculpin were next in abundance in screenwash samples but together comprised only 0.17 percent of fish impinged during the study.

On January 4, 2008, Dominion submitted a letter containing the "Information Requirements Related to Cooling Water Intake Structures, WPDES Permit WI-000-071571" (Dominion 2008), including a copy of the Characterization Report. The submittal concluded that:

> "The information provided in [the study] suggests that differences noted in impingement and entrainment estimates between 1975 – 1976 and 2006 – 2007 are attributed to differences in fish abundance near the KPS as a reflection of fish community changes in Lake Michigan in the years between the studies. Any environmental impacts to Lake Michigan fishes are still considered minimal with no additional structural or operational actions necessary at this time, pending new rule development…"

Based on the existing 316(b) demonstration and determination, as supported by the results of the recent studies, DEK concludes that any environmental impact from impingement of fish and shellfish at KPS is SMALL and does not require further mitigation.

## 4.4 Heat Shock

**NRC**

**"If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of current Clean Water Act…316(a) variance in accordance with 40 CFR 125, or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from heat shock…" 10 CFR 51.53(c)(3)(ii)(B)**

**"…Because of continuing concerns about heat shock and the possible need to modify thermal discharges in response to changing environmental conditions, the impacts may be of moderate or large significance at some plants…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 27**

NRC made impacts on fish and shellfish resources resulting from heat shock a Category 2 issue, because of continuing concerns about thermal discharge effects and the possible need to modify thermal discharges in the future in response to changing environmental conditions (NRC 1996a, Section 4.2.2.1.4). Information to be ascertained includes: (1) type of cooling system (whether once-through or cooling pond), and (2) evidence of a CWA Section 316(a) variance or equivalent state documentation

As Section 3.1.2 describes, KPS has a once-through heat dissipation system that uses water from Lake Michigan for condenser cooling. As discussed below, KPS received Permit No. WI-0001571 to discharge under the WPDES, which has been approved by the Administrator of the U.S. Environmental Protection Agency pursuant to Section 402(b) of the Federal Water Pollution Control Act Amendments of 1972 [33 USC 1342 (b)].

Section 316(a) of the CWA establishes a process whereby a permit holder can demonstrate that thermal discharge limitations are more stringent than necessary to protect a balanced indigenous population of fish and wildlife and obtain facility-specific thermal discharge limits (33 USC 1326). In May 1976, WPSC submitted a "Petition for the Imposition of Alternative Effluent Limitations and Thermal Mixing Zone Requirements for the Kewaunee Nuclear Power Plant" to the WDNR. WPSC sought relief at that time from the thermal standards of the Wisconsin Administrative Code, which limited both the size of the mixing zone and the increase in temperature across the condenser (Delta T) at the edge of the mixing zone (WDNR 1976). In addition, WPSC sought an exemption from the state statute that restricted thermal discharges to Lake Michigan to blowdown from recirculated cooling water systems by the year 1981. WPSC submitted a Clean Water Act 316(a) demonstration in support of the petition.

On September 13, 1976 the WDNR, having reviewed the WPSC petition and 316(a) demonstration, issued an order granting alternative effluent limitations and exempting the thermal component of the WPSC discharge from the thermal mixing zone requirements of Wisconsin Administrative Code NR 102.05 (WDNR 1976).

With regard to potential impacts on fish, WDNR in its "Findings of Fact" summarized the findings of the 316(a) demonstration as follows:

> "The thermal discharge has had no appreciable influence on the local fishery. No major changes in species composition, seasonal abundance or spatial distribution of the representative important species has occurred since the plant began operating…The discharge at the outfall has only a negligible effect on the normal seasonal migrations of fish. No fish kills have occurred since the plant began operation...The discharge of waste heat from the plant has caused no harm to the representative species in the discharge zone and has no effect on the representative species immediately outside the discharge zone."
>
> Source: WDNR 1976

The WDNR's "Findings of Fact" concludes with the following statement:

> "The Department finds that no appreciable harm has resulted from the thermal component of the discharge…to a balanced, indigenous community of shellfish, fish and wildlife in and on the receiving water of Lake Michigan."

The current KPS WPDES permit does not contain thermal effluent limitations, and thus, constitutes acceptance of the exemption from thermal standards. Based on the 316(a) findings, DEK concludes that impacts to fish and shellfish from heat shock are SMALL and warrant no additional mitigation.

## 4.5 Groundwater Use Conflicts (Plants Using >100 GPM of Groundwater)

**NRC**

**"If the applicant's plant…pumps more than 100 gallons (total onsite) of ground water per minute, an assessment of the impact of the proposed action on groundwater use must be provided." 10 CFR 51.53(c)(3)(ii)(C)**

**"…Plants that use more than 100 gpm may cause ground-water use conflicts with nearby ground-water users…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 33**

NRC made this groundwater use conflict a Category 2 issue because overuse of an aquifer could exceed the natural recharge. Locally, a withdrawal rate of more than 100 gallons per minute (gpm) could create a cone of depression that could extend offsite. This could inhibit the withdrawal capacity of nearby offsite users.

As described in Section 2.3 (Groundwater Resources), the total groundwater withdrawal at KPS is approximately 25 – 61 gpm. Therefore, the issue of groundwater use conflicts (plants using more than 100 gpm groundwater) does not apply to KPS.

## 4.6 Groundwater Use Conflicts (Plants Using Cooling Towers or Cooling Ponds and Withdrawing Makeup Water from a Small River)

**NRC**

**"If the applicant's plant utilizes cooling towers or cooling ponds and withdraws make-up water from a river whose annual flow rate is less than $3.15 \times 10^{12}$ $ft^3$ / year…[t]he applicant shall also provide an assessment of the impacts of the withdrawal of water from the river on alluvial aquifers during low flow." 10 CFR 51.53(3)(ii)(A)**

**"…Water use conflicts may result from surface water withdrawals from small water bodies during low flow conditions which may affect aquifer recharge, especially if other groundwater or upstream surface water users come on line before the time of license renewal…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 34**

NRC made this groundwater use conflict a Category 2 issue because consumptive use of withdrawals from small rivers could adversely impact aquatic life, downstream users of the small river, and groundwater-aquifer recharge. This is a particular concern during low-flow conditions and could create a cumulative impact due to upstream consumptive use. Cooling tower and cooling ponds lose flow due to evaporation, which is necessary to cool the heated water before it is discharged to the environment.

As indicated in Section 3.1.2, this issue does not apply to KPS because its cooling system does not include cooling towers or cooling ponds and does not withdraw water from a small river.

## 4.7 Groundwater Use Conflicts (Plants Using Ranney Wells)

**NRC**

**"If the applicant's plant uses Ranney wells…an assessment of the impact of the proposed action on groundwater use must be provided." 10 CFR 51.53(c)(3)(ii)(C)**

**"…Ranney wells can result in potential ground-water depression beyond the site boundary. Impacts of large ground-water withdrawal for cooling tower makeup at nuclear power plants using Ranney wells must be evaluated at the time of application for license renewal…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 35**

NRC made this groundwater use conflict a Category 2 issue because large quantities of groundwater withdrawn from Ranney wells could degrade groundwater quality at river sites by induced infiltration of poor-quality river water into an aquifer.

This issue of groundwater use conflicts does not apply to KPS because the plant does not use Ranney wells. As Section 3.1.2 describes, KPS draws its cooling water from Lake Michigan.

## 4.8 Degradation of Groundwater Quality

**NRC**

**"If the applicant's plant is located at an inland site and utilizes cooling ponds, an assessment of the impact of the proposed action on groundwater quality must be provided." 10 CFR 51.53(c)(3)(ii)(D)**

**"…Sites with closed-cycle cooling ponds may degrade ground-water quality. For plants located inland, the quality of the ground water in the vicinity of the ponds must be shown to be adequate to allow continuation of current uses…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 39**

NRC made degradation of groundwater quality a Category 2 issue because evaporation from closed-cycle cooling ponds concentrates dissolved solids in the water and settles suspended solids. In turn, seepage into the water table aquifer could degrade ground-water quality.

The issue of groundwater degradation does not apply to KPS because the plant does not use cooling water ponds and is not an inland site. As Section 3.1.2 describes, KPS employs a once-through cooling system that withdraws from and discharges to Lake Michigan.

## 4.9 Impacts of Refurbishment on Terrestrial Resources

**NRC**

**The environmental report must contain an assessment of "…the impact of refurbishment and other license-renewal-related construction activities on important plant and animal habitats…" 10 CFR 51.53(c)(3)(ii)(E)**

**"…Refurbishment impacts are insignificant if no loss of important plant and animal habitat occurs. However, it cannot be known whether important plant and animal communities may be affected until the specific proposal is presented with the license renewal application…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 40**

**"…If no important resource would be affected, the impacts would be considered minor and of small significance. If important resources could be affected by refurbishment activities, the impacts would be potentially significant…" (NRC 1996a, Section 3.6, pg. 3-6)**

NRC made impacts to terrestrial resources from refurbishment a Category 2 issue because the significance of ecological impacts cannot be determined without considering site- and project-specific details (NRC 1996a, Section 3.6). Aspects of the site and project to be ascertained are: (1) the identification of important ecological resources, (2) the nature of refurbishment activities, and (3) the extent of impacts to plant and animal habitats.

The issue of impacts of refurbishment on terrestrial resources is not applicable to KPS because, as discussed in Section 3.2, DEK has no plans for refurbishment or other license-renewal-related construction activities at KPS.

## 4.10 Threatened and Endangered Species

**NRC**

**"…Additionally, the applicant shall assess the impact of the proposed action on threatened or endangered species in accordance with the Endangered Species Act." 10 CFR 51.53(c)(3)(ii)(E)**

**"…Generally, plant refurbishment and continued operation are not expected to adversely affect threatened or endangered species. However, consultation with appropriate agencies would be needed at the time of license renewal to determine whether threatened or endangered species are present and whether they would be adversely affected…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 49**

NRC made impacts to threatened and endangered species a Category 2 issue because the status of many species is being reviewed, and site-specific assessment is required to determine whether any identified species could be affected by refurbishment activities or continued plant operations through the renewal period. In addition, compliance with the Endangered Species Act requires consultation with the appropriate federal agencies (NRC 1996a, Sections 3.9 and 4.1).

Section 2.2 of this Environmental Report describes the aquatic communities of Lake Michigan at the KPS site. Section 2.4 describes important terrestrial habitats at KPS and along the associated transmission corridors. That section also discusses the fact that the transmission lines will continue to be an integral part of the transmission system, irrespective of KPS license renewal. No critical habitats have been identified on the KPS site or along the associated transmission corridors. Section 2.5 discusses threatened or endangered species that occur or may occur at KPS and along associated transmission corridors.

With the exception of the four state-listed species observed on the KPS site and discussed in Section 2.5, DEK is not aware of any threatened or endangered terrestrial species that could occur at KPS or along the associated transmission corridors. Vegetation management practices at KPS and along KPS transmission line rights-of-way have no known effect on any listed terrestrial or aquatic species or their habitat. As documented in Sections 3.2 and 3.3, there are no planned modifications to the facility or its procedures associated with license renewal that would affect the environment or plant effluents. Plant and transmission line maintenance practices are not expected to change significantly during the license renewal term. Therefore, no adverse impacts to threatened or endangered species from current or future operations are anticipated.

As discussed in Section 4.9, there are no planned refurbishment activities at KPS during the license renewal term and no plans for major construction activities associated with license renewal. Thus, there will be no impacts to threatened or endangered species from refurbishment or license renewal related construction activities.

DEK wrote to the Wisconsin Department of Natural Resources, and the U.S. Fish and Wildlife Service requesting information on any listed species or critical habitats that might occur on the KPS site or along the associated transmission corridors, with particular

emphasis on species that might be adversely affected by continued operation over the license renewal period. Agency responses are provided in Attachment C and indicate that license renewal is unlikely to affect any listed species.

KPS operations have not impacted threatened and endangered species and renewal of the KPS license is not expected to result in the taking of any threatened or endangered species. DEK has no plans to modify environmental resources and renewal of the license is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of any critical habitat. Additionally, resource agencies contacted by DEK evidenced no serious concerns about license renewal impacts. Therefore, DEK concludes that impacts to threatened or endangered species from license renewal would be SMALL and do not warrant mitigation.

## 4.11 Air Quality During Refurbishment

**NRC**

**"If the applicant's plant is located in or near a nonattainment or maintenance area, an assessment of vehicle exhaust emissions anticipated at the time of peak refurbishment workforce must be provided in accordance with the Clean Air Act as amended." 10 CFR 51.53(c)(3)(ii)(F)**

**"…Air quality impacts from plant refurbishment associated with license renewal are expected to be small. However, vehicle exhaust emissions could be cause for concern at locations in or near nonattainment or maintenance areas. The significance of the potential impact cannot be determined without considering the compliance status of each site and the numbers of workers expected to be employed during the outage…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 50**

NRC made impacts to air quality during refurbishment a Category 2 issue because vehicle exhaust emissions could be cause for some concern, and a general conclusion about the significance of the potential impact could not be drawn without considering the compliance status of each site and the number of workers expected to be employed during an outage (NRC 1996a, Section 3.3). Information needed would include: (1) the attainment status of the plant-site area, and (2) the number of additional vehicles as a result of refurbishment activities.

The issue of air quality during refurbishment is not applicable to KPS because, as discussed in Section 3.2, Dominion has no plans for refurbishment or other license-renewal-related construction activities at KPS.

## 4.12 Microbiological Organisms

**NRC**

**"If the applicant's plant uses a cooling pond, lake, or canal or discharges into a river having an annual average flow rate of less than 3.15 × $10^{12}$ $ft^3$/year (9 × $10^{10}$ $m^3$/year), an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided." 10 CFR 51.53(c)(3)(ii)(G)**

**"…These organisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals that discharge to small rivers. Without site-specific data, it is not possible to predict the effects generically…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 57**

Due to the lack of sufficient data for facilities using cooling ponds, lakes, or canals that discharge to small rivers, NRC designated impacts on public health from thermophilic organisms a Category 2 issue. Information to be ascertained is: (1) whether the plant discharges to a small river, and (2) whether discharge characteristics (particularly temperature) are favorable to the survival of thermophilic organisms.

The issue of thermophilic organisms does not apply to KPS because the plant does not use a cooling pond, lake, or canal that discharges to a small river. As described in Section 3.1.2, KPS uses a once-through heat dissipation system that withdraws from and discharges water to Lake Michigan.

## 4.13 Electric Shock from Transmission-Line-Induced Currents

**NRC**

**The environmental report must contain an assessment of the impact of the proposed action on the potential shock hazard from transmission lines…"[i]f the applicant's transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the National Electric Safety Code for preventing electric shock from induced currents…" 10 CFR 51.53(c)(3)(ii)(H)**

**"…Electrical shock resulting from direct access to energized conductors or from induced charges in metallic structures have not been found to be a problem at most operating plants and generally are not expected to be a problem during the license renewal term. However, site-specific review is required to determine the significance of the electric shock potential at the site…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 59**

NRC made impacts of electric shock from transmission lines a Category 2 issue because, without a review of each plant's transmission line conformance with the National Electrical Safety Code (NESC) criteria (IEEE 1997), NRC could not determine the significance of the electric shock potential. This section provides an analysis of the KPS transmission lines' conformance with the NESC standard.

### Production of Induced Currents

Objects located near transmission lines can become electrically charged due to their immersion in the lines' electric field. This charge results in a current that flows through the object to the ground. The current is called "induced" because there is no direct connection between the line and the object. The induced current can also flow to the ground through the body of a person who touches the object. An object that is insulated from the ground can actually store an electrical charge, becoming what is called "capacitively charged." A person standing on the ground and touching a vehicle or a fence receives an electrical shock due to the sudden discharge of the capacitive charge through the person's body to the ground. After the initial discharge, a steady-state current can develop, the magnitude of which depends on several factors, including the following:

- the strength of the electric field which, in turn, depends on the voltage of the transmission line as well as its height and geometry,
- the size of the object on the ground,
- the extent to which the object is grounded.

In 1977, the NESC adopted a provision that describes how to establish minimum vertical clearances to the ground for electric lines having voltages exceeding 98-kilovolt (kV) alternating current to ground. The clearance must limit the induced current due to electrostatic effects to 5 milliamperes if the largest anticipated truck, vehicle, or equipment were short-circuited to ground. By way of comparison, the setting of ground fault circuit interrupters used in residential wiring (special breakers for outside circuits or those with outlets around water pipes) is 4 to 6 milliamperes.

### Kewaunee Transmission Lines

As described in Section 3.1.6, there are two 345-kilovolt (kV) lines and two 138-kV lines which distribute power from KPS to the electric grid:

- Line F-84: a 138-kV transmission line connecting KPS substation to the East Krok substation (8.2 miles)
- Line Y-51: a 138-kV transmission line connecting KPS substation to the Shoto substation (16.2 miles)
- Line R-304: a 345-kV transmission line connecting KPS substation to the North Appleton substation (50.6 miles)
- Line Q-303: a 345-kV transmission line connecting KPS substation to the Point Beach Nuclear Plant substation (5.6 miles)

As explained in Section 3.1.6, American Transmission Company (ATC) presently owns, operates, and maintains the lines connecting KPS to the electrical grid, and will continue to own, operate, and maintain these lines after KPS ceases operation in the future. The KPS transmission lines were constructed before 1977, when the NESC first introduced the 5 milliampere limit. However, the Q-303 line, which connects KPS to the Point Beach substation, was evaluated for induced current in the Supplemental Environmental Impact Statement for the Point Beach License Renewal (NRC 2005). DEK incorporates by reference and adopts the conclusions of NRC 2005 concerning this line.

### Induced Current Analysis

All locations where the lines crossed paved roads or highways were identified and the lowest clearances were selected for analysis. These limiting cases represent locations along the line where the potential for current-induced shock would be greatest. Once the limiting cases were identified, the electric field strength was calculated for the transmission line at that location, and then the induced current was calculated at the point of the highest electric field strength. If the induced current of the limiting cases exceeded the NESC limit, additional analyses would be performed to identify all crossings with the potential to exceed the limit.

The electric field strength and induced current were calculated using a computer code called ACDCLINE, produced by the Electric Power Research Institute. The results of this computer program have been field-verified through actual electrostatic field measurements by several utilities. The input parameters included design features of the limiting-case scenario and the NESC requirement that conductor sag be determined at a minimum conductor temperature of 120°F. The sag measurements were taken from plan-and-profile drawings for these lines and input into ACDCLINE. For analysis purposes, the maximum vehicle size under the lines is considered to be a tractor-trailer of 8.5 feet in width, 12 feet average height, and 65 feet long.

### Analysis Results

The analytical results for each line are summarized in Table 4.13-1. The analysis determined that the maximum values for the three transmission lines are in compliance with the NESC

and below the NESC limit of 5 milliamperes (TTNUS 2007). As shown in the table, the highest induced current was calculated to be 3.37 millamperes for the 345-kV Line R-304.

ATC conducts surveillance and maintenance inspections on a regular basis to assure that design ground clearances will not change. These procedures include routine ground inspections and aerial patrols by aircraft. The corridors are checked for encroachments, broken conductors, broken or leaning structures, and signs of burnt trees, any of which would be evidence of clearance problems. Ground inspections include examination for clearance at questionable locations, integrity of structures, and surveillance for dead or diseased trees that might affect line operation or line maintenance. Problems noted during inspections are brought to the attention of the appropriate organizations for corrective action (ATC 2004).

As a result of this analysis performed in accordance with the requirements of 10 CFR 51, DEK concludes that electric shock is of SMALL significance for the KPS transmission lines because the magnitude of the induced currents does not exceed the NESC standard. Mitigation measures are not warranted because there is adequate clearance between energized conductors and the ground. These conclusions will remain valid into the future, provided there are no changes in line use, voltage, and maintenance practices or changes in land use under the line.

## 4.14 Housing Impacts

**NRC**

**The environmental report must contain "…[a]n assessment of the impact of the proposed action on housing availability…" 10 CFR 51.53(c)(3)(ii)(I)**

**"…Housing impacts are expected to be of small significance at plants located in a medium or high population area and not in an area where growth control measures that limit housing development are in effect. Moderate or large housing impacts of the workforce associated with refurbishment may be associated with plants located in sparsely populated areas or areas with growth control measures that limit housing development…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 63**

**"…[S]mall impacts result when no discernible change in housing availability occurs, changes in rental rates and housing values are similar to those occurring statewide, and no housing construction or conversion occurs…" (NRC 1996a, Section 4.7.1.1, pp. 4-101 to 4-102)**

NRC made housing impacts a Category 2 issue because impact magnitude depends on local conditions that NRC could not predict for all plants at the time of GEIS publication (NRC 1996a, Section 3.7.2). Local conditions that need to be ascertained are: (1) population categorization as small, medium, or high, and (2) applicability of growth control measures.

Refurbishment activities and continued operations could result in housing impacts due to increased staffing. As described in Section 3.2, DEK does not plan to perform refurbishment. DEK concludes that there would be no refurbishment-related impacts to area housing and no analysis is therefore required. Accordingly, the following discussion focuses on impacts of continued operations on local housing availability.

As described in Section 2.6, KPS is located in a high population area. As noted in Section 2.8, the area of interest is not subject to growth control measures that limit housing development. In 10 CFR 51, Subpart A, Appendix B, Table B-1, NRC concluded that impacts to housing are expected to be of small significance at plants located in "high" population areas where growth control measures are not in effect. Further, DEK anticipates no additional employee hiring attributable to license renewal. Therefore, DEK expects housing impacts to be SMALL.

## 4.15 Public Utilities: Public Water Supply Availability

**NRC**

**The environmental report must contain "…an assessment of the impact of population increases attributable to the proposed project on the public water supply." 10 CFR 51.53(c)(3)(ii)(l)**

**"…An increased problem with water shortages at some sites may lead to impacts of moderate significance on public water supply availability…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 65**

**"Impacts on public utility services are considered small if little or no change occurs in the ability to respond to the level of demand and thus there is no need to add capital facilities. Impacts are considered moderate if overtaxing of facilities during peak demand periods occurs. Impacts are considered large if existing service levels (such as quality of water and sewage treatment) are substantially degraded and additional capacity is needed to meet ongoing demands for services." (NRC 1996a, Section 3.7.4.5, pg. 3-19)**

NRC made public utility impacts a Category 2 issue because an increased problem with water availability, resulting from pre-existing water shortages, could occur in conjunction with plant demand and plant-related population growth (NRC 1996a, Section 4.7.3.5). Local information needed would include: (1) a description of water shortages experienced in the area, and (2) an assessment of the public water supply system's available capacity.

NRC's analysis of impacts to the public water supply system considered both plant demand and plant-related population growth demands on local water resources. As stated in Section 3.4, "Employment," DEK anticipates no additional employee hiring attributable to license renewal. As discussed in Section 3.2, no refurbishment is planned for KPS and no refurbishment impacts are therefore expected.

KPS does not use water from a municipal system; therefore, KPS operations do not affect local public water supplies. DEK has identified no changes during the KPS license renewal term that would require the power station to use municipal water.

Because KPS does not use municipal water and because there is no anticipated increase in employment applicable to the license renewal process, DEK concludes that impacts on public water systems would be SMALL and would not require mitigation.

## 4.16 Education Impacts From Refurbishment

**NRC**

**The environmental report must contain "…[a]n assessment of the impact of the proposed action on…public schools (impacts from refurbishment activities only) within the vicinity of the plant…" 10 CFR 51.53(c)(3)(ii)(l)**

**"…Most sites would experience impacts of small significance but larger impacts are possible depending on site- and project-specific factors…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 66**

**"…[S]mall impacts are associated with project-related enrollment increases of 3 percent or less. Impacts are considered small if there is no change in the school systems' abilities to provide educational services and if no additional teaching staff or classroom space is needed. Moderate impacts are generally associated with 4 to 8 percent increases in enrollment. Impacts are considered moderate if a school system must increase its teaching staff or classroom space even slightly to preserve its pre-project level of service…Large impacts are associated with project-related enrollment increases above 8 percent…" (NRC 1996a, Section 3.7.4.1, pg. 3-15)**

NRC made impacts to education a Category 2 issue because site- and project-specific factors determine the significance of impacts (NRC 1996a, Section 3.7.4.2). Local factors to be ascertained include: (1) project-related enrollment increases, and (2) status of the student/teacher ratio.

This issue is not applicable to KPS because, as Section 3.2 discusses, DEK has no plans for refurbishment or other license-renewal-related construction activities at KPS.

## 4.17 Offsite Land Use

### 4.17.1 Offsite Land Use – Refurbishment

**NRC**

**The environmental report must contain "…[a]n assessment of the impact of the proposed action on…land-use" 10 CFR 51.53(c)(3)(ii)(l)**

**"…Impacts may be of moderate significance at plants in low population areas…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 68**

**"…[I]f plant-related population growth is less than 5 percent of the study area's total population, off-site land-use changes would be small, especially if the study area has established patterns of residential and commercial development, a population density of at least 60 persons per square mile (2.6 $km^2$), and at least one urban area with a population of 100,000 or more within 80 km (50 miles)…" (NRC 1996a, Section 3.7.5, pg. 3-21)**

NRC made impacts to offsite land use as a result of refurbishment activities a Category 2 issue because land-use changes could be considered beneficial by some community members and adverse by others. Local conditions to be ascertained include: (1) plant-related population growth, (2) patterns of residential and commercial development, and (3) proximity to an urban area with a population of at least 100,000.

This issue is not applicable to KPS because, as Section 3.2 discusses, DEK has no plans for refurbishment or other license-renewal-related construction at KPS.

### 4.17.2 Offsite Land Use – License Renewal Term

**NRC**

**The environmental report must contain "An assessment of the impact of the proposed action on…land-use…" 10 CFR 51.53(c)(3)(ii)(l)**

**"…Significant changes in land use may be associated with population and tax revenue changes resulting from license renewal…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 69**

**"…[I]f plant-related population growth is less than 5 percent of the study area's total population, off-site land-use changes would be small…" (NRC 1996a, Section 3.7.5, pg. 3-21)**

**"…[I]f the plant's tax payments are projected to be small relative to the community's total revenue, new tax-driven land-use changes during the plant's license renewal term would be small, especially where the community has preestablished patterns of development and has provided adequate public services to support and guide development…" (NRC 1996a, Section 4.7.4.1, pg. 4-108)**

NRC made impacts to offsite land use during the license renewal term a Category 2 issue, because land-use changes may be perceived as beneficial by some community members and adverse by others. Therefore, NRC could not assess the potential significance of site-specific offsite land-use impacts (NRC 1996a, Section 4.7.4.1). Site-specific factors to consider in an assessment of new tax-driven land-use impacts include: (1) the size of plant-related population growth compared to the area's total population, (2) the size of the plant's tax payments relative to the community's total revenue, (3) the nature of the community's existing land-use pattern, and (4) the extent to which the community already has public services in place to support and guide development.

The GEIS presents an analysis of offsite land use for the renewal term that is characterized by two components: population-driven and tax-driven impacts (NRC 1996a, Section 4.7.4.1).

**Population-Related Impacts**

Based on the GEIS case-study analysis, NRC concluded that all new population-driven land-use changes during the license renewal term at all nuclear plants would be small. This is based on the fact that population growth caused by license renewal would represent a "much smaller percentage" of the local area's total population than has operations-related growth (NRC 1996a, Section 4.7.4.2). As discussed in Section 3.4, DEK does not anticipate any additional employment due to license renewal term activities. Therefore, there would be no population growth in the area. Population driven land use impacts would be SMALL. Mitigation would not be warranted.

### Tax-Revenue-Related Impacts

NRC has determined that the significance of tax payments as a source of local government revenue would be (NRC 1996a, Section 4.7.2):

> SMALL – if the payments are less than 10 percent of the taxing jurisdiction's revenue
>
> MODERATE – if payments are 10 to 20 percent
>
> LARGE – if payments represent greater than 20 percent of revenue

NRC defined the magnitude of land-use changes as follows (NRC 1996a, Section 4.7.4):

> SMALL – very little new development and minimal changes to an area's land-use pattern
>
> MODERATE – considerable new development and some changes to land-use pattern
>
> LARGE – large-scale new development and major changes in land-use pattern

### KPS Taxes

As noted in Section 2.7 "Taxes," DEK pays a lump sum gross revenues tax to the State of Wisconsin in lieu of a property tax on KPS. Gross revenue taxes become part of the State's general purpose revenue, which goes to fund the Wisconsin Shared Revenue Program (WSRP). The taxes are combined, in the WSRP, with other taxes collected statewide. With the exception of the WSRP Utility payment, one of the payments made from the fund, there is no direct correlation between WSRP payments and the sources of those funds. Therefore, it is not possible to accurately determine the exact level of fiscal impact KPS has had on surrounding communities.

However, it is possible to compare the size of the WSRP Utility payment to the local taxing jurisdictions' total tax revenues. The Town of Carlton and Kewaunee County receive WSRP Utility payments from the state. For the period from 2004 through 2005 (the most recent data available), KPS-related WSRP Utility payments to the Town of Carlton represented approximately 68.9 percent to 69.2 percent of the Town's total annual tax revenues (Table 2.7-4). In the years 2004 and 2005, the Town of Carlton collected no general property tax from its residents (Section 2.7). Therefore, according to NRC criteria, this shared revenue utility payment would be of LARGE significance to the Town of Carlton; however, actual land use changes in the town since the plant began operating meet the definition of SMALL, as described above. For the same period, KPS-related WSRP Utility payments to Kewaunee County have represented 3.4 to 3.8 percent of the Kewaunee County revenues. Using NRC's criteria, the shared revenue utility payments received by the County because of KPS presence are now of SMALL significance to Kewaunee County.

As described in Section 3.2, DEK does not anticipate refurbishment or major construction during the license renewal period. Therefore, DEK does not anticipate any increase in the assessed value of KPS due to refurbishment-related improvements, or any related tax-increase-driven changes to offsite land-use and development patterns. Using the NRC's methodology would lead to the conclusion that KPS operations has, and license renewal activities would have a SMALL tax-driven land use impact in Kewaunee County, but a LARGE impact in the Town of Carlton.

Because of pending changes to the methodology for taxing public utilities in the State of Wisconsin, it is anticipated that KPS will be taxed differently, beginning in 2009. The estimated WSRP Utility payment to the Town of Carlton would increase to $423,333 (Table 2.7-3). The estimated WSRP Utility payment to Kewaunee County would increase to $796,667 (Table 2.7-3). Although these changes increase the payments noticeably, they would not change the impact categories of SMALL in Kewaunee County and LARGE in the Town of Carlton; however, actual land use changes in the town since the plant began operating meet the definition of SMALL, as described on the previous page.

**Land Use in the KPS Region**

As shown in Table 2.8-1, the rate of growth of the population in Kewaunee and Manitowoc Counties from 1970 to 2005 has been modest. From 1990 to 2000, Kewaunee County's population growth was 6.9 percent, and that of Manitowoc County was 3.7 percent (Table 2.8-1). The population of the state grew at a slightly faster rate of 9.6 percent in the ten year period (Table 2.8-1). Over the same period, the number of housing units in Kewaunee County increased by 9.0 percent, while the number of housing units in the state increased by 12.9 percent (Table 2.8-2). The County remains largely undeveloped (93 percent). Because the population has grown minimally and there had been no significant change in the economic base of the County, there has been little change in the land use patterns in the County, although some former agricultural tracts have been developed for residential uses.

From 1990 to 2000, the Town of Carlton experienced a slight decline in population, a loss of 41 people (Section 2.8). As is supported by the relatively stable population, Carlton has also experienced relatively little land use change. Approximately 97 percent of the land is agricultural or woodland and 3 percent is developed (Table 2.8-4). Dairy farming remains the primary economic activity. Thus, while payments constitute a large percentage of the Town's revenues, those revenues have not driven significant new delevopment or major changes in land use patterns.

The Bay-Lake Regional Planning Commission (BLRPC) provides comprehensive land planning guidance for Kewaunee County, among others. The BLRPC prepared a comprehensive plan to serve as a framework for the development of county and local comprehensive plans throughout the region (Section 2.8). In addition to the BLRPC document, a number of other land use guidance documents are used in Kewaunee County and/or its municipalities. Most notable are the *Kewaunee County 20-Year Comprehensive Plan* and the *Comprehensive Smart Growth Plan for the Village of Casco and the Towns of Carlton, Casco, Lincoln, Montpelier, and West Kewaunee* (Section 2.8).

### Conclusion

DEK views the continued operation of KPS as a benefit to the Town of Carlton and Kewaunee County through the direct and indirect tax contributions made by DEK on behalf of KPS to the town and county. Because DEK stated that it would not conduct any refurbishment activities for KPS, there would be no anticipated changes in plant valuations.

The current and projected (2009) WSRP Utility payments, which are largely attributable to KPS, are SMALL in relation to Kewaunee County's annual revenues, but are considered LARGE in relation to the Town of Carlton's annual revenues. However, in the Town of Carlton, the majority of the Utility payments are used for property tax relief for the residents and have not driven significant new development or major changes in land use patterns. Because population growth related to the license renewal of KPS is expected to be SMALL and because there would be no anticipated tax-related impacts to Kewaunee County land use, the renewal of KPS license would have a continuing beneficial impact on Kewaunee County.

Therefore, Dominion concludes that land-use impacts would be SMALL. Mitigation for land-use impacts during the license renewal term would not be warranted.

## 4.18 Transportation

**NRC**

**The environmental report must "…assess the impact of highway traffic generated by the proposed project on the level of service of local highways during periods of license renewal refurbishment activities and during the term of the renewed license." 10 CFR 51.53(c)(3)(ii)(J)**

**"…Transportation impacts…are generally expected to be of small significance. However, the increase in traffic associated with additional workers and the local road and traffic control conditions may lead to impacts of moderate or large significance at some sites…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 70**

**Small impacts would be associated with U.S. Transportation Research Board Level of Service A, having the following condition: "…Free flow of the traffic stream; users are unaffected by the presence of others." and Level of Service B, having the following condition: "…Stable flow in which the freedom to select speed is unaffected but the freedom to maneuver is slightly diminished…" (NRC 1996a, Section 3.7.4.2, pp. 3-18 and 3-19)**

NRC made impacts to transportation a Category 2 issue because impact significance is determined primarily by road conditions existing at the time of the project, which NRC could not forecast for all facilities (NRC 1996a, Section 3.7.4.2). Local road conditions to be ascertained are: (1) level of service conditions, and (2) incremental increases in traffic associated with refurbishment activities and license renewal staff.

As described in Section 3.2, no major refurbishment is planned and no refurbishment impacts to local transportation are therefore anticipated. As described in Section 3.4, no additional employees are expected during the license renewal term. Therefore, Dominion expects license-renewal impacts to transportation to be SMALL.

## 4.19 Historic and Archaeological Resources

**NRC**

**The environmental report must "…assess whether any historic or archeological properties will be affected by the proposed project." 10 CFR 51.53(c)(3)(ii)(K)**

**"…Generally, plant refurbishment and continued operation are expected to have no more than small adverse impacts on historic and archeological resources. However, the National Historic Preservation Act requires the Federal agency to consult with the State Historic Preservation Officer to determine whether there are properties present that require protection…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 71**

**"…Sites are considered to have small impacts to historic and archeological resources if (1) the State Historic Preservation Officer (SHPO) identifies no significant resources on or near the site; or (2) the SHPO identifies (or has previously identified) significant historic resources but determines they would not be affected by plant refurbishment, transmission lines, and license-renewal-term operations and there are no complaints from the affected public about altered historic character; and (3) if the conditions associated with moderate impacts do not occur." (NRC 1996a, Section 3.7.7, pg. 3-23)**

NRC made impacts to historic and archaeological resources a Category 2 issue because determinations of impacts to historic and archaeological resources are site-specific in nature, and the National Historic Preservation Act mandates that impacts must be determined through consultation with the State Historic Preservation Officer (SHPO) (NRC 1996a, Section 4.7.7.3).

KPS does not plan any refurbishment activities; therefore, no refurbishment-related impacts to historic or archaeological resources are anticipated. Similarly, there are no major construction activities or modifications to the transmission lines associated with license renewal, and therefore no expected land disturbing activities that could affect historic and archaeological resources.

As described in Section 2.11, the *Final Environmental Statement for the Kewaunee Nuclear Power Plant* (AEC 1972) stated that the KPS property had no known historical significance and there were no national historic sites located in the immediate vicinity of the plant. KPS did not perform an archaeological survey prior to the plant construction. However, KPS did contact The State Historical Society of Wisconsin and the Advisory Council on Historic Preservation, who stated that the operation of KPS would not impact any known historical or archeological resources. (AEC 1972)

As described in Section 2.11, as of 2006, 19 properties in Manitowoc County and 9 properties in Kewaunee County have been listed in the National Register of Historic Places. Of these 28 properties, none fall within a 6-mile radius of KPS.

Beneath the KPS site is a portion of a vast forested area that was buried by the Valderan Glacier approximately 12,400 years ago. The forest extends for many miles and is not unique to the plant site.

DEK is not currently aware of any historic or archaeological sites that are being or have been impacted by KPS operations, facility, or transmission line right-of-way management. As discussed in Section 2.11, the results of an archaeological study of the KPS property show that none of the sites registered with the Wisconsin Archaeological and Historic Resource Database are being or have been impacted by KPS operations. Archaeological field testing of the KPS site yielded nine new locations where artifacts were found. Given that about 735 acres of land were surveyed, the artifact density of 0.01 is extremely low. The survey reports that these were isolated finds without any historical context and are not significant in terms of National Register of Historic Places criteria. KPS does not expect current practices to change as a result of license renewal. Additionally, DEK's procedure for land-disturbing activities includes steps for protection of historic/archaeological resources, should they be encountered.

DEK corresponded with the Wisconsin State Historic Preservation Officer and has not been made aware of any concerns regarding historical or archeological resources at the KPS site or along the associated transmission corridors that may need to be addressed. Copies of correspondence with the SHPO are provided in Attachment D.

Based on the information accumulated at this time, KPS concludes that the continued use of facilities, transmission lines, and rights-of-way is projected to cause little or no (SMALL) impact on historic sites over the license renewal term.

## 4.20 Severe Accident Mitigation Alternatives (SAMA)

**NRC**

**The environmental report must contain a consideration of alternatives to mitigate severe accidents "…if the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental impact statement or related supplement or in an environment assessment…" 10 CFR 51.53(c)(3)(ii)(L)**

**"…The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives…" 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 76**

Section 4.20 summarizes Dominion's analysis of alternative ways to mitigate the impacts of severe accidents at KPS. Attachment F provides a detailed description of the severe accident mitigation alternatives (SAMA) analysis.

The term "accident" refers to any unintentional event (i.e., outside the normal or expected plant operation envelope) that results in the release or a potential for release of radioactive material to the environment. NRC categorizes accidents as "design basis" or "severe." Design basis accidents are those for which the risk is great enough that NRC requires plant design and construction to prevent unacceptable accident consequences. Severe accidents are those that NRC considers too unlikely to warrant design controls.

NRC concluded in its license renewal rulemaking that the unmitigated environmental impacts from severe accidents met its Category 1 criteria. However, NRC made consideration of mitigation alternatives a Category 2 issue because not all plants had completed ongoing regulatory programs related to mitigation (e.g., individual plant examinations and accident management). Site-specific information to be presented in the license renewal environmental report includes: (1) potential SAMAs; (2) benefits, costs, and net value of implementing potential SAMAs; and (3) sensitivity of analysis to changes in key underlying assumptions.

KPS maintains a probabilistic risk assessment (PRA) model to use in evaluating the most significant risks of core damage and the resulting radiological release from the containment structures. For the SAMA analysis, Dominion used the KPS PRA model output as input to an NRC-approved methodology that calculates economic costs and dose to the public from hypothesized releases from the containment structure into the environment. Then, using NRC regulatory analysis techniques, Dominion calculated the monetary value of the unmitigated severe accident risk for KPS. The result represents the monetary value of the base risk of dose to the public and worker, offsite and onsite economic costs, and replacement power. This value became a cost/benefit-screening tool for potential SAMAs; a SAMA whose cost of implementation exceeded the base risk value

could be rejected as being not cost-beneficial. The following list summarizes the steps of this process:

- Kewaunee Power Station (KPS) PRA Model – Use the KPS Internal Events PRA model as the basis for the analysis (Section F.2). Incorporate external events contributions as described in Section F.4.5.
- Level 3 PRA Analysis – Use KPS Level 1 and 2 Internal Events PRA output and site-specific meteorology, demographic, land use, and emergency response data as input in performing a Level 3 PRA (Section F.3) using the MELCOR Accident Consequences Code System Version 2 (MACCS2).
- Baseline Risk Monetization – Use the analysis techniques specified in NEI 05-01, Revision A to calculate the monetary value of the unmitigated KPS severe accident risk. This becomes the maximum averted cost-risk (MACR) that is possible (Section F.4).
- Phase I SAMA Analysis – Identify potential SAMA candidates based on the KPS PRA, Individual Plant Examination (IPE), Individual Plant Examination for External Events (IPEEE), and documentation from the industry and NRC. Screen out Phase I SAMA candidates that are not applicable to the KPS design or are of low benefit in pressurized water reactors (PWRs) such as KPS, candidates that have already been implemented at KPS or whose benefits have been achieved at KPS using other means, and candidates whose estimated cost exceeds the possible MACR (Section F.5).
- Phase II SAMA Analysis – Calculate the risk reduction attributable to each remaining SAMA candidate and compare to a more detailed cost analysis to identify the net cost-benefit. PRA insights are also used to screen SAMA candidates in this phase (Section F.6).
- Sensitivity Analysis – Evaluate how changes in the SAMA analysis assumptions might affect the cost-benefit evaluation (Section F.7).
- Conclusions – Summarize results and identify conclusions (Section F.8).

Using this process, Dominion incorporated industry, NRC, and plant-specific information to create a list of 189 SAMAs for consideration. Dominion analyzed this list and screened out SAMAs that would not apply to the KPS design, that KPS had already implemented, or that would achieve results that KPS had already achieved at the site by other means. Dominion used the cost estimates for the remaining SAMAs and compared them with the maximum averted cost-risk value to screen out SAMAs that would not be cost-beneficial. Sixty-two candidate SAMAs remained for further consideration.

Dominion calculated the risk reduction that would be attributable to each candidate SAMA (assuming SAMA implementation at KPS) and re-quantified the cost-risk value. The difference between the base cost-risk value and the SAMA-reduced cost-risk value became the averted cost-risk, or the value of implementing the SAMA. Dominion used the cost estimates for implementing each SAMA at KPS and repeated the cost/benefit comparison using the SAMA specific averted cost-risk. Fourteen SAMAs were found to be potentially cost beneficial for KPS: These 14 SAMA candidates can be grouped together into three potential areas for risk improvement. Each of the three areas is described below and delineates the individual SAMA candidates contained within each area.

**Improve Availability of AFW Sources**

SAMA Numbers 66 and 172 are related to improving availability of secondary cooling. SAMA 66 would incorporate actions to provide alternate means of secondary cooling sources into abnormal and emergency operating procedures. These actions are already included in the SAMGs, but those procedures are not entered until after core damage is imminent. Incorporating the actions into the EOPs would reduce the chance of core damage due to a loss of secondary cooling. SAMA 172 would provide an additional alarm to indicate that CST level had decreased to the point that AFW pump suction loss was imminent. This additional alarm would provide an immediate cue to the operators to provide an additional water source or to prepare for a switch to bleed and feed cooling.

**Improve Availability of HVAC**

SAMA items 80, 82, 83, 170, and 171 are related to improvements that would improve the reliability and availability of ventilation to risk-significant equipment. SAMA 80 would provide temporary ventilation equipment and procedures to be used following a loss of installed ventilation equipment serving the auxiliary building.

The goal of SAMA items 82, 83, 170, and 171 is to mitigate the chance of losing cooling to the 480 VAC switchgear rooms and, if a loss of HVAC occurs, to improve the ability to detect and mitigate such a loss. These SAMAs would install alarms to detect high temperatures in the switchgear rooms and provide temporary ventilation equipment and procedures to be used following a loss of installed ventilation equipment serving the rooms. As discussed in Section F.7.7, synergies may be possible if these items are implemented concurrently with SAMA items 81, 160, 166, and 167, which would provide similar capabilities for the EDG rooms but would not show a cost-benefit alone.

**Internal Flooding-Related Improvements**

Seven of the SAMA items are directly related to minimizing the consequences of internal flooding events. SAMA item 169 would install flood barriers around MCC-52E, MCC-62E, and MCC-62H so that flood waters accumulating in the auxiliary building will not cause failure of these key power sources.

SAMA items 173, 174, and 175 would install spray protection for equipment located on the auxiliary building mezzanine level: item 173 would protect the auxiliary building mezzanine coolers, item 174 would protect the boric acid transfer pumps, and item 175 would protect the A-train CCW pump. As discussed in Section F.7.7, synergies may be possible if these items are implemented concurrently.

SAMA 176 would install higher capacity sump pumps in safeguards alley. These pumps would be large enough to prevent propagation from one room to another for floods with a flow rate of less than about 500 gpm. By preventing propagation, the likelihood of failing multiple trains of equipment in the area is reduced.

SAMA 177 would ensure that the fire barrier separating the two 480 VAC switchgear rooms was capable of withstanding flooding events and preventing water from propagating from

one side to the other. This modification, as with item 176, would help prevent flood-induced failures of multiple equipment trains.

SAMA 181 would install break-away latching mechanisms that would ensure that the doors from the EDG rooms to the screenhouse tunnel would open before water level in the EDG rooms would reach a level that would cause a loss of offsite power.

**Sensitivity Analyses**

Dominion performed three numerical sensitivity analyses to evaluate how the SAMA analysis would change if certain key parameters were changed. The sensitivity analyses include use of a three percent discount rate, use of a 26-year evaluation period, and evaluation of benefits using estimates of the $95^{th}$ percentile PRA results. The results of the uncertainty analysis indicate that no new SAMA items would show a positive cost-benefit for KPS.

Other sensitivity evaluations performed included consideration of a change in evacuation speed, evaluation of the two unresolved peer review findings, and the synergies that could be obtained by implementing multiple SAMA items simultaneously.

The sensitivity of the overall offsite dose results to a change in the evacuation speed was performed as part of the Level 3 PRA analysis. This sensitivity showed almost no change in the overall dose to a change in the evacuation speed within the 10-mile emergency planning zone (EPZ) of KPS. Therefore, changes to the evacuation speed used in the Level 3 PRA will not change the overall results of the SAMA analysis.

Since the Peer Review, all A and B Level F&Os except two have been resolved either through upgrading documentation, model changes, or both. The two remaining, unresolved, peer review findings relate to HVAC modeling, including loss of HVAC as a separate initiating event. In the first finding, it is stated that evidence exists that loss of HVAC would not result in a reactor trip, but that a basis for the conclusion needs to be documented. Several SAMA items related to HVAC have been evaluated with two showing a positive cost-benefit. The second unresolved F&O relates to not documenting the basis for room cooling requirements when HVAC was not modeled as a support system for components. In the current model, room cooling is modeled as a required support system for all components unless calculations show that HVAC is not needed. Therefore, it is concluded that resolution of the unresolved peer review findings will not change the overall conclusions of this analysis.

An evaluation of potential synergies between the SAMA items was performed to determine if a larger benefit could be obtained by implementing multiple SAMA items simultaneously. In general, SAMA items were distinctive enough that no synergies would be obtained. However, several of the items could be implemented simultaneously with a potential decrease in costs. These items are summarized below.

Potential synergies could be obtained by implementing SAMA items 173, 174, and 175, each of which installs sprays shields to protect equipment in the auxiliary building mezzanine. It is estimated that synergies could be achieved in engineering and installation if the items are implemented simultaneously. Each of these three items was shown poten-

tially to have a positive benefit when considered individually. Implementing the three items together could result in cost savings and, therefore, a larger benefit. However, it is noted that implementation of any of the items individually would achieve a portion of the benefits of the other items.

Potential synergies could be obtained by implementing SAMA items 80, 81, 82, 83, 166, 167, 170, and 171, each of which proposes a means to reduce the likelihood or consequences of a loss of ventilation. However, SAMA 80 evaluated the benefits of improved ventilation in the auxiliary building while the other items addressed ventilation to equipment located in safeguards alley. Given the physical separation between the auxiliary building and safeguards alley, it is expected that potential synergies with the other areas would be very small, if any. However, analysis of ventilation for the diesel and switchgear rooms could result in synergies between the heatup analyses, procedure development and equipment needed.

No other SAMAs were evaluated as having potential synergies with simultaneous implementation.

**Conclusions**

Use of the PRA in conjunction with cost benefit analysis methodologies provides an enhanced understanding of the effects of the proposed changes relative to the cost of implementation and projected impact on a much larger future population. In summary, Dominion identified three categories of improvements that are potentially cost-beneficial, implemented by 14 SAMA candidates. This conclusion is based on conservative treatment of costs and benefits. That is, costs used for the evaluations are underestimated and benefits are overestimated. These SAMAs do not relate to the management of aging during the period of extended operation, and are therefore unrelated to any of the technical matters that must be addressed pursuant to 10 C.F.R. Part 54. Accordingly, these potential SAMAs will be further reviewed for implementation as part of Dominion's ongoing performance improvement programs. Evaluation of plant risk is part of an ongoing effort to improve operation at KPS and implementation of these items will be considered as part of that effort.

## Table 4.13-1. Results of Induced Current Analyses

| Transmission Lines | Length (miles) | Voltage (kV) | Maximum Induced Current (milliamperes) |
|---|---|---|---|
| Line F-84: KPS to East Krok | 8.2 | 138 | 0.51 |
| Line Y-51: KPS to Shoto | 16.2 | 138 | 1.94 |
| Line R-304: KPS to North Appleton | 50.6 | 345 | 3.37 |

Source: TtNUS (2007)

## 4.21 References

AEC (U.S. Atomic Energy Commission) 1972. *Final Environmental Statement Related to Operation of Kewaunee Nuclear Power Plant*. Docket No 50-305. Directorate of Licensing. Washington, DC. December. NRC ADAMS Accession Number 3000007089.

ATC (American Transmission Company). 2004. *Vegetation Management Philosophy and Standards*. Instruction Number: 02-04. May 1 2004.

Dominion (Dominion Resources Services) 2006. Letter to D. Hantz – Wisconsin Department of Natural Resources Wastewater Engineer from P. F. Faggert – Dominion Vice President and Chief Environmental Officer on February 13, 2006.

Dominion (Dominion Resources Services) 2008. *Information Requirements Related to Cooling Water Intake Structures – WPDES Permit WI-0001571-07*. Letter to D. Hantz – Wisconsin Department of Natural Resources Wastewater Engineer from P. F. Faggert – Dominion Vice President and Chief Environmental Officer on January 4, 2008.

EA Engineering (EA Engineering, Science, and Technology, Inc.) 2007. *Impingement Mortality and Entrainment Characterization Report, Kewaunee Power Station, March 2006 – February 2007*. Submitted to Dominion Resources Services, Inc., Glen Allen, Virginia. August.

EPA (U.S. Environmental Protection Agency). 2004a. *National Pollutant Discharge Elimination System—Final Regulations To Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities; Final Rule*. Federal Register. Vol. 69, No. 131, pp. 41576-41653. July 9.

EPA (U.S. Environmental Protection Agency). 2004b. *Fact Sheet: Cooling Water Intake Structures – Section 316(b). Final Regulations for Cooling Water intake Structures at Large Power Plants (Phase II)*. Office of Water. February. Available online at http://www.epa.gov/waterscience/316b/phase2/phase2final-fs.pdf. Accessed on December 6, 2007.

EPA (U.S. Environmental Protection Agency), 2007a. *Implementation of the Decision in Riverkeeper, Inc. v. EPA, Remanding the Cooling Water Intake Structures Phase II Regulation*. Memorandum to Regional Administrators from Benjamin Grumbles – EPA Assistant Administrator Office of Water on March 20, 2007. Available online at http://www.epa.gov/waterscience/316b/phase2/implementation-200703.pdf. Accessed on April 18, 2008.

EPA (U.S. Environmental Protection Agency), 2007b. *National Pollutant Discharge Elimination System—Suspension of Regulations Establishing Requirements for Cooling Water Intake Structures at Phase II Existing Facilities*. Federal Register. Vol. 72, No. 130, pp. 37107-37109. July 9.

IEEE (Institute of Electrical and Electronics Engineers). 1997. *National Electrical Safety Code*, 1997 Edition, New York, New York.

NES (Nalco Environmental Sciences). 1976. *Kewaunee Nuclear Power Plant 316(b) Demonstration – Environmental Effects of Existing Cooling Water Intake Structur*es. Prepared by Nalco Environmental Sciences, Northbrook, Illinois, for Wisconsin Public Service Corporation, Green Bay, Wisconsin.

NRC (U.S. Nuclear Regulatory Commission). 1996a. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS), Volumes 1 and 2*. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

NRC (U.S. Nuclear Regulatory Commission). 1996b. *Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Correction*. Federal Register. Vol. 61, No. 147, pp. 39555-39556. July 30.

NRC (Nuclear Regulatory Commission). 2005. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*, Supplement 23, Regarding Point Beach Nuclear Plant Units 1 and 2. August. NRC ADAMS Accession Number ML052230490.

TtNUS (Tetra Tech NUS). 2007. "Calculation Package for Kewaunee Power Station Transmission Lines, Induced Current Analysis." Aiken, South Carolina. January.

WDNR (Wisconsin Department of Natural Resources) 1976. Letter to Messrs. Williams, Euers, Eisele, Buss, Rudolph, Wahtola, and Mussallem – various affiliations from M. H. Van Susteren – WDNR Hearing Examiner on September 13, 1976.

WDNR (Wisconsin Department of Natural Resources) 1977. Letter to E. W. James – Wisconsin Public Service Corp. from T.A. Kroehn – WDNR Administrator on August 24, 1977.

WDNR (Wisconsin Department of Natural Resources) 2007. *Requirements for Cooling Water Intake Structures – WPDES Permit WI-0001571-07*. Letter to P. F. Faggert – Dominion Resources Services from D. Hantz – WDNR Wastewater Engineer on December 3, 2007.

# 5.0 ASSESSMENT OF NEW AND SIGNIFICANT INFORMATION

**NRC**

**"The environmental report must contain any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware." 10 CFR 51.53(c)(3)(iv)**

The U.S. Nuclear Regulatory Commission (NRC) licenses the operation of domestic nuclear power plants and provides for license renewal, requiring a license renewal application that includes an environmental report (10 CFR 54.23). NRC regulations, 10 CFR 51, prescribe the environmental report content and identify the specific analyses the applicant must perform. In an effort to streamline the environmental review, NRC has resolved most of the environmental issues generically (Category 1) and only requires an applicant's analysis of the remaining issues (Category 2).

While NRC regulations do not require an applicant's environmental report to contain analyses of the impacts of Category 1 issues, the regulations [10 CFR 51.53(c)(3)(iv)] do require that an applicant identify any new and significant information of which the applicant is aware that would negate any of the generic findings that NRC has codified or evaluated in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (NRC 1996a). The purpose of this requirement is to alert NRC staff to such information, so the staff can determine whether to seek the Commission's approval to waive or suspend application of the rule with respect to the affected generic analysis. NRC has explicitly indicated, however, that an applicant is not required to perform a site-specific validation of GEIS conclusions (NRC 1996b, pg. C9-13, Concern Number NEP.015).

Dominion Energy Kewaunee (DEK) expects that new and significant information would include:

- Information that identifies a significant environmental issue not covered in the GEIS and codified in the regulation, or
- Information that was not covered in the GEIS analyses of a particular environmental issue and that leads to an impact finding different from that codified in the regulation.

NRC does not specifically define the term "significant". For the purpose of its review, DEK used guidance available in Council on Environmental Quality (CEQ) regulations. The National Environmental Policy Act authorizes CEQ to establish implementing regulations for federal agency use. NRC requires license renewal applicants to provide NRC with input, in the form of an environmental report, that NRC will use to meet National Environmental Policy Act requirements as they apply to license renewal (10 CFR 51.10). CEQ guidance provides that federal agencies should prepare environmental impact statements for actions that would significantly affect the environment (40 CFR 1502.3), focus on significant environmental issues (40 CFR 1502.1), and eliminate from detailed study issues that are not significant [40 CFR 1501.7(a)(3)]. The CEQ guidance includes a lengthy definition of "significantly" that requires consideration of the context of the action and the intensity or severity of the impact(s) (40 CFR 1508.27). DEK expects that moderate or large impacts, as defined by NRC, would be significant. Chapter 4 presents the NRC definitions of "moderate" and "large" impacts.

The new and significant assessment process that DEK used during preparation of this license renewal application includes: (1) interviews with DEK, Dominion Resources Services, Inc., WPSC, and ATC subject experts on information related to the conclusions in the GEIS as they relate to KPS, (2) review of DEK and KPS environmental management systems for how current programs manage potential impacts and/or provide mechanisms for KPS staff to become aware of new and significant information, (3) correspondence with state and federal regulatory agencies to determine if the agencies had concerns, (4) review of documents related to environmental issues at KPS and regional environs, (5) credit for oversight provided by inspections of plant facilities and environmental monitoring operations by state and federal regulatory agencies, and (6) DEK contracted with industry experts on license renewal environmental impacts to provide an independent review of plant-related information.

DEK is aware of no new and significant information regarding the environmental impacts of KPS license renewal.

## 5.1 References

NRC (U.S. Nuclear Regulatory Commission). 1996a. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)*. Volumes 1 and 2. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

NRC (U.S. Nuclear Regulatory Commission) 1996b. *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. Washington, DC. May. NRC ADAMS Accession Numbers 9606180325 and 9606180333.

# 6.0 SUMMARY OF LICENSE RENEWALS IMPACTS AND MITIGATING ACTIONS

## 6.1 License Renewal Impacts

Dominion Energy Kewaunee (DEK) has reviewed the environmental impacts of renewing the Kewaunee Power Station (KPS) operating license and has concluded that all impacts would be small and would not require mitigation. This environmental report documents the basis for DEK's conclusion. Chapter 4 incorporates by reference the U.S. Nuclear Regulatory Commission (NRC) findings for the 50 Category 1 issues that apply to KPS (and for the 2 "NA" issues for which NRC came to no generic conclusion), all of which have impacts that are small (Attachment A, Table A-1). Chapter 4 also analyzes Category 2 issues, all of which are either not applicable or have impacts that would be small. Table 6-1 identifies the impacts that KPS license renewal would have on resources associated with Category 2 issues.

## 6.2 Mitigation

**NRC**

**"The report must contain a consideration of alternatives for reducing adverse impacts…for all Category 2 license renewal issues…" 10 CFR 51.53(c)(3)(iii)**

**"…The environmental report shall include an analysis that considers and balances…alternatives available for reducing or avoiding adverse environmental effects…." 10 CFR 51.45(c) as incorporated by 10 CFR 51.53(c)(2) and 10 CFR 51.53(c)(3)(iii)**

All impacts of license renewal are small and would not require mitigation. Current operations include mitigation and monitoring activities that would continue during the license renewal term. DEK performs routine mitigation and monitoring activities to ensure the safety of workers, the public, and the environment. These activities include the ongoing radiological effluent control program, radiological environmental monitoring program, effluent chemistry monitoring, and monitoring of Lake Michigan water quality in the vicinity of KPS. These monitoring programs ensure that the plant's permitted emissions and discharges are within regulatory limits and any unusual or off-normal emission/discharges would be quickly detected, mitigating potential impacts.

## 6.3 Unavoidable Adverse Impacts

**NRC**

**The environmental report shall discuss "Any adverse environmental effects which cannot be avoided should the proposal be implemented;" 10 CFR 51.45(b)(2) as adopted by 10 CFR 51.53(c)(2)**

This environmental report adopts by reference NRC findings for applicable Category 1 issues, including discussions of any unavoidable adverse impacts. DEK examined 21 Category 2 issues and identified the following unavoidable adverse impacts of license renewal:

- Waste heat that results from operation of the plant is discharged to Lake Michigan and locally affects its thermal pattern. The additional heat loading could cause a small increase or reduction in productivity of fish, phytoplankton, and benthos near the shoreline.
- Disposal of sanitary, chemical, and radioactive wastes have adverse impacts on land commitments. KPS waste disposal procedures are intended to reduce adverse impacts from these sources to acceptably low levels. The generation of electricity results in spent nuclear fuel, a highly radioactive waste that currently has no permanent disposal option.
- Operation of KPS results in a very small increase in radioactivity in the air and water. However, fluctuations in natural background radiation can be expected to exceed the small incremental dose increase to the local population. Operation of KPS also establishes a very low probability risk of accidental radiation exposure to inhabitants of the area.
- Some fish are impinged on the traveling screens at the intake structure.
- Some larval fish and shellfish are entrained at the intake structure.

## 6.4 Irreversible and Irretrievable Resource Commitments

**NRC**

**The environmental report shall discuss "Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." 10 CFR 51.45(b)(5) as adopted by 10 CFR 51.53(c)(2)**

Continued operation of KPS for the license renewal term will result in irreversible and irretrievable resource commitments, including the following:

- nuclear fuel, which is consumed in the reactor and converted to radioactive waste;
- the land required to dispose of spent nuclear fuel, low-level radioactive wastes generated as a result of plant operations, and sanitary wastes generated from normal industrial operations;
- elemental materials that will become radioactive, and;
- materials used for the normal industrial operations of KPS that cannot be recovered or recycled or that are consumed or reduced to unrecoverable forms.

## 6.5 Short-Term Use Versus Long-Term Productivity of the Environment

**NRC**

**The environmental report shall discuss "The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity…" 10 CFR 51.45(b)(4) as adopted by 10 CFR 51.53(c)(2)**

The current balance between short-term use and long-term productivity at the KPS site was established when the plant began operating in the early 1970s. The *Final Environmental Statement Related to Operation of the Kewaunee Power Plant* (AEC 1972) evaluated the impacts of constructing and operating KPS in Kewaunee County, Wisconsin. The area surrounding the plant site is agricultural. The KPS site consists of approximately 908 acres. Structures, facilities, and parking lots occupy about 60 acres. Approximately 400-450 acres are used for agriculture. The remainder of the land is a mixture of woodlands, fields in various stages of succession, small wetlands and watercourses, and open areas. No other significant alteration of resource use or productivity is evident.

After decommissioning of the plant, the land could be restored to terrestrial habitat, or used for other industrial purposes. Thus, the "trade-off" between the production of electricity and small changes in the local environment is reversible.

Experience with other experimental, developmental, and commercial nuclear plants has demonstrated the feasibility of decommissioning, and dismantlement will take into account the intended new use of the site. Decisions on the ultimate disposition of these lands have not yet been made. Continued operation for an additional 20 years would not increase the short-term productivity impacts described here.

## Table 6-1. Environmental Impacts Related to License Renewal at KPS

| No. | Issue | Environmental Impacts |
|---|---|---|
| | **Surface Water Quality, Hydrology, and Use (for all plants)** | |
| 13 | Water use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow) | None. This issue does not apply because KPS does not use cooling ponds or cooling towers withdrawing water from a small river. |
| | **Aquatic Ecology (for plants with once-through and cooling pond heat dissipation systems)** | |
| 25 | Entrainment of fish and shellfish in early life stages | Small. KPS has a current WPDES permit protecting the environment. In addition, recent studies indicate little or no impact. |
| 26 | Impingement of fish and shellfish | Small. KPS has a current WPDES permit protecting the environment. In addition, recent studies indicate little or no impact. |
| 27 | Heat shock | Small. KPS has a current WPDES permit and an existing 316(a) determination. |
| | **Groundwater Use and Quality** | |
| 33 | Groundwater use conflicts (potable and service water, and dewatering; plants that use >100 gpm) | None. This issue does not apply because KPS uses less than 100 gpm of groundwater. |
| 34 | Groundwater use conflicts (plants using cooling towers or cooling ponds withdrawing makeup water from a small river) | None. This issue does not apply because KPS does not use cooling ponds or cooling towers withdrawing water from a small river. |
| 35 | Groundwater use conflicts (Ranney wells) | None. This issue does not apply because KPS does not use Ranney wells. |
| 39 | Groundwater quality degradation (cooling ponds at inland sites) | None. This issue does not apply because KPS does not use cooling ponds. |
| | **Terrestrial Resources** | |
| 40 | Refurbishment impacts | None. No impacts are expected because KPS does not plan to undertake refurbishment. |
| | **Threatened or Endangered Species** | |
| 49 | Threatened or endangered species | Small. No observed impacts from current operations and transmission line maintenance practices. DEK has no plans to change current natural resource management practices, and resource agencies contacted by DEK have indicated that license renewal is unlikely to affect any listed species. |
| | **Air Quality** | |
| 50 | Air quality during refurbishment (non-attainment and maintenance areas) | None. No impacts are expected because KPS does not plan to undertake refurbishment. |

## Table 6-1. Environmental Impacts Related to License Renewal at KPS (Continued)

| No. | Issue | Environmental Impacts |
|---|---|---|
| | | **Human Health** |
| 57 | Microbiological organisms (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river) | None. The issue does not apply because KPS does not use a cooling pond, lake, or cooling tower that discharges to a small river. |
| 59 | Electric shock from transmission-line-induced currents | Small. The largest modeled induced current under the KPS transmission lines would be less than 5.0 milliamperes, which is the National Electrical Safety Code standard for preventing electric shock from induced current. |
| | | **Socioeconomics** |
| 63 | Housing impacts | Small. KPS anticipates no additional employees attributable to license renewal. |
| 65 | Public services: public utilities | Small. KPS anticipates no public utility water use and no additional employees attributable to license renewal. |
| 66 | Public services: education (refurbishment) | None. No impacts are expected because KPS does not plan to undertake refurbishment. |
| 68 | Offsite land use (refurbishment) | None. No impacts are expected because KPS does not plan to undertake refurbishment. |
| 69 | Offsite land use (license renewal term) | Small. No plant-induced changes to offsite land use are expected from license renewal. |
| 70 | Public services: transportation | Small. KPS anticipates no additional employees attributable to license renewal. |
| 71 | Historic and archaeological resources | Small. No cultural resource impact is identified. |
| | | **Postulated Accidents** |
| 76 | Severe accidents | Small. DEK identified 14 potentially cost-beneficial SAMAs that offer a level of risk reduction. However, as these SAMAs do not relate to aging management during the license renewal term, they need not be implemented as part of license renewal. |

> = more than
gpm = gallons per minute
CWA = Clean Water Act
KPS = Kewaunee Power Station
WPDES = Wisconsin Pollutant Discharge Elimination System

## 6.6 References

AEC (U.S. Atomic Energy Commission) 1972. *Final Environmental Statement Related to Operation of Kewaunee Nuclear Power Plant*. Docket No 50-305. Directorate of Licensing. Washington, DC. December. NRC ADAMS Accession Number 3000007089.

# 7.0 ALTERNATIVES TO THE PROPOSED ACTION

**NRC**

**The environmental report shall discuss "Alternatives to the proposed action…" 10 CFR 51.45(b)(3), as adopted by reference at 10 CFR 51.53(c)(2).**

**"…The report is not required to include discussion of need for power or economic costs and benefits of…alternatives to the proposed action except insofar as such costs and benefits are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation…" 10 CFR 51.53(c)(2).**

**"While many methods are available for generating electricity, and a huge number of combinations or mixes can be assimilated to meet a defined generating requirement, such expansive consideration would be too unwieldy to perform given the purposes of this analysis. Therefore, NRC has determined that a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only electric generation sources that are technically feasible and commercially viable…" (NRC 1996a).**

**"…The consideration of alternative energy sources in individual license renewal reviews will consider those alternatives that are reasonable for the region, including power purchases from outside the applicant's service area…" (NRC 1996b).**

Chapter 7 evaluates alternatives to KPS license renewal. The chapter identifies actions that might be taken, and associated environmental impacts, if the U.S. Nuclear Regulatory Commission (NRC) chooses not to renew the plant's operating license. The chapter also addresses actions that DEK has considered, but would not take, and identifies DEK basis for determining that such actions would be unreasonable.

DEK divided its alternatives discussion into two categories, "no-action" and "alternatives that meet system generating needs." In considering the level of detail and analysis that it should provide for each category, DEK relied on the NRC decision-making standard for license renewal:

> "…the NRC staff, adjudicatory officers, and Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable." [10 CFR 51.95(c)(4)].

DEK has determined that the environmental report would support NRC decision-making as long as the document provides sufficient information to clearly indicate whether an alternative would have a smaller, comparable, or greater environmental impact than the proposed action. This approach is consistent with regulations of the Council on Environmental Quality, which provide that the consideration of alternatives (including the proposed action) should enable reviewers to evaluate their comparative merits (40 CFR 1500-1508). DEK believes that Chapter 7 provides sufficient detail about alternatives to establish the basis for necessary comparisons to the Chapter 4 discussion of impacts from the proposed action.

In characterizing environmental impacts from alternatives, DEK has used the same definitions of SMALL, MODERATE, and LARGE that are presented in the introduction to Chapter 4.

## 7.1 No-Action Alternative

DEK uses "no-action alternative" to refer to a scenario in which NRC does not renew the KPS operating license. Components of this alternative include replacing the generating capacity of KPS and decommissioning the facility, as described below.

DEK is a wholesale supplier of electricity in Wisconsin. KPS is DEK's only generating facility in Wisconsin, and its 556 MWe-net unit generated $3.9 \times 10^9$ kilowatt hours of electricity in 2004, $3.0 \times 10^9$ kilowatt hours in 2005, and $3.7 \times 10^9$ kilowatt hours in 2006 (EIA 2007a). This power is sufficient to supply the electricity used by over 150,000 American homes and would be unavailable to Wisconsin residents and consumers in the event the KPS operating license is not renewed. KPS is a baseload facility. DEK considers any alternative that did not include replacing this baseload capacity, either by DEK or another generating company, as unreasonable. Replacement could be accomplished by (1) building new generating capacity, (2) purchasing power from the wholesale market, or (3) reducing baseload power requirements through demand reduction. Section 7.2.3.4 describes each of these possibilities in detail, and Section 7.3 describes environmental impacts from feasible alternatives.

The Generic Environmental Impact Statement (GEIS) (NRC 1996a) defines decommissioning as the safe removal of a nuclear facility from service and the reduction of residual radioactivity to a level that permits release of the property for unrestricted use and termination of the license. NRC-evaluated decommissioning options include immediate decontamination and dismantlement (DECON), and safe storage of the stabilized and defueled facility (SAFSTOR) for a period of time, followed by decontamination and dismantlement. Regardless of the option chosen, decommissioning must be completed within a 60-year period. Under the no-action alternative, DEK would continue operating KPS until the current license expires, then initiate decommissioning activities in accordance with NRC requirements. The GEIS describes decommissioning activities based on an evaluation of a larger reactor (the "reference" pressurized-water reactor is the 1,175-megawatts-electrical [MWe] Trojan Nuclear Plant). This description is comparable to decommissioning activities that DEK would conduct at KPS.

As the GEIS notes, NRC has evaluated environmental impacts from decommissioning (NRC 2002a). NRC-evaluated impacts include: occupational and public radiation dose; impacts of waste management; impacts to air and water quality; and ecological, economic, and socioeconomic impacts. DEK adopts by reference the NRC conclusions regarding environmental impacts of decommissioning.

DEK notes that decommissioning activities and their impacts are not discriminators between the proposed action and the no-action alternative. DEK will have to decommission KPS regardless of the NRC decision on license renewal; license renewal would only postpone decommissioning for another 20 years. NRC has established in the GEIS that the timing of decommissioning operations does not substantially influence the environmental impacts of decommissioning. DEK adopts by reference the NRC findings (10 CFR 51, Appendix B, Table B-1, Decommissioning) to the effect that delaying decommissioning until after the renewal term would have small environmental impacts. The discriminators between the proposed action and the no-action alternative lie within the choice of generation replacement options to be part of the no-action alternative. Section 7.3 analyzes the environmental impacts from these options.

DEK concludes that the decommissioning impacts under the no-action alternative would not be substantially different from those occurring following license renewal, as identified in the GEIS (NRC 1996a) and in the decommissioning generic environmental impact statement (NRC 2002a). These impacts would be temporary and would occur at the same time as the impacts from meeting system generating needs.

## 7.2 Alternatives That Meet System Generating Needs

### 7.2.1 Generating Capacity and Utilization Statistics

The current mix of power generation options in Wisconsin is one indicator of what has been considered to be feasible alternatives in the State.

Wisconsin's electric power industry had a total generating capacity of 16,415 MWe in 2006. Based on 2006 generation data, Wisconsin's electric industry produced about 62 x $10^9$ kilowatt hours of electricity. Figures 7.2-1 and 7.2-2 illustrate the division of Wisconsin's total generating capacity and amount of electricity generated by fuel type, respectively.

The difference between capacity and utilization is the result of optimal usage. For example, in Wisconsin, coal represented 43.0 percent of utilities' installed capacity and nuclear energy represented 9.6 percent, but coal produced 65.0 percent of the electricity generated by utilities and nuclear produced 19.8 percent (EIA 2007b). This reflects Wisconsin's reliance on coal and nuclear energy as base-load generating sources.

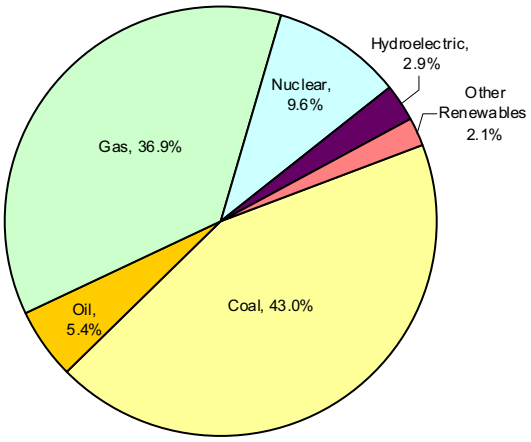



**Figure 7.2-1. Wisconsin Generating Capacity by Fuel Type, 2006**

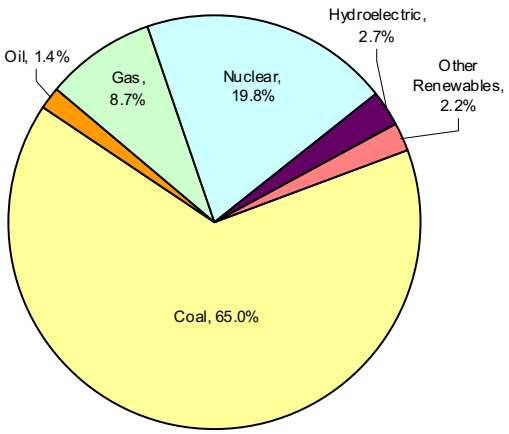



**Figure 7.2-2. Wisconsin Generation by Fuel Type, 2006**

### 7.2.2 Electric Power Industry Restructuring

Nationally, the electric power industry has been undergoing a transition from a regulated monopoly to a competitive market environment. Efforts to deregulate the electric utility industry began with passage of the National Energy Policy Act of 1992. Provisions of the act required electric utilities to allow open access to their transmission lines and encouraged development of a competitive wholesale market for electricity. The act did not mandate competition in the retail market, leaving that decision to the states (NEI 2000).

Initially, 24 states and the District of Columbia pursued initiatives to restructure their electric power industry, including provisions to promote retail competition. Since the power crisis in California and the West, six of the states that passed restructuring legislation have delayed, repealed. or indefinitely postponed implementation. Currently, 16 states and the District of Columbia have restructured their electric power industry allowing full retail access for all customer groups and two states allow retail access for large customers only. Some states continue to study the issue of electric power industry restructuring, but no state has passed restructuring legislation since June of 2000 (Rose and Meeusen 2006).

Wisconsin has enacted three laws that have made major changes to the State's utility industry. In 1997, Wisconsin Act 204, the Electric Reliability Act, streamlined the approval process for new plant construction and authorized new merchant power plants to be built and to sell wholesale power in the State. The Act also required utilities to transfer control and operation of their transmission lines to an Independent System Operator. In 1999, Wisconsin Act 9, "Reliability 2000," established deadlines for the transfer of transmission assets to what has become the American Transmission Company (ATC), and transferred responsibility and funding of energy efficiency programs to the State. "Reliability 2000" also mandated that renewable resources produce 2.2 percent of the State's retail electricity sales by the end of 2011 (WLRB 1999). In 2005, Wisconsin passed Wisconsin Act 141, The Energy Efficiency and Renewable Resource Act. Provisions of Wisconsin Act 141 revised the funding and structure of energy efficiency and renewable resource programs in the State and increased the statewide goal for renewable resources to 10 percent of the State's retail electricity sales by 2015 (PSCW 2007).

Potential federal legislation, market shifts, changes in neighboring states, and new technology will continue to impact decision making in Wisconsin. It is not clear what entity (DEK or another supplier) would construct new generating units to replace those at KPS, if its license was not renewed. Regardless of which entities construct and operate the replacement power supply, certain environmental parameters would be constant among these alternative power sources. Therefore, this report discusses the impacts of reasonable alternatives to KPS without regard to ownership.

### 7.2.3 Alternatives Considered

The decision to construct replacement generation if the KPS license is not renewed will depend on reasonable, predictable regulations, financial incentives and laws that reflect the reality of the current situation. New generating units are capital-intensive and require extensive effort to complete.

#### 7.2.3.1 Generic Greenfield Site Review

DEK analyzed locating hypothetical new power production units at the existing KPS site and at an undetermined green field site. DEK concluded that KPS is the preferred site for new construction because this approach would minimize environmental impacts by building on

previously disturbed land and by making the most use possible of existing facilities, such as transmission lines, roads and parking areas, office buildings, and components of the cooling system. Locating hypothetical units at the existing site has, therefore, been applied to the following alternative technology discussion.

#### 7.2.3.2 Technology Choices

DEK included in its alternative analysis conventional technologies that utilize non-renewable resources, advanced technologies, and alternative technologies that utilize renewable sources of energy as potential capacity addition alternatives.

For base-load service (like KPS), the most economical commercially available technologies are typically pulverized coal, gas-fired combined-cycle, and nuclear. Simple-cycle gas-fired turbines are typically the most economical commercially available technology for peaking service.

Development and deployment of advanced coal-based technologies such as Integrated Gasification Combined Cycle (IGCC) or Ultrasupercritical (USC) units for electricity generation could minimize environmental impacts. Even with the application of emission control technologies, however, emission offsets and credits would still be needed to permit such a project. These options are not economically viable at this time, but may be in the future.

USC steam power plant technology combines high pressure with high temperature steam cycles to achieve maximum electric generation efficiencies. A majority of the nation's pulverized coal-fired power plants utilize subcritical or supercritical boiler systems that operate at lower temperatures and pressure than USC. USC technology is projected to be about 5 percent more efficient than conventional supercritical technology and about 10 percent more efficient than today's subcritical units. (EPRI 2007) Note that USC units have not been commercially demonstrated in the United States although they have been under development and recently operating overseas.

At this time, DEK concludes that replacement technologies for the maximum dependable base-load capacity (556 MWe-net) of the KPS nuclear unit are limited to supercritical pulverized coal-fired boiler and natural gas-fired combined-cycle systems.

#### 7.2.3.3 Mixtures of Different Alternatives

NRC indicated in the GEIS that, while many methods are available for generating electricity and an infinite number of combinations of technology can be assimilated to meet system needs, such expansive consideration would be too unwieldy, given the purposes of the alternatives analysis. Therefore, NRC determined that a reasonable set of

alternatives should be limited to analysis of single discrete electrical generation sources and only those electric generation technologies that are technically reasonable and commercially viable (NRC 1996a). Consistent with the NRC determination, DEK has not evaluated mixes of generating sources. The impacts from the generation alternatives presented in this chapter would give the limits of the impacts from any generation mixture of technologies.

#### 7.2.3.4 Alternatives

Section 7.2.3.4.1 presents fossil-fuel generation as the feasible alternative to license renewal. Advanced light water reactor, purchased power, and reduced demand are discussed in Sections 7.2.3.4.2 through 7.2.3.4.4, respectively, which present the basis for concluding that these options are not feasible alternatives to license renewal. Section 7.2.3.4.5 discusses other alternatives that DEK has determined are not reasonable and feasible and the basis for these determinations.

DEK compared two options of locating hypothetical new generating units at the existing KPS site and at an undetermined greenfield site. DEK concluded that KPS is the preferred site for new construction to minimize environmental impacts by building on previously disturbed land and by making the most use possible of existing facilities, such as transmission lines, roads and parking areas, office buildings, and components of the cooling system. Locating hypothetical units at the existing KPS site has, therefore, been applied to the representative new generating units.

##### 7.2.3.4.1 Construct and Operate New Fossil Fuel-Fired Generation

For comparability, DEK selected fossil fuel-fired units of approximately equivalent electric power capacity. One unit with a net capacity of 556 MWe could be assumed to replace the 556-MWe-net KPS maximum dependable capacity. However, DEK's experience indicates that, although custom size units can be built, using standardized sizes is more economical. For example, a manufacturer's standard-sized units include a gas-fired combined-cycle plant of 529.9 MWe net capacity (Chase and Kehoe 2000). For comparability, DEK set the net power of the coal-fired plant equal to the gas-fired plants. Although this provides slightly less capacity than the existing units, it ensures against overestimating environmental impacts from the alternatives. The shortfall in capacity could be replaced by other methods (see Mixtures of Different Alternatives in Section 7.2.3.3).

It must be emphasized, however, that these are hypothetical alternatives. DEK does not have plans for such construction at KPS.

### Pulverized Coal-Fired Generation

NRC evaluated pulverized coal-fired generation alternatives for McGuire Nuclear Station (NRC 2002b). For McGuire, NRC analyzed 2,400 MWe of coal-fired generation capacity. DEK has reviewed the NRC analysis, believes it to be sound, and notes that it analyzed more generating capacity than the 556 MWe discussed in this analysis. In defining the KPS coal-fired alternative, DEK has used input specific to the site and Wisconsin and has scaled from the NRC analysis, where appropriate.

Table 7.2-1 presents the coal-fired alternative emission control characteristics. DEK based its emission control technology and percent control assumptions on alternatives that the U.S. Environmental Protection Agency (EPA) has identified as being available for minimizing emissions (EPA 1998). For the purposes of analysis, DEK has assumed that coal and limestone (calcium carbonate) would be delivered via barge. A rail spur could also be built to the site.

### Gas-Fired Generation

NRC has evaluated the environmental impacts of constructing and operating five 482-MWe combined-cycle gas-fired units as an alternative to a nuclear power plant license renewal (NRC 2002b). DEK has reviewed the NRC analysis, believes it to be sound, and notes that it analyzed more generating capacity than the 556 MWe-net discussed in this analysis. DEK has adopted the NRC analysis with necessary Wisconsin- and DEK-specific modifications noted.

DEK has chosen to evaluate gas-fired generation using combined-cycle turbines because it has determined that the technology is mature, economical, and feasible. As indicated, a manufacturer's standard unit size (529.9 MWe net) is available and economical. Therefore, DEK has analyzed this net capacity gas-fired combined cycle plant, to be located on KPS property. Table 7.2-2 presents the gas-fired alternative characteristics.

#### 7.2.3.4.2 Construct and Operate New Nuclear Reactor

Since 1997, the NRC has certified four new standard designs for nuclear power plants under 10 CFR 52, Subpart B. These designs are the U.S. Advanced Boiling Water Reactor (10 CFR 52, Appendix A), the System 80+ Design (10 CFR 52, Appendix B), the AP600 Design (10 CFR 52, Appendix C), and the AP1000 Design (NRC 2006). All of these plants are light-water reactors. However, a new nuclear reactor is currently not a feasible alternative for Wisconsin because of the State's moratorium on new nuclear power plant construction that has been in place since 1983. Wisconsin law requires that before the Public Service Commission can approve construction, two prerequisites must be met: a new nuclear power plant must be economically advantageous to the ratepayers, and a Federal nuclear waste repository must exist. Unsuccessful attempts were made in 2003 and 2005 to repeal the moratorium (WLRB 2006).

#### 7.2.3.4.3 Purchase Power

DEK is a wholesale supplier of electric power in Wisconsin. As a wholesale supplier of electric power, DEK would not be able to offer competitively priced power if it had to purchase electricity for re-sale in the wholesale market. Therefore, DEK does not consider such power purchases feasible or consistent with its business purposes.

If the KPS operating license were not renewed, arrangements for replacement power would be the responsibility of the local supplier and not DEK. While such arrangements could involve power purchases, it is unlikely that 590 MWe of baseload capacity could be replaced over a 20 year period (corresponding to the capacity that would be lost if KPS's operating license were not renewed) without construction of replacement baseload generating facilities. Therefore, a power purchase alternative would likely only shift the responsibility for constructing and location of replacement baseload generating facilities.

The source of this purchased power may reasonably include new generating facilities developed elsewhere in the region. While the technologies that would be used to generate this purchased power are speculative, the impacts of a power purchase alternative would be expected to be similar to the alternatives analyzed in Section 7.3.

Recent transmission studies have been conducted for northeastern Wisconsin concluded that the existing transmission system places serious constraints on power transfers in the region (ATC 2007). Therefore, DEK anticipates that additional transmission infrastructure would also be needed if KPS's capacity were replaced by power purchases. Given the potential length of new transmission corridors into northeastern Wisconsin, the construction of additional transmission infrastructure could result in noticeable land use changes, a characteristic of an impact that is moderate.

#### 7.2.3.4.4 Reduce Demand

Because DEK is a merchant generator and does not have a retail customer base in Wisconsin, it does not have a demand-side management (DSM) program in Wisconsin or the ability to implement such a program in Wisconsin. A DSM program reduces generation needs through a combination of energy conservation and load management programs. Although Wisconsin has a Governor's Task Force on Energy Efficiency and Renewables, and electric utilities in the state have DSM programs, electricity demand in the state continues to grow. According to the Wisconsin Public Service Commission's "Strategic Energy Assessment, Energy 2012," demand is expected to grow by about 250 to 350 MW per year (PSCW 2007). Thus, in spite of DSM, the electricity generated by KPS would have to be replaced. Further, DSM measures would not serve DEK's business purposes as a merchant generator. Therefore, DSM is not considered a reasonable alternative to renewal of the KPS operating license.

#### 7.2.3.4.5 Other Alternatives

This section identifies alternatives that DEK has determined are not feasible and the basis for these determinations. DEK accounted for the fact that KPS is a base-load generator and that any feasible alternative to KPS would also need to be able to generate base-load power. In performing this evaluation, DEK relied heavily upon NRC's GEIS (NRC 1996a).

**Wind**

Wind power systems make a positive contribution to the overall energy mix for the country, but are not feasible as baseload generation. Wind power systems produce power intermittently because they are only fully operational when the wind is blowing at sufficient velocity and duration (McGowan and Connors 2000). While recent advances in technology have improved wind turbine reliability, average annual capacity factors for wind power systems are relatively low (25 to 40 percent) (McGowan and Connors 2000) compared to 85 to 95 percent industry average for a base-load plant such as a nuclear plant. Therefore, wind is not a feasible means of providing baseload generation.

The Wisconsin Energy Division, in cooperation with Wisconsin's regulated utilities, has completed a three-year wind energy study. The results indicated that large areas of northeastern Wisconsin have wind speeds high enough, under certain conditions, to economically produce electricity from modern wind machines. Annual average wind speeds in this region are 14 to 15 miles per hour at 60 meters above ground (WDOE 2003). As of June 2006, there are 53 MW of wind power capacity in Wisconsin and an additional 884 MW under development (PSCW 2007).

Estimates based on existing installations indicate that a utility-scale wind farm would require about 30 to 50 acres per MWe of installed capacity (McGowan and Connors 2000). Wind farm facilities would occupy 3 to 5 percent of the wind farm's total acreage (McGowan and Connors 2000). Assuming ideal wind conditions and a 35 percent capacity factor, a wind farm with a net output of 556 MWe would require about 79,400 acres (124 square miles) -- the equivalent to more than one-third of Kewaunee County -- of which about 2,400 acres (4 square miles) would be occupied by turbines and support facilities. Based on the amount of land needed, the wind alternative would result in a large environmental impact. Additionally, wind plants have aesthetic impacts, generate noise, and can harm birds and bats.

DEK has concluded that, due to the large amount of land needed (approximately 124 square miles), the high degree of intermittence, and low capacity factors, wind power is not a reasonable or feasible alternative to KPS license renewal.

**Solar**

There are two basic types of solar technologies used to produce electrical power: photovoltaic and solar thermal power. Photovoltaics convert sunlight directly into electricity using semiconducting materials. Solar thermal power systems use mirrors to concentrate sunlight on a receiver holding a fluid or gas, heating it, and causing it to turn a turbine or push a piston coupled to an electric generator (Leitner and Owens 2003).

Solar technologies produce more electricity on clear, sunny days with more intense sunlight and when the sunlight is at a more direct angle (i.e., when the sun is perpendicular to the collector). Cloudy days can significantly reduce output. To work effectively, solar installations require consistent levels of sunlight (solar insolation) (Leitner and Owens 2003).

Solar thermal systems can be equipped with a thermal storage tank to store hot heat transfer fluid, providing thermal energy storage. By using thermal storage, a solar thermal plant can provide dispatchable electric power (Leitner and Owens 2003).

There are 21 utility-owned photovoltaic or solar electric facilities in Wisconsin with a total capacity of 82.2 kW (PSCW 2007). Solar power is not an effective alternative in Wisconsin. The State receives about 4.0 to 5.0 kilowatt hours of solar radiation per square meter per day, compared with 5.5 to 7.0 kilowatt hours per square meter per day in areas of the West, such as Arizona and California, which are most promising for solar technologies (NREL 2008). Further, solar power has a low capacity factor and is not suitable for baseload generation.

Also, land requirements for solar plants are high. The area of land required depends on the available solar insolation and type of plant, but is about 3.8 acres per megawatt for photovoltaic systems and 8 acres per megawatt for solar thermal power plants (Leitner 2002). Assuming capacity factors of 24 percent for photovoltaics and 32 percent for solar thermal power, facilities having 556 MWe net capacity are estimated to require 8,803 acres (14 square miles), if powered by photovoltaic cells, and 13,900 acres (22 square miles), if powered by solar thermal power.

DEK has concluded that, due to the high cost, low capacity factors, and the substantial amount of land needed to produce the desired output, solar power is not a reasonable or feasible alternative to KPS license renewal.

**Hydropower**

Hydroelectric power is a fully commercialized technology. Wisconsin has approximately 500 MW of generating capacity in place along the Fox, Menominee, Oconto, Peshtigo, Wisconsin, Chippewa, Flambeau, and Wolf Rivers. For the years 2001 to 2003, these facilities produced an average of 2,180,700 MWh of electricity (PSCW 2007). However, as the GEIS points out in Section 8.3.4, hydropower's percentage of United States generating capacity is expected to decline because hydroelectric facilities have become difficult to site as a result of public concern over flooding, destruction of natural habitat, and destruction of natural river courses. According to the U.S. Hydropower Resource Assessment for Wisconsin (Conner and Francfort 1996), there are no remaining sites in Wisconsin that would be environmentally suitable for a large hydroelectric facility. Therefore, there is little potential for increasing the capacity of this renewable resource, aside from upgrading existing facilities and refurbishing a number of small, recently retired units. (PSCW 2007)

The GEIS estimates land use of 1,600 square miles per 1,000 MWe for hydroelectric power. Based on this estimate, replacement of KPS generating capacity would require flooding more than 890 square miles, — more than the combined areas of Kewaunee and Door Counties — resulting in a large impact on land use. Further, operation of a hydroelectric facility would alter aquatic habitats above and below the dam, which would impact existing aquatic communities.

DEK has concluded that, due to the lack of suitable sites in Wisconsin and the large amount of land needed, in addition to the adverse environmental and ecological resource impacts, hydropower is not a feasible alternative to renewal of the KPS operating license.

**Geothermal**

Geothermal energy is a proven resource for power generation. Geothermal power plants use naturally heated fluids as an energy source for electricity production. To produce electric power, underground high-temperature reservoirs of steam or hot water are tapped by wells and the steam rotates turbines that generate electricity. Typically, water is then returned to the ground to recharge the reservoir. (NREL 1997)

Geothermal energy can achieve average capacity factors of 95 percent and can be used for base-load power where this type of energy source is available (NREL 1997). Widespread application of geothermal energy is constrained by the geographic availability of the resource. In the U.S., high-temperature hydrothermal reservoirs are located in the western continental U.S., Alaska, and Hawaii. There are no known high-temperature geothermal sites in Wisconsin (SMU 2004).

Because there are no high-temperature geothermal sites in Wisconsin, DEK concludes that geothermal is not a feasible alternative to renewal of the KPS operating license.

**Wood Energy**

Wood is one of Wisconsin's most abundant renewable energy resources. A large volume of wood can be found in the State's forests in the form of waste from forestry operations. Additional supplies exist in residues from Wisconsin's wood product industries and from urban sources. The total potential annual sustainable energy from Wisconsin wood, including standing trees, harvest residues, primary mill residues, and urban waste, is 133,000,000 MMBtu (Altfeather 2005). In 2005, Wisconsin burned about 1.6 million tons of wood in commercial and industrial wood energy systems and two retrofitted coal boilers owned by electric utilities (WDOE 2006). The largest wood waste power plants, however, are 40 to 50 MW in size. A recent study estimated that approximately 130,000 acres of wood crops would be required to support a 150 MW wood energy facility (EPS 2000). Based on this estimate, replacement of KPS would require the dedication of about 750 square miles of forest area to energy production.

Further, as discussed in Section 8.3.6 of the GEIS, construction of a wood-fired plant would have an environmental impact that would be similar to that for a coal-fired plant, although facilities using wood waste for fuel would be built on smaller scales. Like coal-fired plants, wood-waste plants require large areas for fuel storage, processing, and waste (e.g., ash) disposal. Additionally, operation of wood-fired plants has environmental impacts, including impacts on the aquatic environment and air quality. Wood has a low heat content that makes it unattractive

for base-load applications. Wood is also difficult to handle and has high transportation costs.

While wood resources are abundant in Wisconsin, DEK has concluded that, due to the lack of an environmental advantage, low heat content, handling difficulties, and high transportation costs, wood energy is not a reasonable or feasible alternative to renewal of the KPS operating license.

**Municipal Solid Waste**

The initial capital costs for municipal solid waste plants are greater than for comparable steam turbine technology at wood-waste facilities. This is due to the need for specialized waste separation and handling equipment (FPSC&DEP 2003).

The decision to burn municipal solid waste to generate electricity is usually driven by the need for an alternative to landfills, rather than by energy considerations. Combusting waste usually reduces its volume by approximately 90 percent. The remaining ash is buried in landfills (FPSC&FDEP 2003). It is unlikely that many landfills will begin converting waste to energy due to the numerous obstacles and factors that may limit the growth in waste-to-energy (WTE) power generation. Chief among them are environmental regulations and public opposition to siting WTE facilities near feedstock supplies.

The overall level of construction impacts from a WTE plant should be approximately the same as that for a conventional coal-fired plant. The air emission profile and other operational impacts (including impacts on the aquatic environment, air, and waste disposal) for a WTE plant would also be similar to a conventional fossil fueled unit (FPSC&FDEP 2003).

DEK has concluded that, due to the high costs, public opposition, and lack of obvious environmental advantages other than reducing landfill volume, burning MSW to generate electricity is not a reasonable or feasible alternative to renewal of the KPS operating license.

**Other Biomass-Derived Fuels**

In addition to wood and municipal solid waste fuels, there are several other concepts for fueling electric generators: burning or gasifying energy crops; converting crops to a liquid fuel such as ethanol (primarily used as a gasoline additive); harvesting the combustible gases formed through natural biodegradation of landfill waste or livestock manure.

However, as discussed in the GEIS, none of the technologies that utilize biomass derived fuels for generating electricity has progressed to the point of being competitive on a large scale or of being reliable enough to replace a large base-load plant such as KPS. Further, estimates in the

GEIS suggest that the overall level of construction impacts from a crop-fired plant should be approximately the same as that for a wood-fired plant. Facilities fueled by combustible gases like landfill gas or livestock waste would have similar impacts as a natural gas-fired plant. Additionally, plants would have similar operational impacts including impacts on the aquatic and air environment and solid waste management issues.

DEK has concluded that, due to the high costs and lack of environmental advantage, burning other biomass-derived fuels is not a reasonable or feasible alternative to renewal of the KPS operating license.

**Petroleum**

Wisconsin has several oil-fired units; however, they generate less than two percent of the State's power. Oil-fired operation is more expensive than nuclear or coal-fired operation. In addition, future increases in petroleum prices are expected to make oil-fired generation increasingly more expensive than coal-fired generation. The high cost of oil has prompted a steady decline in its use for electricity generation. Additionally, operation of petroleum-fired plants would have environmental impacts (including impacts on the aquatic environment and air) that would be similar to those from a coal-fired plant.

DEK has concluded that, due to the high fuel costs and lack of obvious environmental advantage, oil-fired generation is not a reasonable or feasible alternative to KPS license renewal.

**Fuel Cells**

Fuel cells work without combustion and many of the associated impacts. Power is produced electrochemically by passing a hydrogen-rich fuel over an anode and air over a cathode and separating the two by an electrolyte. The only by-products are heat, water, and carbon dioxide. Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam under pressure. Natural gas is typically used as the source of hydrogen.

Fuel cell power plants are in the initial stages of commercialization. While more than 800 large stationary fuel cell systems have been built and operated worldwide, the global electricity generating capacity using large stationary fuel cells was approximately 105 MWe in 2006 (Fuel Cell Today 2006). In addition, the largest stationary fuel cell power plant yet built is only 11 MWe (Fuel Cell Today 2003). Recent estimates suggest that manufacturers would need to at least triple their production capacity to achieve a competitive price of $1,500 to $2,000 per kilowatt (Shipley and Elliott 2004).

DEK believes that this technology has not matured sufficiently to support production for a facility the size of KPS. DEK has concluded that, due to cost and production limitations, fuel cell technology is not a reasonable or feasible alternative to KPS license renewal.

**Delayed Retirement**

There is currently a small number of planned retirements or downgrades of plants in Wisconsin. In 2004, WEPCO retired three of its older Port Washington coal-burning units with a total capacity of 225 MWe. MG&E plans to eliminate all coal burning facilities at its Blount Generating Station in Madison reducing the power plant's capacity by 90 MWe. It is reasonable to assume that some additional older units will be retired in the future. (PSCW 2006)

KPS is the only plant that DEK operates in Wisconsin. Therefore, DEK does not have units that could delay retirement. Another generation company could agree to delay retirement of a plant, but compensation for a plant the size of KPS would appear to be unreasonable without major construction to upgrade or replace plant components which could trigger new environmental requirements, making the option less feasible.

## 7.3 Environmental Impacts of Alternatives

This section evaluates the environmental impacts of alternatives that DEK has determined to be reasonable alternatives to KPS license renewal: pulverized coal and gas-fired combined-cycle.

### 7.3.1 Air Quality Considerations

The EPA has established National Ambient Air Quality Standards (NAAQS) for six common pollutants: nitrogen oxides ($NO_X$), sulfur dioxide ($SO_2$), carbon monoxide, lead, ozone, and particulate matter (PM). Particulate matter with aerodynamic diameters of 10 microns or less are identified as $PM_{10}$, particulate matter with aerodynamic diameters of 2.5 microns or less are identified as $PM_{2.5}$. 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.

In October 2006, the EPA issued a final rule that revises the 24-hour $PM_{2.5}$ standard and revokes the annual $PM_{10}$ standard. Nonattainment designations for the $PM_{10}$ are not affected by the new rule, but additional nonattainment areas could be designated under the new $PM_{2.5}$ standard. (EPA 2006a)

KPS is located in Kewaunee County, Wisconsin, which is part of the Lake Michigan Interstate Air Quality Control Region (AQCR) (40 CFR 81.67). Kewaunee County is a maintenance area for the ozone standards. See Section 2.10 for addtional details.

The acid rain requirements of the Clean Air Act Amendments required $NO_X$ reductions and capped the nation's $SO_2$ emissions from power plants. Each company with fossil-fuel-fired units was allocated $SO_2$ allowances. To be in compliance with the Act, the companies must hold enough allowances to cover their annual $SO_2$ emissions.

In March 2005, EPA finalized the Clean Air Interstate Rule (CAIR) which addresses $SO_2$ and $NO_X$ emissions that contribute to non-attainment of the eight-hour ozone and fine particulate matter standards in downwind states. Wisconsin is one of the states covered by CAIR. The CAIR is projected to reduce Wisconsin's sulfur dioxide and nitrogen oxide emissions by 32 and 61 percent, respectively, by 2015. Currently, sources in Wisconsin significantly contribute to fine particle pollution in Illinois, Indiana, and Michigan and to ground-level ozone pollution in New York and Michigan. (EPA 2006B)

To operate a new fossil-fired plant in Wisconsin, DEK would need to acquire enough $NO_X$ and $SO_2$ allowances to cover its annual emissions by purchasing allowances from the open market. Because KPS is DEK's only generating plant in Wisconsin, installing additional emission controls at existing fossil-fired facilities or

decommissioning existing fossil-fired capacity and applying the allowances from that plant to the new one are not options.

### 7.3.2 Pulverized Coal-Fired Generation

NRC evaluated environmental impacts from pulverized coal-fired generation alternatives in the GEIS (NRC 1996a). NRC concluded that construction impacts could be substantial, due in part to the large land area required (which can result in natural habitat loss) and the large workforce needed. NRC pointed out that siting a new coal-fired plant where an existing nuclear plant is located would reduce many construction impacts. NRC identified adverse impacts from operations, including human health concerns associated with air emissions, solid waste generation, and losses of aquatic biota due to cooling water withdrawals and discharges.

The coal-fired alternative that DEK has defined, for purposes of analysis, in Section 7.2.3.1 would be located at KPS.

#### Air Quality

A 529.9 MWe coal-fired plant would burn about 2.10 million tons of coal annually and emit sulfur dioxide ($SO_2$), nitrogen oxides ($NO_X$), particulate matter ($PM_{10}$ and $PM_{2.5}$), and carbon monoxide; all of which are regulated pollutants. DEK has assumed a plant design that would minimize air emissions through a combination of boiler technology and post-combustion pollutant removal. DEK estimates the following coal-fired alternative emissions (TtNUS 2007). Assumptions are provided in Table 7.2-1.

$SO_2$ = 720 tons per year

$NO_X$ = 526 tons per year

Carbon monoxide = 526 tons per year

Carbon dioxide = 5.80 million tons per year

$PM_{10}$ = 13 tons per year

$PM_{2.5}$ = 3 tons per year

Mercury = 0.09 tons per year

DEK concludes that the coal-fired alternative would have MODERATE impacts on air quality; the impacts would be noticeable, but would not destabilize air quality in the area.

#### Waste Management

DEK concurs with the GEIS assessment that the coal-fired alternative would generate substantial solid waste during operations. The coal-fired plant would consume approximately 2.10 million tons of coal per year with an ash content of 5.41 percent (Table 7.2-1). After combustion, approximately 85 percent of this ash (approximately 96,700 tons per year), would be recycled. The remaining ash, approximately 17,100 tons per year, would be collected for onsite disposal. In addition, approximately 17,800 tons of scrubber sludge would be disposed onsite

each year (based on annual limestone usage of approximately 23,600 tons). Assuming 30 foot tall waste piles, DEK estimates that ash and scrubber waste disposal over a 40-year plant life would require approximately 21 acres. While only half this waste volume and acreage would be attributable to the 20-year license renewal period alternative, the total numbers are pertinent as a cumulative impact.

DEK believes that with proper siting, coupled with current waste management and monitoring practices, waste disposal would not destabilize any resources. There would be space within the 908-acre KPS property for this disposal. After closure of the waste site and revegetation, the land would be available for other uses. For these reasons, DEK believes that waste disposal for the coal-fired alternative would have MODERATE impacts; the impacts of increased waste disposal would be noticeable, but would not destabilize any important resource, and further mitigation would be unwarranted.

**Water Use and Quality**

Impacts to aquatic resources and water quality would be similar to or less than the present impacts of KPS. New baseload coal units on the KPS site would likely employ closed loop cooling towers, which would lessen the thermal impact on Lake Michigan. The existing intake structure would be adequate for the coal-fired generation and would likely be utilized and modified as required to meet EPA requirements for altered cooling systems. Plant discharges would comply with all appropriate permits.

**Land Use**

As with any large construction project, some erosion and sedimentation and fugitive dust emissions could be anticipated, but would be minimized by using best management practices. Debris from clearing and grubbing could be disposed of onsite.

DEK estimates that construction of the powerblock and coal storage area would affect 90 acres of land and associated terrestrial habitat. New mechanical draft cooling towers would affect about 1.5 acres.

If coal is delivered by barge, a barge offloading facility and a conveyor system to the coal yard would be constructed, requiring the conversion of some lakefront land to industrial use. Construction of the barge offloading facility would affect the terrestrial habitat along the lakefront as well as aquatic habitat associated with the construction, maintenance, and operation of the offloading facility. If coal is delivered by rail, a rail spur would need to be constructed from the nearest line in the City of Kewaunee. Clearing would be required, resulting in loss of some terrestrial habitat.

The visual impact of the site would increase with the construction of stacks, boilers, cooling towers, and barge or rail deliveries but all changes would be consistent with the industrial nature of the site.

**Socioeconomics**

Socioeconomic impacts from the construction workforce would be minimal, because worker relocation would not be expected, due to the site's proximity to Green Bay, Wisconsin, approximately 30 miles from the site. DEK estimates an operational workforce of only 65 for the coal-fired alternative. The reduction in workforce would result in adverse socioeconomic impacts. DEK believes these impacts would be small, due to KPS' proximity to the Green Bay area.

**Historic and Cultural Resources**

As discussed in Section 2.11, DEK performed a cultural resources survey of the KPS site in 2007. The survey identified three historic and archeological sites within one-mile of KPS, but none of these sites is on KPS property. Items found during field testing at KPS are considered isolated finds without any historic context and are not significant in terms of National Register of Historic Places criteria. In addition, DEK's procedure for land-disturbing activities includes steps for protection of historic/archaeological resources, should they be encountered. Therefore, impacts to cultural resources due to the construction of new coal-fired units on the KPS site would be unlikely.

**Summary**

DEK believes that other construction and operation impacts associated with the coal-fired alternative would be small. In most cases, the impacts would be detectable, but they would not destabilize any important attribute of the resource involved. Due to the minor nature of these impacts, mitigation would not be warranted beyond that previously mentioned.

### 7.3.3 Gas-Fired Generation

NRC evaluated environmental impacts from gas-fired generation alternatives in the GEIS, focusing on combined-cycle plants. Section 7.2.3.1 presents DEK's reasons for defining the gas-fired generation alternative as a combined-cycle plant on the KPS site. Land-use impacts from gas-fired units on KPS would be less than those from the pulverized coal-fired alternative due to a smaller facility footprint.

DEK has identified the adverse impacts from the operations of the gas-fired alternative to include human health concerns associated with air emissions, and losses of aquatic biota due to cooling water withdrawals and discharges.

**Air Quality**

Natural gas is a relatively clean-burning fossil fuel; the gas-fired alternative would release similar types of emissions, but in lesser quantities than the coal-fired alternative. Control technology for gas-fired turbines focuses on $NO_X$ emissions. DEK

estimates the following gas-fired alternative emissions (TtNUS 2007). Assumptions are provided in Table 7.2-2.

$SO_2$ = 8 tons per year

$NO_X$ = 135 tons per year

Carbon monoxide = 28 tons per year

Carbon dioxide = 1.37 million tons per year

Filterable Particulates = 24 tons per year (all particulates are $PM_{2.5}$)

While gas-fired turbine emissions are less than coal-fired boiler emissions, and regulatory requirements are less stringent, the emissions are still greater than emissions from KPS. DEK concludes that emissions from the gas-fired alternative at KPS would noticeably alter local air quality, but would not destabilize regional resources (i.e., air quality). Air quality impacts would therefore be MODERATE, but substantially smaller than those of coal-fired generation.

**Waste Management**

Due to the clean nature of the fuel the solid waste generated such as ash from this type of facility would be minimal. There would be a small amount of solid waste from spent selective catalytic reduction (SCR) catalyst used for NOx control. The SCR process for a 2,400 MWe plant would generate approximately 1,500 cubic feet of spent catalyst per year (NRC 2002b). Based on this estimate, a 529.9 MWe plant would generate approximately 330 cubic feet of spent catalyst per year. DEK concludes that gas-fired generation waste management impacts would be SMALL.

**Water Use and Quality**

The gas-fired power plant would use a similar cooling system as outlined in Section 7.3.2 for the coal-fired alternative. Aquatic biota losses due to cooling water withdrawals would be offset by the concurrent shutdown of KPS. Water use impacts would be similar or smaller than the coal-fired alternative.

**Land Use**

DEK estimates that 22 acres would be needed for a gas-fired power plant. New mechanical draft cooling towers would affect about one acre. Reduced land requirements, due to a smaller facility footprint, would reduce impacts to ecological, aesthetic, and cultural resources.

A new gas pipeline would be required for the 529.9-MWe gas turbine generator in this alternative. To the extent practicable, DEK would route the pipeline along existing, previously disturbed, rights-of-way to minimize impacts. Approximately 45 miles of new pipeline construction would be required to connect KPS to the existing pipeline network. An 8-inch diameter pipeline would necessitate a 50-foot-wide corridor, resulting in the disturbance of as much as 272 acres. This new construction may also necessitate an upgrade of the State-wide pipeline network. Aesthetic impacts, erosion and sedimentation, fugitive dust, and construction

debris impacts would be similar to the pulverized coal-fired alternative, but smaller because of the reduced facility size.

**Socioeconomics**

Socioeconomic impacts of construction would be minimal. However, DEK estimates a workforce of 18 for gas operations. The reduction in work force would result in adverse socioeconomic impacts. DEK believes these impacts would be MODERATE and would be mitigated by the site's proximity to the Green Bay area.

**Historic and Cultural Resources**

As discussed in Section 2.11, DEK performed a cultural resources survey of the KPS site in 2007. The survey identified three historic and archeological sites within one-mile of KPS, but none of these sites is on KPS property. Items found during field testing at KPS are considered isolated finds without any historic context and are not significant in terms of National Register of Historic Places criteria. In addition, DEK's procedure for land-disturbing activities includes steps for protection of historic/archaeological resources, should they be encountered. Therefore, impacts to cultural resources due to the construction of new gas-fired units on the KPS site would be unlikely.

**Summary**

DEK believes that other construction and operation impacts associated with the gas-fired alternative would be SMALL. In most cases, the impacts would be detectable, but they would not destabilize any important attribute of the resource involved. Due to the minor nature of these impacts, mitigation would not be warranted beyond that previously mentioned.

## Table 7.2-1. Pulverized Coal-Fired Alternative

| Characteristic | Basis |
|---|---|
| Unit size = 529.9 MWe ISO rating net[a] | Calculated to be <KPS net capacity – 556 MWe |
| Unit size = 564 MWe ISO rating gross[a] | Calculated based on 6 percent onsite power |
| Number of units = 1 | Assumed |
| Boiler type = tangentially fired, dry-bottom, supercritical | Minimizes nitrogen oxides emissions (EPA 1998) |
| Fuel type = subbituminous, pulverized coal | Typical for coal used in Wisconsin |
| Fuel heating value = 8,975 Btu/lb | 2006 value for coal used in Wisconsin (EIA 2007c) |
| Fuel ash content by weight = 5.41 percent | 2006 value for coal used in Wisconsin (EIA 2007c) |
| Fuel sulfur content by weight = 0.36 percent | 2006 value for coal used in Wisconsin (EIA 2007c) |
| Uncontrolled $NO_X$ emission = 10 lb/ton<br>Uncontrolled $SO_X$ emission = 13.7 lb/ton<br>Uncontrolled CO emission = 0.5 lb/ton<br>Uncontrolled $CO_2$ emission = 5,510 lb/ton<br>Uncontrolled $PM_{10}$ emission = 12.4 lb/ton<br>Uncontrolled $PM_{2.5}$ emission = 3.2 lb/ton | Typical for pulverized coal, tangentially fired, dry-bottom, NSPS (EPA 1998; EIA 2007c) |
| Heat rate = 9,000 Btu/kWh | Typical for supercritical boilers (EPA 2006c) |
| Capacity factor = 0.85 | Typical for large coal-fired plants |
| $NO_X$ control = low $NO_X$ burners, overfire air and selective catalytic reduction (85 to 95 percent reduction)[b] | Best available control technology and widely demonstrated for minimizing NOx emissions (EPA 1998) |
| Particulate control = fabric filters (baghouse-99.9 percent removal efficiency) | Best available control technology for minimizing particulate emissions (EPA 1998) |
| $SO_2$ control = Wet scrubber – limestone (80 to 95 percent removal efficiency)[c] | Best available control technology for minimizing $SO_2$ emissions (EPA 1998) |
| a The difference between "net" and "gross" is electricity consumed onsite.<br>b DEK assumed 95 percent reduction to avoid overestimating emissions.<br>c DEK assumed 95 percent removal efficiency to avoid overestimating emissions.<br>Btu = British thermal unit<br>CO = carbon monoxide<br>$CO_2$ = carbon dioxide<br>ISO rating = International Standards Organization rating at standard atmospheric conditions of 59°F, 60 percent relative humidity, and 14.696 pounds of atmospheric pressure per square inch<br>kWh = kilowatt hour<br>lb = pound<br>MWe = megawatt electric<br>NOx = nitrogen oxides<br>NSPS = New Source Performance Standard<br>$SO_2$ = sulfur dioxide<br>< = less than | |

## Table 7.2-2. Gas-Fired Alternative

| Characteristic | Basis |
|---|---|
| Unit size = 529.9 MWe ISO rating net:[a] | Manufacturer's standard size gas-fired combined-cycle plant that is <KPS net capacity of 556 MWe (Chase and Kehoe 2000) |
| Unit size = 552 MWe ISO rating gross:[a] | Calculated based on 4 percent onsite power |
| Number of units = 1 | Assumed |
| Fuel type = natural gas | Assumed |
| Fuel heating value = 1,012 Btu/$ft^3$ | 2006 value for gas used in Wisconsin (EIA 2007c) |
| Fuel sulfur content = 0.00066 lb/MMBtu | (INGAA 2000; EPA 2000) |
| $NO_X$ control = selective catalytic reduction (SCR) with steam/water injection | Best available for minimizing NOx emissions (EPA 2000) |
| Fuel $NO_X$ content = 0.0109 lb/MMBtu | Typical for large SCR-controlled gas fired units with water injection (EPA 2000) |
| Fuel CO content = 0.00226 lb/MMBtu | Typical for large SCR-controlled gas fired units (EPA 2000) |
| Fuel $CO_2$ content = 110 lb/MMBtu | Typical for large SCR-controlled gas fired units (EPA 2000) |
| Heat rate = 6,090 Btu/kWh | (Chase and Kehoe 2000) |
| Capacity factor = 0.85 | Dominion experience |
| [a] The difference between "net" and "gross" is electricity consumed onsite.<br>Btu = British thermal unit<br>CO = carbon monoxide<br>$CO_2$ = carbon dioxide<br>$ft^3$ = cubic foot<br>kWh = kilowatt hour<br>MM = million<br>MWe = megawatt electric<br>NOx = nitrogen oxides<br>< = less than<br>ISO rating = International Standards Organization rating at standard atmospheric conditions of 59°F, 60 percent relative humidity, and 14.696 pounds of atmospheric pressure per square inch | |

## 7.4 References

Note to reader: Some web pages cited in this document are no longer available, or are no longer available through the original URL addresses. Hard copies of cited web pages are available in DEK files. Some sites, for example the census data, cannot be accessed through their given URLs. The only way to access these pages is to follow queries on previous web pages. The complete URLs used by DEK have been given for these pages, even though they may not be directly accessible.

ATC (American Transmission Company). 2007. *Zone 4, Northeast Wisconsin 2007 10-Year Transmission System Assessment Update*. December 2007. Available online at http://www.atc10yearplan.com/documents/Zone42007Summary.pdf. Accessed April 18, 2008.

Altfeather, Nate. 2005. *Estimate of the Sustainable Energy Resource in Wisconsin's Forests*. Biological Systems Engineering, University of Wisconsin – Madison. Available online at http://www.uwex.edu/uwmril/pdf/RuralEnergyIssues/renewable/05%20Energy%20from%20Forest%20Summary.pdf. Accessed January 18, 2007.

Chase, D.L and P.T. Kehoe. 2000. *GE Combined-Cycle Product Line and Performance*, GER-3574G, GE Power Systems, Schenectady, NY. October. Available online at http://www.gepower.com/prod_serv/products/tech_docs/en/downloads/ger3574g.pdf. Accessed January 12, 2007.

Conner, Alison M. and James E. Francfort. 1996. "*U.S. Hydropower Resource Assessment for Wisconsin*. DOE/ID-10430(WI). Idaho National Engineering Laboratory. May. Available online at http://hydro2.inel.gov/resourceassessment/pdfs/states/wi.pdf. Accessed January 17, 2007.

EIA (Energy Information Administration) 2007a. *Monthly Nuclear Utility Generation by State and Reactor for 2004, 2005, and 2006*. Available online at http://www.eia.doe.gov/cneaf/nuclear/page/nuc_generation/gensum.html. Accessed on March 5, 2008.

EIA (Energy Information Administration) 2007b. *State Electricity Profiles 2006*. DOE/EIA-0348(2006). November. Available online at http://www.eia.doe.gov/cneaf/electricity/st_profiles/e_profiles_sum.html. Accessed on March 5, 2008.

EIA (Energy Information Administration) 2007c. *Cost and Quality of Fuels for Electric Plants 2005 and 2006*. DOE/EIA-0191(2006). October 2007. Available online at http://tonto.eia.doe.gov/FTPROOT/electricity/019106.pdf. Accessed on October 16, 2006.

EPA (U.S. Environmental Protection Agency) 1998. *Air Pollutant Emission Factors. Vol. 1, Stationary Point Sources and Area Sources*. Section 1.1, Bituminous and Subbituminous Coal Combustion. AP-42. September. Available online at http://www.epa.gov/ttn/chief/ap42/ch01/index.html. Accessed on January 17, 2007.

EPA (U.S. Environmental Protection Agency) 2000. *Air Pollutant Emission Factors. Vol. 1, Stationary Point Sources and Area Sources*. Section 3.1, Stationary Gas Turbines. AP-42. April. Available online at http://www.epa.gov/ttn/chief/ap42/ch03/index.html. Accessed on June 05, 2007.

EPA (Environmental Protection Agency) 2006a. *National Ambient Air Quality Standards for Particulate Matter*. Federal Register, Vol. 71, No. 200, pp. 61144-61233. October 17, 2006.

EPA (U.S. Environmental Protection Agency) 2006b. *Clean Air Interstate Rule: Wisconsin*. Available online at http://www.epa.gov/cair/wi.html. Accessed on January 12, 2007.

EPA (Environmental Protection Agency) 2006c. *Environmental Footprints and Costs of Coal-Based Integrated Gasification Combined Cycle and Pulverized Coal Technologies*. Final Report EPA-430/R-06/006. July 2006. Available online at http://www.epa.gov/air/caaac/coaltech/2007_01_epaigcc.pdf. Accessed on November 20, 2007.

EPRI (Electric Power Research Institute) 2007. *Advanced Clean Coal*. California Energy Commission 2007, Integrated Energy Policy Report Committee Workshop. May 29, 2007. Available at http://www.energy.ca.gov/2007_energypolicy/documents/2007-05-29_workshop/presentations/Dalton_EPRI_Clean_Coal.pdf. Accessed on October 14, 2007.

EPS (Energy Performance Systems, Inc.). 2000. *WTE$^{TM}$ Biomass Power Plant in Central Wisconsin*. November. Available at http://www.doa.state.wi.us/docs_view2.asp?docid=54. Accessed January 17, 2007.

FPSC&FDEP (Florida Public Service Commission and Florida Department of Environmental Protection) 2003. *An Assessment of Renewable Electric Generating Technologies for Florida*. Available online at http://www.psc.state.fl.us/publications/ pdf/electricgas/Renewable_Energy_Assessment.pdf. Accessed January 12, 2007.

Fuel Cell Today. 2003. *Fuel Cell Today Market Survey: Large Stationary Applications*. Available online at http://www.fuelcelltoday.com. Accessed January 17, 2007.

Fuel Cell Today. 2006. *Fuel Cell Today: 2006 Large Stationary Survey*. Available online at http://www.fuelcellstoday.com/media/pdf/surveys/2006-Large-Stationary.pdf. Accessed March 17, 2006.

INGAA (Interstate Natural Gas Association of America) 2000. *Gas Use on Emissions From Power Generation*. Available at www.ingaa.org/File.aspx?id=282. Accessed November 21, 2007.

Leitner, A. 2002. *Fuel from the Sky: Solar Power's Potential for Western Energy Supply*. NREL/SR-550-32160. National Renewable Energy Laboratory, Golden Colorado. July. Available online at http://www.nrel.gov/csp/publications.html?print. Accessed January 17, 2007.

Leitner, A and B. Owens. 2003. *Brighter than a Hundred Suns: Solar Power for the Southwest*. NREL/SR-550-33233. National Renewable Energy Laboratory, Golden Colorado. January. Available online at http://www.nrel.gov/csp/publications.html? print. Accessed January 17, 2007.

McGowan, Jon G. and Stephen R. Connors. 2000. *Windpower: A Turn of the Century Review*. Annual Review of Energy and Environment, November 2000, Vol. 25, Pages 147-197.

NEI (Nuclear Energy Institute). 2000. *Restructuring the U.S. Electric Power Industry*. Available online at http://www.nei.org/index.asp?catnum=3&catid=621. Accessed January 10, 2007.

NRC (U.S. Nuclear Regulatory Commission). 1996a. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)*. Volumes 1 and 2. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

NRC (U.S. Nuclear Regulatory Commission) 1996b. *Environmental Review for Renewal of Nuclear Power Plant Operating Licenses*. Federal Register, Vol. 61, No. 244, pp. 66537-66554. December 18.

NRC (U.S. Nuclear Regulatory Commission). 2002a. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities; Supplement 1; Regarding the Decommissioning of Nuclear Power Reactors*. NUREG-0586 Supplement 1, Office of Nuclear Reactor Regulation. Washington DC. November. NRC ADAMS Accession Number ML023470316.

NRC (U.S. Nuclear Regulatory Commission). 2002b. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants: McGuire Nuclear Station, Units 1 and 2*. NUREG-1437, Supplement 8, Final. Office of Nuclear Reactor Regulation. Washington, DC. December.

NRC (U.S. Nuclear Regulatory Commission) 2006. *AP1000 Design Certification*. Federal Register. Vol. 71, No. 18. January 27, 2006.

NREL (National Renewable Energy Laboratory) 1997. *Geothermal Energy Power from the Depths*. DOE/GO-10097-518. December. Available online at http://www.nd.gov/dcs/energy/pubs/renewable/geothermal.pdf. Accessed on January 10, 2007.

NREL (National Renewable Energy Laboratory). 2008. *United States Solar Atlas*. Available online at http://www.nrel.gov/gis/solar.html. Accessed on March 6, 2008.

PSCW (Public Service Commission of Wisconsin) 2006. *Environmental Assessment of the Strategic Energy Assessment 2006-2012*. June 8. Docket 5-ES-103. PSCW Reference #55442. Available online at http://psc.wi.gov/apps/erf_share/view/viewdoc.aspx?docid=55442. Accessed on November 29, 2007

PSCW (Public Service Commission of Wisconsin) 2007. *Strategic Energy Assessment Final Report, Energy 2012*. February. Docket 5-ES-103. PSCW Reference #69877. Available online at http://psc.wi.gov/apps/erf_share/view/viewdoc.aspx?docid=69877. Accessed on November 28, 2007

Rose, Kenneth and Karl Meeusen. 2006. *2006 Performance Review of Electric Power Markets*. August 27. Available online at http://www.scc.virginia.gov/caseinfo/reports/2006_rose_1.pdf. Accessed on January 12, 2007.

Shipley, Anna M., and R. Neal Elliott. 2004. *Stationary Fuel Cells: Future Promise, Current Hype*. Report Number IE041. American Council for an Energy-Efficient Economy, Washington, D.C., March. Available online at http://aceee.org/pubs/ie041full.pdf. Accessed on January 17, 2007.

SMU (Southern Methodist University). 2004. *Surface Heat Flow Map of the United States*. Available online at http://www.smu.edu/geothermal/heatflow/heatflow.htm. Accessed on January 10, 2007.

TtNUS (Tetra Tech NUS, Inc.). 2007. *Calculation Package for Air Emissions and Solid Waste from Coal- and Gas-Fired Alternatives for the Kewaunee Power Station*. November.

WDOE (Wisconsin Division of Energy) 2003. *GIS Wind Data – February 2003, 60-Meters*. Available online at http://www.focusonenergy.com/Information-Center/Renewables/Wind-Maps-Data/. Accessed on March 12, 2008.

WDOE (Wisconsin Division of Energy). 2006. *Wisconsin Energy Statistics, 2006*. Available online at http://www.doa.state.wi.us/docs_view2.asp?docid=4398. Accessed on January 17, 2007.

WLRB (Wisconsin Legislative Reference Bureau) 1999. *Electric Reliability 2000. Budget Brief 99-1*. November. Available online at http://www.legis.state.wi.us/lrb/pubs/budbriefs/99bb1.pdf. Accessed on January 12, 2007.

WLRB (Wisconsin Legislative Reference Bureau) 2006. *Rethinking the Moratorium on Nuclear Energy*. Brief 06-7. May. Available online at http://www.legis.state.wi.us/lrb/pubs/wb/06wb7.pdf. Accessed on January 12, 2007.

# 8.0 COMPARISON OF ENVIRONMENTAL IMPACTS OF LICENSE RENEWAL WITH THE ALTERNATIVES

**NRC**

**"…To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form;" 10 CFR 51.45(b)(3) as adopted by 51.53(c)(2)**

Chapter 4 analyzes environmental impacts of the Kewaunee Power Station (KPS) license renewal and Chapter 7 analyzes impacts from renewal alternatives. Table 8-1 summarizes environmental impacts of the proposed action (license renewal) and the alternatives, for comparison purposes. The environmental impacts compared in Table 8-1 are those that are either Category 2 issues for the proposed action, license renewal, or are issues that the Generic Environmental Impact Statement (GEIS) (NRC 1996) identified as major considerations in an alternatives analysis. For example, although the U.S. Nuclear Regulatory Commission (NRC) concluded that air quality impacts from the proposed action would be small (Category 1), the GEIS identified human health concerns associated with air emissions from alternatives (Section 7.2.3). Therefore, Table 8-1 compares air impacts among the proposed action to the alternatives. Table 8-2 is a more detailed comparison of the alternatives.

## Table 8-1. Impacts Comparison Summary

| Impact | Proposed Action (License Renewal) | No-Action Alternatives | | | |
|---|---|---|---|---|---|
| | | Base (Decommissioning) | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| Land Use | SMALL | SMALL | MODERATE | SMALL to MODERATE | MODERATE |
| Water Quality | SMALL | SMALL | SMALL | SMALL | SMALL to MODERATE |
| Air Quality | SMALL | SMALL | MODERATE | MODERATE | SMALL to MODERATE |
| Ecological Resources | SMALL | SMALL | MODERATE | SMALL | SMALL to MODERATE |
| Threatened or Endangered Species | SMALL | SMALL | SMALL | SMALL | SMALL |
| Human Health | SMALL | SMALL | MODERATE | SMALL | SMALL to MODERATE |
| Socioeconomics | SMALL | SMALL | SMALL | MODERATE | SMALL to MODERATE |
| Waste Management | SMALL | SMALL | MODERATE | SMALL | SMALL to MODERATE |
| Aesthetics | SMALL | SMALL | SMALL to MODERATE | SMALL | SMALL to MODERATE |
| Cultural Resources | SMALL | SMALL | SMALL | SMALL | SMALL |

SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource. 10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 3.

## Table 8-2. Impacts Comparison Detail

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Alternative Descriptions** | | | | |
| KPS license renewal for 20 years, followed by decommissioning | Decommissioning following expiration of current KPS license. Adopting by reference, as bounding KPS decommissioning, GEIS description (NRC 1996, Section 7.1) | New construction at the KPS site | New construction at the KPS site | Would involve construction of new generation capacity in the State. Adopting by reference GEIS description of alternate technologies (NRC 1996 Section 7.2.1.2). |
| | | Installation of a barge offloading facility or a new rail spur | Construct gas pipeline in a 50-foot-wide corridor. May require upgrades to existing pipelines | |
| | | Use existing switchyard and transmission lines | Use existing switchyard and transmission lines | Construct up to 200 miles of transmission lines |
| | | Single unit 529.9-MW (net) tangentially-fired, dry bottom units; supercritical; capacity factor 0.85 | Single pre-engineered natural gas fired system, with heat recovery steam generators, producing a total of 529.9 MWe; capacity factor 0.85 | |
| | | Existing KPS intake/ discharge system plus cooling towers | Existing KPS intake/ discharge system plus cooling towers | |

## Table 8-2. Impacts Comparison Detail (Continued)

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Alternative Descriptions (Continued)** | | | | |
| | | Pulverized subbituminous coal, 8,975 Btu/lb; 9,000 Btu/kWh; 5.41 % ash; 0.36% sulfur; 10 lb NOx/ton; 2,100,000 tons coal/yr | Natural gas, 1,012 Btu/ $ft^3$; 6,090 Btu/kWh; 0.0034 lb SOx/MMBtu; 0.0109 lb NOx/MMBtu; 110 lb $CO_2$/MMBtu; 24,500,000,000 $ft^3$ gas/ yr | |
| | | Low NOx burners, over-fire air and selective catalytic reduction (85 to 95% NOx reduction efficiency | Selective catalytic reduction with steam/ water injection | |
| | | Wet scrubber – lime/ limestone desulfurization system (80 to 95% SOx removal efficiency); 23,600 tons limestone/yr | | |
| | | Fabric filters (99.9% particulate removal efficiency) | | |
| 705 permanent and 30 long-term contract workers | | 65 workers (Section 7.3.2) | 18 workers (Section 7.3.3) | |

## Table 8-2. Impacts Comparison Detail (Continued)

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Land Use Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issue findings (Attachment A, Table A-1, Issues 52, 53) | SMALL – Not an impact evaluated by GEIS (NRC 1996) | MODERATE – 90 acres required for the powerblock and associated facilities; 1.5 acres for cooling towers; 34 acres for solid waste disposal (including ash) (Section 7.3.2) | SMALL to MODERATE – 32 acres for facility and 1.0 acres for cooling towers at KPS location (Section 7.3.3). New gas pipeline would be built to connect with existing gas pipeline corridor | MODERATE – Most transmission facilities could be constructed along existing transmission corridors (Section 7.3.4). Adopting by reference GEIS description of land use impacts from alternate technologies (NRC 1996) |
| **Water Quality Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issue findings (Table A-1, Issues 3, 5, 7, 9-12, and 32). Five Category 2 issues not applicable (Section 4.1, Issue 13); Section 4.5, Issue 33; Section 4.6, Issue 34; Section 4.7, Issue 35; and Section 4.8, Issue 39). | SMALL – Adopting by reference Category 1 issue finding (Table A-1, Issue 89). | SMALL – Construction impacts minimized by use of best management practices. Operational impacts similar to KPS by using cooling water and discharge to Lake Michigan. (Section 7.3.2) | SMALL – Reduced cooling water demands, inherent in combined-cycle design (Section Section 7.3.3) | SMALL to MODERATE – Adopting by reference GEIS description of water quality impacts from alternate technologies (NRC 1996) |

## Table 8-2. Impacts Comparison Detail (Continued)

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Air Quality Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issue finding (Table A-1, Issue 51). One Category 2 issue not applicable (Section 4.11, Issue 50). | SMALL – Adopting by reference Category 1 issue findings (Table A-1, Issue 88) | MODERATE –<br>720 tons $SO_2$/yr<br>526 tons NOx/yr<br>526 tons CO/yr<br>5,800,000 tons $CO_2$/yr<br>13 tons $PM_{10}$/yr<br>3 tons $PM_{2.5}$/yr<br>0.09 tons Hg/yr<br>(Section 7.3.2) | MODERATE –<br>8 tons $SO_2$/yr<br>135 tons NOx/yr<br>28 tons CO/yr<br>1,370,000 tons $CO_2$/yr<br>24 tons $PM_{2.5}$/yr[a]<br>(Section 7.3.3) | SMALL to MODERATE – Adopting by reference GEIS description of air quality impacts from alternate technologies (NRC 1996) |
| **Ecological Resource Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issue findings (Table A-1, Issues 15-24 and 45-48). One Category 2 issue not applicable (Section 4.9, Issue 40). KPS holds a current WPDES permit for protecting the environment. In addition, 316(a) and 316(b) determinations have been made as discussed in Sections 4.2, 4.3, and 4.4. (Section 4.4, Issue 27). | SMALL – Adopting by reference Category 1 issue finding (Table A-1, Issue 90) | MODERATE – 34 acres could be required for ash/ sludge disposal over 20-year license renewal term. (Section 7.3.2) | SMALL – Construction of pipeline could alter the terrestrial habitat. (Section 7.3.3) | SMALL to MODERATE – Adopting by reference GEIS description of ecological resource impacts from alternate technologies (NRC 1996) |

## Table 8-2. Impacts Comparison Detail (Continued)

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Threatened or Endangered Species Impacts** | | | | |
| SMALL – No impacts observed from current operations and transmission line maintenance practices. Plant operations and transmission line maintenance practices are not expected to change significantly during the license renewal term (Section 4.10, Issue 49). | SMALL – Not an impact evaluated by GEIS (NRC 1996) | SMALL – Federal and state laws prohibit destroying or adversely affecting protected species and their habitats | SMALL – Federal and state laws prohibit destroying or adversely affecting protected species and their habitats | SMALL – Federal and state laws prohibit destroying or adversely affecting protected species and their habitats |
| **Human Health Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issues (Table A-1, Issues 58, 61, 62). One Category 2 issue not applicable (Section 4.12, Issue 57). Risk due to transmission-line induced currents minimal due to conformance with consensus code (Section 4.13, Issue 59). | SMALL – Adopting by reference Category 1 issue finding (Table A-1, Issue 86) | MODERATE – Adopting by reference GEIS conclusion that risks from emissions are likely (NRC 1996) | SMALL – Adopting by reference GEIS conclusion that some risk exists from emissions (NRC 1996) | SMALL to MODERATE – Adopting by reference GEIS description of human health impacts from alternate technologies (NRC 1996) |

## Table 8-2. Impacts Comparison Detail (Continued)

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Socioeconomic Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issue findings (Table A-1, Issues 64, 67). Two Category 2 issues not applicable (Section 4.16, Issue 66 and Section 4.17, Issue 68). Location in high population area with no growth controls minimizes potential for housing impacts. Section 4.14, Issue 63). Plant property tax payment represents less than 10 percent of county's total tax revenues (Section 4.17, Issue 69). KPS does not use municipal water and transportation infrastructure minimizes potential for related impacts. No additional employees are expected during the license renewal term (Section 4.15, Issue 65 and Section 4.18, Issue 70). | SMALL – Adopting by reference Category 1 issue finding (Table A-1, Issue 91) | SMALL – Reduction in permanent work force at KPS could adversely affect surrounding counties, but would be mitigated by KPS' proximity to several metropolitan areas (Section 7.3.2) | MODERATE – Reduction in permanent work force at KPS could adversely affect surrounding counties, but would be mitigated by KPS' proximity to the Green Bay metropolitan area (Section Section 7.3.3) | SMALL to MODERATE – Adopting by reference GEIS description of socioeconomic impacts from alternate technologies (NRC 1996) |

## Table 8-2. Impacts Comparison Detail (Continued)

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Waste Management Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issue findings (Table A-1, Issues 77-85). | SMALL – Adopting by reference Category 1 issue finding (Table A-1, Issue 87) | MODERATE – 17,100 tons of coal ash and 17,800 tons of scrubber sludge annually would require 21 acres over 20-year license renewal term. (Section 7.3.2) | SMALL – Approximately 330 $ft^3$ spent SCR catalyst per year (Section 7.3.3 | SMALL to MODERATE – Adopting by reference GEIS description of waste management impacts from alternate technologies (NRC 1996) |
| **Aesthetic Impacts** | | | | |
| SMALL – Adopting by reference Category 1 issue findings (Table A-1, Issues 73, 74). | SMALL – Not an impact evaluated by GEIS (NRC 1996) | SMALL to MODERATE – The coal-fired power blocks, exhaust stacks, cooling towers, and coal pile would be visible from offsite, in an industrial setting (Section 7.3.2) | SMALL – Steam turbines, stacks, and cooling towers would create visual impacts comparable to those from existing KPS facilities (Section 7.3.3) | SMALL to MODERATE – Adopting by reference GEIS description of aesthetic impacts from alternate technologies (NRC 1996) |

## Table 8-2. Impacts Comparison Detail (Continued)

| Proposed Action (License Renewal | Base (Decommissioning) | No-Action Alternative | | |
|---|---|---|---|---|
| | | With Coal-Fired Generation | With Gas-Fired Generation | With Purchased Power |
| **Cultural Resource Impacts** | | | | |
| SMALL –No cultural resource impact identified. (Section 4.19, Issue 71). | SMALL – Not an impact evaluated by GEIS (NRC 1996) | SMALL – Impacts to cultural resources would be unlikely due to developed nature of the site (Section 7.3.2) | SMALL – Construction in previously disturbed soil would be unlikely to affect cultural resources (Section 7.3.3) | SMALL – Adopting by reference GEIS description of cultural resource impacts from alternate technologies (NRC 1996) |

Btu = British thermal unit
CO = carbon monoxide
$CO_2$= carbon dioxide
$ft^3$ = cubic foot
gal= gallon
GEIS = Generic Environmental Impact Statement (NRC 1996)
kWh = kilowatt hour
lb = pound
MM = million
MW = megawatt
NOx = nitrogen oxides
$PM_{10}$ = particulates with a diameter less than 10 microns
$PM_{2.5}$ = particulates with a diameter less than 2.5 microns
SHPO = State Historic Preservation Officer
$SO_2$ = sulfur dioxide
Yr = year
SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource. 10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 3.
[a.] All particulates are $PM_{2.5}$.

## 8.1 References

NRC (U.S. Nuclear Regulatory Commission). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)*. Volumes 1 and 2. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

# 9.0 STATUS OF COMPLIANCE

## 9.1 Proposed Action

**NRC**

**"The environmental report shall list all federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land-use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection…" 10 CFR 51.45(d), as adopted by 10 CFR 51.53(c)(2)**

### 9.1.1 General

Table 9-1 lists environmental authorizations for current Kewaunee Power Station (KPS) operations. In this context "authorizations" includes any permits, licenses, approvals, or other entitlements. DEK expects to continue renewing these authorizations during both the current license period and license renewal period. Based on the new and significant information identification process described in Chapter 5, DEK concludes that KPS is currently in compliance with applicable environmental standards and requirements.

Table 9-2 lists additional environmental authorizations and consultations related to DEK renewal of the KPS license to operate. As indicated, DEK anticipates needing relatively few such authorizations and consultations. Sections 9.1.2 through 9.1.5 discuss some of these items in more detail.

### 9.1.2 Threatened or Endangered Species

Section 7 of the Endangered Species Act (16 USC 1531 et seq.) requires federal agencies to ensure that agency action is not likely to jeopardize any species that is listed or proposed for listing as endangered or threatened. Depending on the action involved, the Act requires consultation with the U.S. Fish and Wildlife Service (FWS) regarding effects on non-marine species, the National Marine Fisheries Service (NMFS) for marine species, or both. FWS and NMFS have issued joint procedural regulations at 50 CFR 402, Subpart B, that address consultation, and FWS maintains the joint list of threatened and endangered species at 50 CFR 17.

Although not required of an applicant by federal law or NRC regulation, DEK has invited comment from both federal and state agencies regarding potential effects that KPS license renewal might have on threatened and endangered species. Attachment C includes copies of DEK correspondence with FWS and the Wisconsin Department of Natural Resources. DEK did not consult with NMFS

because species under the auspices of NMFS are not known to be in the KPS vicinity.

### 9.1.3 Coastal Zone Management Program Compliance

The Federal Coastal Zone Management Act (16 USC 1451 et seq.) imposes requirements on applicants for a federal license to conduct an activity that could affect a state's coastal zone (NRC 2004). The Act requires the applicant to certify to the licensing agency that the proposed activity would be consistent with the state's federally approved coastal zone management program [16 USC 1456(c)(3)(A)]. The National Oceanic and Atmospheric Administration has promulgated implementing regulations indicating that the requirement is applicable to renewal of federal licenses for activities not previously reviewed by the state [15 CFR 930.51(b)(1)]. The regulation requires that the license applicant provide its certification to the federal licensing agency and a copy to the applicable state agency [15 CFR 930.57(a)].

The NRC office of Nuclear Reactor Regulation has issued guidance to its staff regarding compliance with the Act (NRC 2004). This guidance acknowledges that Wisconsin has an approved coastal zone management program. KPS, located in Kewaunee County, is within the Wisconsin coastal zone. DEK is submitting project-descriptive material and a certification to the Wisconsin Coastal Management Program. Attachment E is a copy of the certification.

### 9.1.4 Historic Preservation

Section 106 of the National Historic Preservation Act (16 USC 470 et seq.) requires federal agencies having the authority to license any undertaking to, prior to issuing the license, take into account the effect of the undertaking on historic properties and to afford the Advisory Committee on Historic Preservation an opportunity to comment on the undertaking. Committee regulations provide for establishing an agreement with any State Historic Preservation Officer (SHPO) to substitute state review for Committee review (35 CFR 800.7). Although not required of an applicant by federal law or NRC regulation, DEK has invited comment by the Wisconsin SHPO. Attachment D includes copies of DEK correspondence with the SHPO regarding potential effects that KPS license renewal might have on historic or cultural resources.

### 9.1.5 Water Quality (401) Certification

Federal Clean Water Act Section 401 requires applicants for a federal license to conduct an activity that might result in a discharge into navigable waters to provide the licensing agency a certification from the state that the discharge will comply with applicable Clean Water Act requirements (33 USC 1341). The Wisconsin Department of Natural Resources (WDNR) issued a Section 401 State Water Quality Certification for KPS on August 3, 1973 (provided in Attachment B). A Wisconsin Pollutant Discharge Elimination System (WPDES) Permit for KPS reflecting continued compliance with the standards and requirements established under the Clean Water Act is also provided in Attachment B.

### 9.1.6 Zoning and Land Use Regulations

KPS was built prior to the establishment of zoning and land use regulations in the Town of Carlton and Kewaunee County. The County has not adopted a comprehensive zoning ordinance but it does have a Shoreland and Flood Plain Zoning Ordinance. As KPS predates the enactment of the shoreland zoning ordinance, KPS is classified as a legal nonconforming use. KPS is also a legal nonconforming use with respect to the Town of Carlton's zoning ordinance. KPS maintains close contact with both the Town and the County during the planning and construction of new facilities to ensure compliance with all zoning and land use regulations.

## 9.2 Alternatives

**NRC**

**"…The discussion of alternatives in the report shall include a discussion of whether the alternatives will comply with such applicable environmental quality standards and requirements." 10 CFR 51.45(d), as required by 10 CFR 51.53(c)(2)**

The coal and gas alternatives discussed in Section 7.2.2.1 can be constructed and operated to comply with all applicable environmental quality standards and requirements.

## Table 9-1. Environmental Authorizations for Current Operations

| Agency | Authority | Requirement | Number | Issue or Expiration Date | Activity Covered |
|---|---|---|---|---|---|
| U.S. Nuclear Regulatory Commission | Atomic Energy Act (42 USC 2011, et seq.), 10 CFR 50.10 | License to operate | DPR-43 | Expires 12/ 21/13 | Operation of KPS |
| U.S. Nuclear Regulatory Commission | 10 CFR 20.2002 | Approval | NA | Issued 11/13/95 | Disposal of contaminated WWTF sludge |
| U.S. Department of Transportation | 49 USC 5108 | Registration | 062706 552 0750Q | Expires 06/30/09 | Hazardous materials shipments |
| U.S. Environmental Protection Agency | Federal Resource Conservation and Recovery Act (42 USC 6912), Ch. 291 Wisconsin Statutes | Notification of Regulated waste Activity | EPA ID# WID00713016 | NA | Hazardous Waste Generation/ Transport |
| U.S. Army Corp of Engineers | 30 Stat. 1151; 33 U.S.C. 403, Section 10 | Permit for construction of water intake and discharge structures in Lake Michigan | NCCOD-S 69-10 | Issued 12/12/68 | Cooling water system |
| Wisconsin Department of Natural Resources | Ch. 283 Wisconsin Statutes | Permit for construction of water intake and discharge structures in Lake Michigan | 2-WP-2570 | Issued 12/04/67 | Cooling water system |
| Wisconsin Department of Natural Resources | Ch. 281 Wisconsin Statutes | Permit to construct and operate | 3430 (Note: Current WPDES permit authorizes discharges.) | Issued 11/26/85 | Sanitary sewage treatment system |

## Table 9-1. Environmental Authorizations for Current Operations (Continued)

| Agency | Authority | Requirement | Number | Issue or Expiration Date | Activity Covered |
|---|---|---|---|---|---|
| Wisconsin Department of Natural Resources | Ch. 283 Wisconsin Statutes | Letter Approval (Note: Continued authorization via WPDES permit.) | NA | Issued 08/05/92 | Land spreading of WWTF Pretreatment Sludge |
| Wisconsin Department of Natural Resources | Clean Water Act (33 USC Section 1251 et seq.), Ch. 283 Wisconsin Statutes | Individual WPDES permit | WI-00001571-06 | Expires 06/30/10 | Discharges to Lake Michigan and unnamed tributary that flows into Lake Michigan: operation of cooling water intake system. |
| Wisconsin Department of Natural Resources | Clean Water Act (33 USC Section 1251 et seq.), Ch. 283 Wisconsin Statutes | General WPDES Industrial Storm Water Discharge Permit | WI-S049158-2 | Expires 03/31/06 (Authorization continues. Automatically reissued when new permit becomes available.) | Storm water runoff from industrial facilities |
| Wisconsin Department of Natural Resources | Federal Clean Air Act (42 USC 7661-7671), Ch. 285 Wisconsin Statutes | Air Pollution Control Operation Permit | 431022790-F11 (Note: DEK is considering conversion of this permit to a "Type A Registration Operation Permit," Air Pollution Control Permit Number ROP-A01, issued by the WDNR.) | Expires 06/19/07 (Note: A timely renewal application was submitted. Authorization continues under "Application shield" clause of s.285.62(8), statutes.) | Air emissions from a boiler and diesel generators |
| Wisconsin Department of Natural Resources | Chs. 280 and 281 Wisconsin Statutes | Registration | ID# 43104061 | NA | Non-transient non-community water supply registration for KPS |

## Table 9-1. Environmental Authorizations for Current Operations (Continued)

| Agency | Authority | Requirement | Number | Issue or Expiration Date | Activity Covered |
|---|---|---|---|---|---|
| Wisconsin Department of Natural Resources | Ch. 281 Wisconsin Statutes | High-Capacity Well Approval | Approval #s 52802, 52803 | Issued 01/26/68 | Approval for wells with combined capacity >100,000 gpd |
| Wisconsin Department of Commerce | Ch. 101.09 Wisconsin Statutes | Aboveground Storage Tank Registration | Owner ID: 383035<br>Site ID: 679179<br>Tank ID: 463455 | NA | Aboveground storage tank |
| Wisconsin Department of Commerce | Federal Resource Conservation and Recovery Act (42 USC 6912), Ch. 101.09 Wisconsin Statutes | Underground Storage Tank Registration | Owner ID: 383035<br>Site ID: 679179<br>Tank IDs: 285236, 2852239, 406492, 771175, 978062 | Expires 05/28/06 (285236, 2852239, 978062) (Timely renewal application was submitted.)<br>Expires 10/28/08 (406492, 771175) | Underground storage tanks |
| South Carolina Department of Health and Environmental Control | South Carolina Radioactive Waste Transportation and Disposal Act (S.C. Code of Laws 13-7-110 et seq.) | Radioactive waste transport permit | 0044-48-08 | Expires 12/31/08 | Transportation of radioactive waste to disposal facility in South Carolina |
| Tennessee Department of Environment and Conservation | Tennessee Code Annotated 68-202-206 | License to ship radioactive material | T-WI003-L08 | Expires 12/31/08 | Shipments of radioactive material to processing facility in Tennessee |
| Utah Department of Environmental Quality | R313-26 of Utah Radiation Control Rules | Site Access Permit | 0704004220 | Expires 6/28/08 | Access to land disposal site |

> = greater than
gpd = gallons per day
NA = Not Applicable: one-time registration
US = United States Code
WPDES = Wisconsin Pollutant Discharge Elimination System
WWTF = Wastewater Treatment Facility

## Table 9-2. Environmental Authorizations for License Renewal

| Agency | Authority | Requirement | Remarks |
|---|---|---|---|
| U.S. Nuclear Regulatory Commission | Atomic Energy Act (42 USC 2011 et seq.) | License renewal | Environmental report submitted in support of license renewal application |
| U.S. Fish and Wildlife Service (FWS) | Endangered Species Act, Section 7 (16 USC 1536) | Consultation | Requires federal agency issuing a license to consult with FWS (Attachment C) |
| Wisconsin Department of Natural Resources | Endangered and Threatened Species Laws (State Statute 29.604 & Administrative Rule NR 27) | Endangered Resources Review | Review explains what rare species, natural communities, or natural features tracked in the Natural Heritage Inventory database are found in or near the proposed project area. And any additional steps to assure compliance with the Wisconsin Endangered Species Law. (Attachment C) |
| Wisconsin Department of Natural Resources | Clean Water Act, Section 401 (33 USC 1341) | Certification | Requires State certification that proposed action would comply with Clean Water Act standards (Attachment B) |
| Wisconsin Historical Society | National Historic Preservation Act, Section 106 (16 USC 470f) | Consultation | Requires federal agency issuing a license to consider cultural impacts and consult with State Historic Preservation Officer (Attachment D) |
| Wisconsin Department of Administration | Federal Coastal Zone Management Act (16 USC 1451 et seq.) | Certification | Requires an applicant to provide certification to the federal agency issuing the license that license renewal would be consistent with the federally approved state coastal zone management program. Based on its review of the proposed activity, the State must concur with or object to the applicant's certification. (Attachment E) |

> = greater than
gpd = gallons per day
NA = Not Applicable: one-time registration
US = United States Code
WPDES = Wisconsin Pollutant Discharge Elimination System
WWTF = Wastewater Treatment Facility

## 9.3 References

NRC (U.S. Nuclear Regulatory Commission). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)*. Volumes 1 and 2. NUREG-1437. Washington, DC. May. NRC ADAMS Accession Numbers ML040690705 and ML040690738.

NRC (U.S. Nuclear Regulatory Commission). 2004. *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues*. Appendix D. NRR Office Instruction No. LIC-203, Revision 1. May 24. NRC ADAMS Accession Number ML033550003.

# ATTACHMENT A

## NRC NEPA ISSUES FOR LICENSE RENEWAL OF POWER PLANTS

DEK Energy Kewaunee (DEK) has prepared this environmental report in accordance with the requirements of U.S. Nuclear Regulatory Commission (NRC) regulation 10 CFR 51.53. NRC included in the regulation a list of National Environmental Policy Act (NEPA) issues for license renewal of nuclear power plants. Table A-1 lists these 92 issues and identifies the section in which DEK addressed each applicable issue in the environmental report. For organization and clarity, DEK has assigned a number to each issue and uses the issue numbers throughout the environmental report.

## Table A-1. KPS Environmental Report Discussion of License Renewal NEPA Issues

| Issue | Category | Section of this Environmental Report | GEIS Cross Reference[b] (Section/Page) |
|---|---|---|---|
| **Surface Water Quality, Hydrology, and Use (for all plants)** | | | |
| 1. Impacts of refurbishment on surface water quality | 1 | NA | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 2. Impacts of refurbishment on surface water use | 1 | NA | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 3. Altered current patterns at intake and discharge structures | 1 | 4.0 | 4.2.1.2.1/4-5 |
| 4. Altered salinity gradients | 1 | NA | Issue applies to an activity, discharge to saltwater, which KPS does not do. |
| 5. Altered thermal stratification of lakes | 1 | 4.0 | 4.2.1.2.3/4-7 |
| 6. Temperature effects on sediment transport capacity | 1 | NA | Issue applies to an activity, discharge to a river, which KPS does not do. |
| 7. Scouring caused by discharged cooling water | 1 | 4.0 | 4.2.1.2.3/4-6 |
| 8. Eutrophication | 1 | NA | Issue applies to an activity, discharge to a small body of water, which KPS does not do. |
| 9. Discharge of chlorine or other biocides | 1 | 4.0 | 4.2.1.2.4/4-10 |
| 10. Discharge of sanitary wastes and minor chemical spills | 1 | 4.0 | 4.2.1.2.4/4-10 |
| 11. Discharge of other metals in waste water | 1 | 4.0 | 4.2.1.2.4/4-10 |
| 12. Water use conflicts (plants with once-through cooling systems) | 1 | 4.0 | 4.2.1.2.3/4-13 |
| 13. Water use conflicts (plants with cooling ponds or cooling towers using make-up water from a small river with low flow) | 2 | Identified as NA in Section 4.1 | Issue applies to an activity, using makeup water from a small river, which KPS does not do. |

**Table A-1. KPS Environmental Report Discussion of License Renewal NEPA Issues (Continued)**

| Issue | Category | Section of this Environmental Report | GEIS Cross Reference[b] (Section/Page) |
|---|---|---|---|
| **Aquatic Ecology (for all plants)** | | | |
| 14. Refurbishment impacts to aquatic resources | 1 | NA | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 15. Accumulation of contaminants in sediments or biota | 1 | 4.0 | 4.2.1.2.4/4-10 |
| 16. Entrainment of phytoplankton and zooplankton | 1 | 4.0 | 4.2.2.1.1/4-15 |
| 17. Cold shock | 1 | 4.0 | 4.2.2.1.5/4-18 |
| 18. Thermal plume barrier to migrating fish | 1 | 4.0 | 4.2.2.1.6/4-19 |
| 19. Distribution of aquatic organisms | 1 | 4.0 | 4.2.2.1.6/4-19 |
| 20. Premature emergence of aquatic insects | 1 | 4.0 | 4.2.2.1.7/4-20 |
| 21. Gas supersaturation (gas bubble disease) | 1 | 4.0 | 4.2.2.1.8/4-21 |
| 22. Low dissolved oxygen in the discharge | 1 | 4.0 | 4.2.2.1.9/4-23 |
| 23. Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses | 1 | 4.0 | 4.2.2.1.10/4-24 |
| 24. Stimulation of nuisance organisms (e.g., shipworms) | 1 | 4.0 | 4.2.2.1.11/4-25 |
| **Aquatic Ecology (for plants with once-through and cooling pond heat dissipation systems)** | | | |
| 25. Entrainment of fish and shellfish in early life stages for plants with once-through and cooling pond heat dissipation systems | 2 | 4.2 | 4.2.2.1.2/4-16 |
| 26. Impingement of fish and shellfish for plants with once-through and cooling pond heat dissipation systems | 2 | 4.3 | 4.2.2.1.3/4-16 |
| 27. Heat shock for plants with once-through and cooling pond heat dissipation systems | 2 | 4.4 | 4.2.2.1.4/4-17 |

**Table A-1. KPS Environmental Report Discussion of License Renewal NEPA Issues (Continued)**

| Issue | Category | Section of this Environmental Report | GEIS Cross Reference[b] (Section/Page) |
|---|---|---|---|
| **Aquatic Ecology (for plants with cooling-tower-based heat dissipation systems)** | | | |
| 28. Entrainment of fish and shellfish in early life stages for plants with cooling-tower-based heat dissipation systems | 1 | NA | Issue applies to a heat dissipation system, cooling towers, that KPS does not have |
| 29. Impingement of fish and shellfish for plants with cooling-tower-based heat dissipation systems | 1 | NA | Issue applies to a heat dissipation system, cooling towers, that KPS does not have |
| 30. Heat shock for plants with cooling-tower-based heat dissipation systems | 1 | NA | Issue applies to a heat dissipation system, cooling towers, that KPS does not have |
| **Groundwater Use and Quality** | | | |
| 31. Impacts of refurbishment on groundwater use and quality | 1 | NA | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 32. Groundwater use conflicts (potable and service water; plants that use <100 gpm) | 1 | 4.0 | 4.8.1.1/4-116 |
| 33. Groundwater use conflicts (potable, service water, and dewatering; plants that use >100 gpm) | 2 | Identified as NA in Section 4.5 | Issue applies to an activity, using >100 gpm or more of groundwater, which KPS does not do. |
| 34. Groundwater use conflicts (plants using cooling towers withdrawing make-up water from a small river) | 2 | Identified as NA in Section 4.6 | Issue applies to an activity, using makeup water from a small river, which KPS does not do. |
| 35. Groundwater use conflicts (Ranney wells) | 2 | Identified as NA in Section 4.7 | Issue applies to a plant feature, Ranney wells, which KPS does not have. |
| 36. Groundwater quality degradation (Ranney wells) | 1 | NA | Issue applies to a feature, Ranney wells, which KPS does not have. |
| 37. Groundwater quality degradation (saltwater intrusion) | 1 | NA | Issue applies to a feature, location at an ocean or estuary site, which KPS does not have. |
| 38. Groundwater quality degradation (cooling ponds in salt marshes) | 1 | NA | Issue applies to a feature, location in a salt marsh, which KPS does not have. |
| 39. Groundwater quality degradation (cooling ponds at inland sites) | 2 | Identified as NA in Section 4.8 | Issue applies to a feature, cooling ponds, which KPS does not have. |

**Table A-1. KPS Environmental Report Discussion of License Renewal NEPA Issues (Continued)**

| Issue | Category | Section of this Environmental Report | GEIS Cross Reference[b] (Section/Page) |
|---|---|---|---|
| **Terrestrial Resources** | | | |
| 40. Refurbishment impacts to terrestrial resources | 2 | Identified as NA in Section 4.9 | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 41. Cooling tower impacts on crops and ornamental vegetation | 1 | NA | Issue applies to a feature, mechanical draft cooling towers, which KPS does not have. |
| 42. Cooling tower impacts on native plants | 1 | NA | Issue applies to a feature, mechanical draft cooling towers, which KPS does not have. |
| 43. Bird collisions with cooling towers | 1 | NA | Issue applies to a feature, cooling towers, which KPS does not have. |
| 44. Cooling pond impacts on terrestrial resources | 1 | NA | Issue applies to a feature, cooling ponds, which KPS does not have. |
| 45. Power line right-of-way management (cutting and herbicide application) | 1 | 4.0 | 4.5.6.1/4-71 |
| 46. Bird collisions with power lines | 1 | 4.0 | 4.5.6.2/4-74 |
| 47. Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock) | 1 | 4.0 | 4.5.6.3/4-77 |
| 48. Floodplains and wetlands on power line right-of-way | 1 | 4.0 | 4.5.7.7/4-81 |
| **Threatened or Endangered Species (for all plants)** | | | |
| 49. Threatened or endangered species | 2 | 4.10 | 4.1/4-1 |
| **Air Quality** | | | |
| 50. Air quality during refurbishment (non-attainment and maintenance areas) | 2 | Identified as NA in Section 4.11 | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 51. Air quality effects of transmission lines | 1 | 4.0 | 4.5.2/4-62 |
| **Land Use** | | | |
| 52. Onsite land use | 1 | 4.0 | 3.2/3-1 |
| 53. Power line right-of-way land use impacts | 1 | 4.0 | 4.5.3/4-62 |

**Table A-1. KPS Environmental Report Discussion of License Renewal NEPA Issues (Continued)**

| Issue | Category | Section of this Environmental Report | GEIS Cross Reference[b] (Section/Page) |
|---|---|---|---|
| **Human Health** | | | |
| 54. Radiation exposures to the public during refurbishment | 1 | NA | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 55. Occupational radiation exposures during refurbishment | 1 | NA | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 56. Microbiological organisms (occupational health) | 1 | NA | Issue applies to a feature, cooling towers, which KPS does not have. |
| 57. Microbiological organisms (public health) (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river) | 2 | Identified as NA in Section 4.12 | Issue applies to an activity, discharge to a small river, which KPS does not do. |
| 58. Noise | 1 | 4.0 | 4.3.7/4-49 |
| 59. Electromagnetic fields, acute effects | 2 | 4.13 | 4.5.4.1/4-66 |
| 60. Electromagnetic fields, chronic effects | NA | 4.0 | 4.5.4.2/4-67 |
| 61. Radiation exposures to public (license renewal term) | 1 | 4.0 | 4.6.2/4-87 |
| 62. Occupational radiation exposures (license renewal term) | 1 | 4.0 | 4.6.3/4-95 |
| **Socioeconomics** | | | |
| 63. Housing impacts | 2 | 4.14 | 4.7.1/4-101 |
| 64. Public services: public safety, social services, and tourism and recreation | 1 | 4.0 | 4.7.3/4-104 (public safety)<br>4.7.3.3/4-106 (safety)<br>4.7.3.44-107 (social)<br>4.7.3.6/4-107 (tour, rec.) |
| 65. Public services: public utilities | 2 | 4.15 | 4.7.3/4-104 |
| 66. Public services: education (refurbishment) | 2 | Identified as NA in Section 4.16 | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 67. Public services: education (license renewal term) | 1 | 4.0 | 4.7.3.1/4-106 |
| 68. Offsite land use (refurbishment) | 2 | Identified as NA in Section 4.17.1 | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 69. Offsite land use (license renewal term) | 2 | 4.17.2 | 4.7.4/4-107 |
| 70. Public services: transportation | 2 | 4.18 | 4.7.3.2/4-106 |

**Table A-1. KPS Environmental Report Discussion of License Renewal NEPA Issues (Continued)**

| Issue | Category | Section of this Environmental Report | GEIS Cross Reference[b] (Section/Page) |
|---|---|---|---|
| **Socioeconomics (Continued)** | | | |
| 71. Historic and archaeological resources | 2 | 4.19 | 4.7.7/4-114 |
| 72. Aesthetic impacts (refurbishment) | 1 | NA | Issue applies to an activity, refurbishment, which KPS does not plan to conduct. |
| 73. Aesthetic impacts (license renewal term) | 1 | 4.0 | 4.7.6/4-111 |
| 74. Aesthetic impacts of transmission lines (license renewal term) | 1 | 4.0 | 4.5.8/4-83 |
| **Postulated Accidents** | | | |
| 75. Design basis accidents | 1 | 4.0 | 5.3.2/5-11 (design basis)<br>5.5.1/5-114 (summary) |
| 76. Severe accidents | 2 | 4.20 | 5.3.3/5-12 (probabilistic analysis)<br>5.3.3.2/5-19 (air dose)<br>5.3.3.3/5-49 (water)<br>5.3.3.4/5-65 (groundwater)<br>5.3.3.5/5-95 (economic)<br>5.4/5-106 (mitigation)<br>5.5.2/5-114 (summary) |
| **Uranium Fuel Cycle and Waste Management** | | | |
| 77. Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high-level waste) | 1 | 4.0 | 6.2/6-8 |
| 78. Offsite radiological impacts (collective effects) | 1 | 4.0 | Not in GEIS |
| 79. Offsite radiological impacts (spent fuel and high-level waste disposal) | 1 | 4.0 | Not in GEIS |
| 80. Nonradiological impacts of the uranium fuel cycle | 1 | 4.0 | 6.2.2.6/6-20 (land use)<br>6.2.2.7/6-20 (water use)<br>6.2.2.8/6-21 (fossil fuel)<br>6.2.2.9/6-21 (chemical) |
| 81. Low-level waste storage and disposal | 1 | 4.0 | 6.4.2/6-36 (low-level defined)<br>6.4.3/6-37 (low-level volume)<br>6.4.4/6-48 (renewal effects) |
| 82. Mixed waste storage and disposal | 1 | 4.0 | 6.4.5/6-63 |
| 83. Onsite spent fuel | 1 | 4.0 | 6.4.6/6-70 |
| 84. Nonradiological waste | 1 | 4.0 | 6.5/6-86 |
| 85. Transportation | 1 | 4.0 | 6.3/6-31, as revised by Addendum 1, August 1999 |

**Table A-1. KPS Environmental Report Discussion of License Renewal NEPA Issues (Continued)**

| Issue | Category | Section of this Environmental Report | GEIS Cross Reference[b] (Section/Page) |
|---|---|---|---|
| **Decommissioning** | | | |
| 86. Radiation doses (decommissioning) | 1 | 4.0 | 7.3.1/7-15 |
| 87. Waste management (decommissioning) | 1 | 4.0 | 7.3.2/7-19 (impacts)<br>7.4/7-25 (conclusions) |
| 88. Air quality (decommissioning) | 1 | 4.0 | 7.3.3/7-21 (air)<br>7.4/7-25 (conclusions) |
| 89. Water quality (decommissioning) | 1 | 4.0 | 7.3.4/7-21 (water)<br>7.4/7-25 (conclusions) |
| 90. Ecological resources (decommissioning) | 1 | 4.0 | 7.3.5/7-21 (ecological)<br>7.4/7-25 (conclusions) |
| 91. Socioeconomic impacts (decommissioning) | 1 | 4.0 | 7.3.7/7-19 (socioeconomic)<br>7.4/7-24 (conclusions) |
| **Environmental Justice** | | | |
| 92. Environmental justice | NA | 2.6.2 | Not in GEIS |

a= Source: 10 CFR 51, Subpart A, Appendix A, Table B-1. (Issue numbers added to facilitate discussion.)
b = Source: Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437).

# ATTACHMENT B

# CLEAN WATER ACT DOCUMENTATION



1. The Wisconsin Pollutant Discharge Elimination System (WPDES) permit for DEK's Kewaunee Power Station is approximately 22 pages long. Therefore, only the cover page, providing the authority to discharge to Lake Michigan, is included in this Attachment.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

L. P. Voigt
Secretary

BOX 450
MADISON, WISCONSIN 53701

August 3, 1973

IN REPLY REFER TO: 3210-5

Wisconsin Public Service Corporation
P. O. Box 1200
Green Bay, Wisconsin 54301

Attn: Mr. Evan James, Senior Vice President
Power Generation and Engineering

Dear Sirs:

This is in response to your request to the Wisconsin Department of Natural Resources for State certification in accordance with Section 401(a) of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) for the proposed discharge to Lake Michigan from the Kewaunee Nuclear Power Plant located in the Town of Carlton, Kewaunee County, Wisconsin.

Notice of the application was published by the Department on July 2, 1973, and required that written comments be submitted by July 20, 1973. A total of 39 letters were received. Based on an evaluation of the comments, public hearing was not deemed necessary.

It is hereby certified that for the proposed discharge from the Kewaunee Nuclear Power Plant there are no applicable effluent limitations promulgated pursuant to provisions of Sections 301, 302, 306 and 307 of the 1972 Amendments and that the proposed discharge will be in compliance with water quality standards for Lake Michigan as set forth in Chapters NR 102 and 103 of the Wisconsin Administrative Code.

Very truly yours,
Division of Environmental Protection

Thomas G. Frangos
Administrator

WPDES Permit No. WI-0001571-07-0

WISCONSIN
DEPT. OF NATURAL RESOURCES

# WPDES PERMIT

## *STATE OF WISCONSIN*
## *DEPARTMENT OF NATURAL RESOURCES*

**PERMIT TO DISCHARGE UNDER THE**
**WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM**

**Dominion Energy Kewaunee, Inc.**

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
State Highway 42, Kewaunee, WI
to

Lake Michigan and an unnamed tributary to Lake Michigan

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By Russell Rasmussen
Russell Rasmussen
Director, Bureau of Watershed Management

July 18, 2005
Date Permit Signed/Issued

**PERMIT TERM: EFFECTIVE DATE – August 01, 2005** **EXPIRATION DATE - June 30, 2010**

# ATTACHMENT C

# SPECIAL-STATUS SPECIES CORRESPONDENCE

Letter Page

Pamela F. Faggert
Vice President and Chief Environmental Officer
Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, Virginia 23060
Phone: 804-273-3467

Dominion

February 14, 2007

Ms. Louise Clemency
Field Supervisor
Green Bay Ecological Services Office
U.S. Fish & Wildlife Service
2661 Scott Tower Drive
Green Bay, WI 54229

SUBJECT: Kewaunee Power Station
Request for Information on Threatened or Endangered Species

Dear Ms. Clemency:

Dominion Energy Kewaunee, Inc. (DEK), a subsidiary of Dominion Resources, Inc., is preparing an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license for the Kewaunee Power Station (KPS). The current operating license for the station will expire in 2013. As part of the license renewal process, the NRC requires license applicants to "assess the impact of the proposed action on threatened or endangered species in accordance with the Endangered Species Act" (10 CFR 51.53). The NRC will request an informal consultation with your office at a later date under Section 7 of the Endangered Species Act. By contacting you early in the application process, we hope to identify any issues that need to be addressed or any information your office may need to expedite the NRC consultation.

Wisconsin Public Service Corporation (WPSC) was the majority owner of KPS from 1973 until 2005, at which time ownership of the plant was transferred to DEK. Operating authority was also transferred from the Nuclear Management Company to DEK at that time. In addition, WPSC transferred ownership of its transmission lines in 1999 to American Transmission Company (ATC), a multi-state company that owns, maintains, and operates electricity transmission equipment.

Kewaunee Power Station lies on the western shore of Lake Michigan in Kewaunee County, Wisconsin, approximately 25 miles east-southeast of Green Bay (see attached Figure 2.1-1). The KPS site proper encompasses approximately 908 acres, most of which is leased agricultural land, open fields and scattered woodlots. The plant itself, along with support buildings, parking lots and the switchyard, comprise approximately 60 acres. One 345-kV transmission line and two 138-kV transmission lines were built to connect KPS to the regional grid (see Figure 3.1-2). An additional 345-kV transmission line connects KPS to the Point Beach Nuclear Plant sub-station. These transmission lines, owned and maintained by ATC, total approximately 80 miles and cross portions of Brown, Kewaunee, Manitowoc, and Outagamie counties.

Based on a review of historical documents and information on the Wisconsin Department of Natural Resources website (county records of "rare, threatened, and endangered species"), no Federally-listed species are known to occur on the KPS site proper or within/along approximately 80 miles of associated transmission corridors. As noted above, DEK does not own or maintain the transmission lines that

connect KPS to the regional grid, and is not involved in vegetation management in the associated transmission corridors.

Two listed bird species, the bald eagle (*Haliaeetus leucocephalus*) and the piping plover (*Charadrius melodus*), have been recorded in the four counties associated with KPS and its transmission lines. Bald eagles are relatively common in western and central Wisconsin, particularly along the Mississippi and Wisconsin Rivers. They are less common in southeastern Wisconsin in the more populous counties that border Lake Michigan. The bald eagle is reported to nest in Brown, Manitowoc, and Outagamie Counties. Bald eagles have been observed occasionally in the general vicinity of KPS by site personnel, but are not believed to nest in the area.

Piping plovers have historically nested in small numbers along the Lake Superior shoreline, but have not nested successfully along the Wisconsin shore of Lake Michigan in a half-century. Small numbers of migrants (1-4 birds) are seen each spring migrating along the western shore of Lake Michigan. Approximately 5 miles of Lake Michigan shoreline in the nearby Point Beach State Forest (8 miles south of KPS) was designated critical habitat for the Great Lakes population of piping plover in May 2001 (66 FR 22938) because the beach area "includes areas of suitable piping plover nesting habitat." One piping plover was observed in the Point Beach State Forest in the spring of 2001. No nesting has been documented in that area and no plovers have been observed on the KPS shoreline property.

In addition to the bald eagle and piping plover, two federally-listed plants are found in Brown and Manitowoc Counties: the dune (or pitcher's) thistle (*Cirsium pitcheri*) and the dwarf lake iris (*Iris lacustris*). Neither was observed by site personnel during recent (2006) surveys of the KPS property and neither is likely to be found inland along KPS-associated transmission corridors. Two federally-listed insects are reported in Kewaunee and Outagamie Counties: Hine's emerald dragonfly (*Somatochlora hineana*) and Karner blue butterfly (*Lycaeides melissa samuelis*), respectively. Neither has been observed on the KPS property.

Maintenance activities necessary to support license renewal would be expected to be limited to previously disturbed areas. No additional land disturbance would be anticipated in support of license renewal. As a consequence, we believe that operation of KPS over the license renewal term (an additional 20 years) would not adversely affect any threatened or endangered species.

Please call Mr. Richard Gallagher at telephone number (860) 447-1791, ext. 3876 if you have any questions or require any additional information. After your review, we would appreciate your sending a letter detailing any concerns you may have about any listed species or critical habitat in the area or concurring with DEK that operation of KPS over the license renewal term would have no effect on any threatened or endangered species. DEK will include a copy of this letter and your response in the Environmental Report that will be submitted to the NRC as part of the KPS license renewal application.

Very truly yours,

DOMINION ENERGY KEWAUNEE , INC.

Pamela F. Faggert

Pamela F. Faggert
Vice President and Chief Environmental Officer

2/14/07
Date

Enclosure: Figure 2.1-1 (50-Mile Radius)
Figure 3.1-2 (Transmission Line)

# United States Department of the Interior

FISH AND WILDLIFE SERVICE

Green Bay ES Field Office
2661 Scott Tower Drive
New Franken, Wisconsin 54229-9565
Telephone 920/866-1717
FAX 920/866-1710

March 15, 2007

Ms. Pamela F. Faggert
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

re: Proposed Relicensing Review
Kewaunee Nuclear Power Station
Kewaunee County, Wisconsin

Dear Ms. Faggert:

The U.S. Fish and Wildlife Service (Service) has received your letter dated February 14, 2007, with a review of the potential impacts of the proposed action on federally listed species and a request for concurrence. The project site is the Kewaunee Nuclear Power Station (plant) and associated transmission lines in Kewaunee County, Wisconsin. We have reviewed the attached information and our comments follow.

Your letter includes a determination that the bald eagle (*Haliaeetus leucocephalus*), while occasionally observed near the plant, it is not believed to nest in the general area. The letter also states that the pitcher's thistle (*Cirsium pitcheri*) and dwarf lake iris (*Iris lacustris*) have not been observed at the property. Although the species have been recorded in Outagamie and/or Kewaunee Counties, there is no habitat at the project site for the Hine's emerald dragonfly (*Somatochlora hineana*) and Karner blue butterfly (*Lycaeides melissa samuelis*). The Service agrees that none of the species noted above are known to reproduce or occur (other than incidentally) at the project site.

Your letter states that piping plovers (*Charadrius melodus*) have not been observed on the plant property. Although the piping plover does not currently occur in the project area, that factor by itself does not support a determination that the re-licensing would have no effect on the plover. The Great Lakes population of the piping plover has been significantly expanding its numbers and its range over the past few years. Several pairs of piping plovers nested successfully on Lake Superior in Wisconsin last year and there were several sightings of plovers along the Lake Michigan shoreline in Wisconsin late last summer. However, during a conversation on March 15, 2007, with Mr. Richard Gallagher, of your firm, he described the beach habitat on the southern portion of plant property as narrow and unsuitable for nesting plovers, and the habitat on the north as marginal, with significant encroachment of vegetation. Should habitat conditions

become more suitable during the term of the new license and one or more plover pairs attempt to nest at the site, Mr. Gallagher described human activity in the beach area as minimal. The additional information provided by Mr. Gallagher regarding the habitat conditions and activities along the beach area support your statement the re-licensing would not affect the plover.

While these comments are current as of the date of this letter, please be aware that over time, habitats at or near the project site may be utilized by listed or proposed species not present at this time. Further, fish, wildlife or plant species occurring within the project area may become federally-listed as threatened or endangered or proposed for listing; it also is possible that critical habitat could be proposed or designated for a species. Therefore, if the project or operations of the project in the natural areas surrounding the plant or transmission lines are significantly modified, an updated review of the project should be conducted.

As this project involves a Federal action (i.e., authorization), the Nuclear Regulatory Commission (NRC), or its designated agent, is responsible or its designated agent, is responsible for making a determination under Section 7 of the Endangered Species Act of 1973, as amended (ESA), as to whether the selected project alternative may affect federally-listed threatened or endangered species or designated critical habitat. If the NRC or its designated agent determines that there are no federally listed species or designated critical habitat present in or near the project area, or that the project would have no effect on federally listed species or designated critical habitat, concurrence from the Service is not required. In such instances, we recommend that the NRC or its agent document how that determination was reached and include that information in the project file for the Record of Decision.

If the proposed project may affect, but is unlikely to adversely affect federally-listed threatened or endangered species or designated critical habitat, the NRC obtain written concurrence from our office. If the project may affect, and is likely to adversely affect federally-listed species or adversely modify designated critical habitat, the NRC must initiate formal consultation with the Service in accordance with section 7 of the ESA. Further information on the section 7 consultation process can be obtained by contacting the staff person identified at the end of this letter.

We appreciate the opportunity to respond. Questions pertaining to these comments can be directed to Ms. Leakhena Au at 920-866-1734.

Sincerely,

Jack A. Hicks

for Louise Clemency
Field Supervisor

Pamela F. Faggert
Vice President and Chief Environmental Officer
Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, Virginia 23060
Phone: 804-273-3467

Dominion

February 14, 2007

Ms. Shari Koslowsky
Office of Energy
Wisconsin Department of
Natural Resources
101 S. Webster Street
Box 7921
Madison, WI 53707-7921

SUBJECT: Kewaunee Power Station
Request for Information on Threatened or Endangered Species

Dear Ms. Koslowsky:

Dominion Energy Kewaunee, Inc. (DEK), a subsidiary of Dominion Resources, Inc., is preparing an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license for the Kewaunee Power Station (KPS). The current operating license for the station will expire in 2013. As part of the license renewal process, the NRC requires license applicants to "assess the impact of the proposed action on threatened or endangered species in accordance with the Endangered Species Act" (10 CFR 51.53). The NRC will request an informal consultation with your office at a later date under Section 7 of the Endangered Species Act. By contacting you early in the application process, we hope to identify any issues that need to be addressed or any information your office may need to expedite the NRC consultation.

Wisconsin Public Service Corporation (WPSC) was the majority owner of KPS from 1973 until 2005, at which time ownership of the plant was transferred to DEK. Operating authority was also transferred from the Nuclear Management Company to DEK at that time. In addition, WPSC transferred ownership of its transmission lines in 1999 to American Transmission Company (ATC), a multi-state company that owns, maintains, and operates electricity transmission equipment.

Kewaunee Power Station lies on the western shore of Lake Michigan in Kewaunee County, Wisconsin, approximately 25 miles east-southeast of Green Bay (see attached Figure 2.1-1). The KPS site proper encompasses approximately 908 acres, most of which is leased agricultural land, open fields and scattered woodlots. The plant itself, along with support buildings, parking lots and the switchyard, comprise approximately 60 acres. One 345-kV transmission line and two 138-kV transmission lines were built to connect KPS to the regional grid (see Figure 3.1-2). An additional 345-kV transmission line connects KPS to the Point Beach Nuclear Plant sub-station. These transmission lines, owned and maintained by ATC, total approximately 80 miles and cross portions of Brown, Kewaunee, Manitowoc, and Outagamie counties.

Based on a review of historical documents and information on the Wisconsin Department of Natural Resources website (county records of "rare, threatened, and endangered species"), no Federally-listed species are known to occur on the KPS site proper or within/along approximately 80 miles of associated transmission corridors. As noted above, DEK does not own or maintain the transmission lines that connect KPS to the regional grid, and is not involved in vegetation management in the associated transmission corridors.

Two listed bird species, the bald eagle (*Haliaeetus leucocephalus*) and the piping plover (*Charadrius melodus*), have been recorded in the four counties associated with KPS and its transmission lines. Bald eagles are relatively common in western and central Wisconsin, particularly along the Mississippi and Wisconsin Rivers. They are less common in southeastern Wisconsin in the more populous counties that border Lake Michigan. The bald eagle is reported to nest in Brown, Manitowoc, and Outagamie Counties. Bald eagles have been observed occasionally in the general vicinity of KPS by site personnel, but are not believed to nest in the area.

Piping plovers have historically nested in small numbers along the Lake Superior shoreline, but have not nested successfully along the Wisconsin shore of Lake Michigan in a half-century. Small numbers of migrants (1-4 birds) are seen each spring migrating along the western shore of Lake Michigan. Approximately 5 miles of Lake Michigan shoreline in the nearby Point Beach State Forest (8 miles south of KPS) was designated critical habitat for the Great Lakes population of piping plover in May 2001 (66 FR 22938) because the beach area "includes areas of suitable piping plover nesting habitat." One piping plover was observed in the Point Beach State Forest in the spring of 2001. No nesting has been documented in that area and no plovers have been observed on the KPS shoreline property.

In addition to the bald eagle and piping plover, two federally-listed plants are found in Brown and Manitowoc Counties: the dune (or pitcher's) thistle (*Cirsium pitcheri*) and the dwarf lake iris (*Iris lacustris*). Neither was observed by site personnel during recent surveys (2006) of the KPS property and neither is likely to be found inland along KPS-associated transmission corridors. Two federally-listed insects are reported in Kewaunee and Outagamie Counties: Hine's emerald dragonfly (*Somatochlora hineana*) and Karner blue butterfly (*Lycaeides melissa samuelis*), respectively. Neither has been observed on the KPS property.

In addition, by letter dated July 21, 2006, DEK requested information from your office in connection with the Kewaunee independent spent fuel storage project; your office responded by letter dated September 5, 2006. For your information, a threatened and endangered species evaluation is being performed in this area. Thus far, no species have been determined to be present. The evaluation is expected to be completed in the spring.

Also in response to the September 5, 2006 letter, an ongoing site ecological survey was performed that concentrated on the species listed in the letter. As has been communicated to your office, we have determined the presence of a state Special Concern plant species and state listed bird species. These species can be expected to continue to be unaffected by future operations.

Maintenance activities necessary to support license renewal would be expected to be limited to previously disturbed areas. No additional land disturbance would be anticipated in support of license renewal. As a consequence, we believe that operation of KPS over the license renewal term (an additional 20 years) would not adversely affect any threatened or endangered species.

Please call Mr. Richard Gallagher at telephone number (860) 447-1791, ext. 3876 if you have any questions or require any additional information. After your review, we would appreciate your sending a letter detailing any concerns you may have about any listed species or critical habitat in the area, or

concurring with DEK that operation of KPS over the license renewal term would have no effect on any threatened or endangered species. DEK will include a copy of this letter and your response in the Environmental Report that will be submitted to the NRC as part of the KPS license renewal application.

Very truly yours,

DOMINION ENERGY KEWAUNEE , INC.

Pamela F. Faggert

Pamela F. Faggert
Vice President and Chief Environmental Officer

2/14/07
Date

Enclosure: Figure 2.1-1 (50-Mile Radius)
Figure 3.1-2 (Transmission Line)

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Scott Hassett, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
Telephone 608-266-2621
FAX 608-267-3579
TTY 608-267-6897

19 April 2007

Pamela Faggert
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

SUBJECT: Endangered Resources Review (ERIR Log # 07-082)
Kewaunee Power Station

Dear Ms. Faggert:

The Office of Energy (OE) has reviewed your correspondence dated 14 February 2007 requesting endangered resources information and concerns related to the "proposed action" (i.e., operation of the Kewaunee Power Station).

The area identified in Figure 3.1-2 of your correspondence is large and license renewal is anticipated in 2013. As you might understand, identifying our concerns on this spatial and time scale present some ambiguities. I would recommend that you continue to refer to the Natural Heritage Inventory County Maps available to get a gross indication of the nature and magnitude of any large-scale indirect impacts that may result from the facility.

For any direct impacts related to existing or proposed construction, there is no new information recorded in the Natural Heritage Inventory (NHI) beyond that already cited in your 14 February correspondence for occurrences within 2 miles of the facility. This list is valid for one year and should be updated prior to license renewal or subsequent construction at the site. Although Dominion does not own or operate the connecting transmission facilities, it is important to consider the cumulative impacts that this may have on endangered resources insofar as activities at the power plant may in turn result in changes to those facilities.

On page 2, paragraph 6 you indicated that future operations would not affect the two species identified during the ecological surveys. The plant species was identified outside the facility area. We encourage Dominion to protect this population on their property. The bird species is located within the facility boundary and we caution that activities at the plant may affect this species if they are proximate to the nest or unusual with respect to existing conditions.

Occurrences are only in the NHI if the appropriate surveys have been completed and the observation was reported to the Department. As a result, our data files may be incomplete. The lack of additional known occurrences does not preclude the possibility that other endangered resources may be present.

**This letter is for informational purposes and only addresses endangered resource issues. This letter does not constitute Department of Natural Resources authorization of the proposed project and does not exempt the project from securing necessary permits and approvals from the Department.**

Please contact me at 608.261.4382 if you have any questions about this information.

Sincerely,

Shari Koslowsky
Office of Energy, G3/OE

CC: BER (electronic file)
Joe Henry, NER

# ATTACHMENT D

# CULTURAL RESOURCE CORRESPONDENCE

Pamela F. Faggert
Vice President and Chief Environmental Officer

Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, Virginia 23060
Phone: 804-273-3467

Dominion

February 14, 2007

Mr. Sherman Banker
Wisconsin Historical Society
816 State Street
Madison, Wisconsin 53706-1482

Subject: License Renewal Application for Kewaunee Power Station
Request for Information on Historical/Archeological Resources

Dear Mr. Banker:

Dominion Energy Kewaunee, Inc. (DEK), a subsidiary of Dominion Resources, Inc., is preparing an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license for the Kewaunee Power Station (KPS). The current operating license for the station will expire in 2013. The renewal term would be for an additional 20 years beyond the original license expiration date.

As part of the license renewal process, the NRC requires license renewal applicants to assess whether any historical or archeological resources will be affected by the proposed project. The NRC will request an informal consultation with your office at a later date under Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470) and the Federal Advisory Council on Historic Preservation regulations (36 CFR 800). By contacting you early in the application process, we hope to identify any issues that need to be addressed or any information your office may need to expedite the NRC consultation.

KPS lies on the western shore of Lake Michigan in Kewaunee County, Wisconsin, approximately 25 miles east-southeast of Green Bay (see attached Figure 2.1-1). The KPS site proper encompasses approximately 908 acres, most of which is leased agricultural land, open fields and scattered woodlots. The plant itself, along with support buildings, parking lots and the switchyard, comprise approximately 60 acres. The Sandy Bay Cemetery, a 1.13-acre site located within the KPS boundary, is owned by the town of Carlton, with perpetual care provided by the town. One 345-kV transmission line and two 138-kV transmission lines were built to connect KPS to the regional grid (see Figure 3.1-2). An additional 345-kV transmission line connects KPS to the Point Beach Nuclear Plant sub-station. These transmission lines, owned and maintained by the American Transmission Company, total approximately 80 miles and cross portions of Brown, Kewaunee, Manitowoc, and Outagamie counties.

KPS was built on a vast forested area that was buried by the Valderan glacier about 12,400 years ago. The buried forest is of scientific interest, but is not unique to the plant site. The Two Creeks Buried Forest unit of the Ice Age National Scientific Reserve is located south of the KPS property. The Reserve is part of the national park system, and provides public access to remnants of the buried forest.

As of 2006, 19 properties in Manitowoc County and 9 properties in Kewaunee County have been listed in the National Register of Historic Places. Of these 28 properties, none fall within the 6-mile radius of KPS

(Figure 2.1-2). We will provide all of this information to the NRC to aid in their evaluation of the License Renewal Application.

DEK is committed to the conservation of significant historical or archeological resources, and expects that operation of KPS through the license renewal period (an additional 20 years) would not adversely affect any listed resources. Maintenance activities necessary to support license renewal would be expected to be limited to previously disturbed areas. No additional land disturbance would be anticipated in support of license renewal. As a consequence, operation of the plant, including maintenance of transmission lines, over the license renewal term will not adversely affect any historical or archeological resources.

Currently, KPS is preparing to install an on-site dry cask spent fuel storage facility, independent of the license renewal process. This installation is primarily on previously disturbed land, but would include a small area of previously undisturbed land. As part of this project, KPS retained an archaeological services firm to conduct a survey of the area. No artifacts were discovered during this survey. When it becomes available, the survey report will be sent to your office for your information.

This letter is to solicit your input into the identification of any issues related to historical or archeological resources at KPS and associated facilities that you believe may need to be addressed. Once the License Renewal Application is submitted, you will be contacted by the NRC to assess any impacts this license renewal would have on issues concerning the Wisconsin Historical Society and other agencies.

Your response regarding any effects license renewal may have on historical or archeological resources would be greatly appreciated. To ensure that your written comments are included in our application filing with the NRC, we would appreciate your response to us by June, 2007. If there are any concerns that need to be addressed regarding historical or archeological resources, please let us know as soon as possible. We will include a copy of this letter and, if available, your response as part of our License Renewal Application.

Please contact Mr. Richard Gallagher at telephone number (860) 447-1791, ext. 3876 if you have any questions or require any additional information.

Very truly yours,

DOMINION ENERGY KEWAUNEE , INC.

Pamela F. Faggert — 2/14/07

Pamela F. Faggert
Vice President and Chief Environmental Officer

Date

Enclosure: Figure 2.1-1 (50-Mile Radius)
Figure 2.1-2 (6-Mile Radius)
Figure 3.1-2 (Transmission Line)

WISCONSIN HISTORICAL SOCIETY

Headquarters Building
816 State Street
Madison, WI 53706-1482
608-264-6400

February 26, 2007

Ms. Pamela F. Faggert
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

RE: License Renewal Application For Kewaunee Power Station

**Project Submittal Rejection Notification**

In prior correspondence, we advised all federal agencies that the Wisconsin § 106 review process had changed as of August 1, 2002. The materials you recently submitted for our review do not comply with our new process guidelines.

For detailed information on the new process, please visit the Office of Preservation Planning's "The Wisconsin NHPA § 106 Review Process" web site at:

http://www.wisconsinhistory.org/hp/protecting/106_intro.asp

It may be necessary to obtain the services of a qualified consultant to complete this research. When the necessary research has been completed, sign and date the form, and return it to our office for review and comment.

For specific questions about this issue, please contact Dan Duchrow by email at Daniel.Duchrow@wisconsinhistory.org or by telephone at (608) 264-6505.

Thank you for your attention to this matter.

Pamela F. Faggert
Vice President and Chief Environmental Officer
Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, Virginia 23060
Phone: 804-273-3467

Dominion®

Mr. Sherman Banker
Wisconsin Historical Society
816 State Street
Madison, Wisconsin 53706-1482

Subject: License Renewal Application for Kewaunee Power Station
Request for Information on Historical/Archeological Resources

Dear Mr. Banker:

By letter dated February 14, 2007, Dominion Energy Kewaunee, Inc. (DEK), a subsidiary of Dominion Resources, Inc., informed you that it is preparing an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license for the Kewaunee Power Station (KPS). The current operating license for the station will expire in 2013. The renewal term would be for an additional 20 years beyond the original license expiration date.

By letter from you dated February 26, 2007, Dominion was informed of a new process for addressing issues associated with Section 106 of the National Historic Preservation Act. Attached please find "Request for SHPO Comment and Consultation on a Federal Undertaking," along with a Phase I Archaeological Survey performed on the project site.

As stated in the February 14 letter discussed above, the NRC will request an informal consultation with your office at a later date. By contacting you early in the application process, we hope to identify any issues that need to be addressed or any information your office may need to expedite the NRC consultation.

Your response regarding any effects license renewal may have on historical or archeological resources would be greatly appreciated. To ensure that your written comments are included in our application filing with the NRC, we would appreciate your response to us by December, 2007. If there are any concerns that need to be addressed regarding historic or archeological resources, please let us know as soon as possible.

Please contact Mr. Richard Gallagher at telephone number (860) 447-1791, ext. 3876 if you have any questions or require any additional information.

Very truly yours,

DOMINION ENERGY KEWAUNEE , INC.

Pamela F. Faggert — 10/31/07

Pamela F. Faggert — Date

Pamela F. Faggert
Vice President and Chief Environmental Officer
Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, Virginia 23060
Phone: 804-273-3467

Dominion

October 3, 2007

Mr. Harold G. Frank, Chairman
Forest County Potawatomi Community of Wisconsin
P. O. Box 340
Crandon, Wisconsin 54520

Subject: License Renewal Application for Kewaunee Power Station
Request for Comments

Dear Mr. Frank:

Dominion Energy Kewaunee, Inc. (DEK) is preparing an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license for the Kewaunee Power Station (KPS). The current operating license for the station will expire in 2013. The renewal term would be for an additional 20 years beyond the original license expiration date.

KPS lies on the western shore of Lake Michigan in Carlton township, Kewaunee County, Wisconsin, approximately 25 miles east-southeast of Green Bay (see attached Figure 2.1-1). The KPS site proper encompasses approximately 908 acres, most of which is leased agricultural land, open fields and scattered woodlots. The plant itself, along with support buildings, parking lots and the switchyard, comprise approximately 60 acres.

As the chairman of a Native American community with historic ties to the area, we are writing to make you aware of our pending application, so that you have the opportunity to comment on the project. As you are undoubtedly aware, the town of Carlton is where Black Earth, a significant Potawatomi village and the birthplace of Chief Simon Kahquados, is located. Black Earth was located approximately three and one half miles west of the KPS site, on what is now the East Twin River. It is also the burial ground of War Thunder. It is our understanding that members of the tribe would spend some time each year to the north of the plant itself, using the area as a base for fishing.

DEK is committed to the conservation of significant historical or archeological resources; therefore, operation of KPS through the license renewal period (an additional 20 years) will not adversely affect such resources. During this year, an archaeological resource survey was performed on site by a professional archaeological research firm. With the exception of eight scattered arrowheads/arrowhead fragments (which were left in place), no Native American artifacts were discovered. Further, maintenance activities necessary to support license renewal would be expected to be limited to previously disturbed areas. Additionally, the Dominion procedure for land disturbing activities contains stop-work instructions in the event historic/archaeological artifacts are discovered. As a consequence, operation of the plant over the license renewal term will not adversely affect any historical or archeological resources.

This letter is to solicit your input into the identification of any issues related to historical or archeological resources at KPS and associated facilities that you believe need to be addressed. Your response regarding any effects license renewal may have on historical or archeological resources would be greatly appreciated. To ensure that your written comments are included in our application filing with the NRC,

we would appreciate your response to us by December, 2007. If there are any concerns that need to be addressed regarding historical or archeological resources, please let us know as soon as possible. We will include a copy of this letter and, if available, your response as part of our License Renewal Application.

Please contact Mr. Richard Gallagher at telephone number (860) 447-1791, ext. 3876 if you have any questions or require any additional information.

Very truly yours,

DOMINION ENERGY KEWAUNEE, INC.

Pamela F. Faggert 10/3/07

Pamela F. Faggert Date

Enclosure: Figure 2.1-1 (50-Mile Radius)

# ATTACHMENT E

## CONSISTENCY CERTIFICATION WITH WISCONSIN COASTAL MANAGEMENT PROGRAM

# ATTACHMENT E

# CONSISTENCY CERTIFICATION WITH WISCONSIN COASTAL MANAGEMENT PROGRAM

Dominion Energy Kewaunee (DEK) is applying to the Nuclear Regulatory Commission (NRC) for renewal of the Kewaunee Power Station (KPS) license to operate for an additional 20 years (2013 to 2033). KPS became a merchant generating plant when it was acquired by Dominion in 2005. KPS operations during the license renewal term would be essentially a continuation of current operations as described below, with no changes that would affect Wisconsin's coastal zone.

## CONSISTENCY CERTIFICATION

The proposed activity (operation of KPS during the license renewal period) complies with the policies of Wisconsin's approved Coastal Management Program and will be conducted in a manner consistent with such policies. Attachment 1 lists these policies and discusses for each the applicability to KPS and status of compliance.

The following sections provide additional supporting information: a detailed description of the project; an assessment of the probable coastal zone effects; and findings indicating that the proposed project, its associated facilities, and their effects, are consistent with Wisconsin's coastal management policies.

## PROJECT DESCRIPTION

### Location, Setting, and General Plant Description

KPS is a one-unit generating plant that began commercial operation on June 16, 1974, pursuant to NRC Operating License DPR-43, which will expire on December 21, 2013. The generating plant is a pressurized water reactor with a gross electrical rating of 590 megawatts. Dominion is applying for renewal of the operating license for an additional 20 years. This license renewal does not involve siting of new generating capacity or development or alteration of Lake Michigan shoreline. In addition, Dominion has identified no refurbishment activities necessary to allow an additional 20 years of operation, and has identified no significant environmental impacts from programs and activities for managing the effects of aging. As such, renewal would result in a continuation of environmental impacts currently regulated by the state. Table 9-1 lists licenses, permits, and other environmental authorizations for current KPS operations and Table 9-2 identifies compliance activities associated specifically with NRC license renewal.

KPS is located on the west-central shore of Lake Michigan in Kewaunee County, Wisconsin, approximately 30 miles east-southeast of Green Bay (Figure 2.1-1, 50-mile vicinity). The region around the site is sparsely populated except for an area to the south where it is industrialized near Two Rivers and Manitowoc, and to the west in the Fox River Valley (Figure 2.1-1). The total plant site is 908 acres, and is bisected by Wisconsin State Route 42. Approximately 450 acres, mostly west of Route 42, is leased to area farmers. The remainder of the site is a combination of small forested plots, old fields in various stages of succession, small wetlands and watercourses, and the industrial plant complex. The site has approximately 2 miles of Lake Michigan shoreline, with steep bluffs along the northern and southern shorelines and more gradual sloping along the center

shoreline where the power plant is located. Three creeks and one drainage ditch drain the KPS lands to the lake.

The plant complex (Figure 2.1-3) is approximately 60 acres adjoining Lake Michigan and includes the facility buildings, parking areas, and switchyard. The major structures are the Reactor Containment Vessel, the Shield Building, the Turbine Building, the Auxiliary Building, the Screenhouse, and the Technical Support Center. Other buildings at KPS include the Access Building, the Office/Warehouse Annex, a sewage treatment facility and the Administration and Training Facility. In addition, the property has a landfill that was used to dispose of excavation and construction debris at the time of the plant's construction.

**Cooling and Auxiliary Water Systems**

KPS utilizes a once-through cooling system that draws water from and discharges to Lake Michigan. The cooling system removes waste heat from the condensers, as well as other plant equipment, and discharges through a structure into the shallow bottom of Lake Michigan. The normal flow rate at the condenser with both circulating water pumps running is approximately 400,000 gallons per minute (gpm).

The intake structure is located approximately 1,600 feet from the shore in a water depth of approximately 15 feet. The intake consists of a submerged cluster of three vertical 22-foot diameter inlets with trash grilles of 2 feet by 2 feet. The trash grilles are provided with re-circulated water to remove any ice formations. During winter operation the inlet crib and auxiliary inlets are below the ice blanket and are at least 450 feet outboard of maximum windrow ice development.

The plant intake is equipped with two auxiliary water intake tees 50 and 100 feet shoreward of the intake crib. Each tee has a 30-inch opening rising vertically to 1 foot above the lake bottom at Elevation 559 feet±. Special screened cover plates are suspended 12 inches above the intake openings to minimize entrainment of debris. Each auxiliary water intake can supply water in excess of 24,000 gpm.

The 10-foot diameter steel intake pipe carries the water to a 56.5-foot by 25-foot forebay with an overflow weir whose crest is at Elevation 582.5 feet. The weir has a bottom length of 38.5 feet and side slopes of 45 degrees. The forebay normal water surface with two pumps in operation at normal lake levels is 570.0 feet and with one pump in operation it is 575.0 feet. From the forebay, water passes through four 10-foot wide by 36-foot long traveling screens with a mesh size of 3/8 inch. Normal operation is with one or two circulating water pumps and two or three service water pumps operating. Water velocity through the traveling screens is less than 2.4 feet per second at the low water depth.

Circulating water is returned to the lake through a 10-foot diameter discharge tunnel to a discharge structure with sheet piling walls and a concrete floor slab. Recirculating water for de-icing the inlet grilles is taken from the 10-foot diameter discharge line by a recirculating water pump. A 30-inch recirculating water line is provided to recirculate water directly to the traveling screen inlet to prevent ice formation and to provide an auxiliary intake for the service water system if the normal intake is unavailable. Traveling screen backwash water, fish, and debris are sent to the discharge via this line.

A hypochlorinating system is provided to intermittently inject sodium hypochlorite into the condenser inlet waterboxes to prevent the build-up of bacterial slime on the condenser tubes and zebra mussels in the system.

**Wastewater Treatment and Discharge**

KPS operates an onsite sewage treatment plant. Sewage from plant facilities drains by gravity to two lift stations. The lift stations use air to transfer the sewage from the lift station up to a 5000-gallon equalization chamber. Prior to entering this tank, the sewage passes through a comminutor. Air is used to keep the sewage in the equalization chamber mixed. From the equalization chamber the sewage is pumped to a mixed liqueur aeration tank. Air is pumped into this tank to facilitate aerobic digestion of the sewage. From the mixed liqueur aeration tank the sewage goes to a clarifier. Sludge generated in the aerobic digestion process settles to the bottom of the clarifier and is returned to the mixed liqueur tank. Periodically some of this sludge is transferred to the sludge holding tank where it is concentrated and sent to the Green Bay sewage plant for disposal. The clear water in the clarifier passes over a weir to a chlorine contact chamber (Note: chlorination is not actually required or performed in this plant). From the chlorine contact chamber the clear water drains directly to the unnamed tributary located immediately north of the sewage treatment plant.

**Spent Nuclear Fuel Storage**

KPS has two storage pools inside the plant with storage capacity for 990 fuel assemblies. DEK has constructed a dry fuel storage facility in accordance with a general license issued by NRC. The dry fuel site is north of the plant.

**Transmission Lines**

The major transmission lines required for the plant are two 345 kV lines for connection to the North Appleton and Point Beach substations and two 138 kV lines 8.2 and 16.2 miles in length. The corridors for these lines involve 1066 acres of land. The substation, switchyards and transmission towers occupy approximately 10 acres. Land along the transmission right-of-way is farmland (84%), woodland (7%), wetlands (2%), and scrubland (7%).

**Impacts Assessment**

The NRC has prepared a Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants (Ref. E-11) that describes the impacts that nuclear power plant license renewal could have on the environment and codified its findings (10 CFR 51, Subpart A, Appendix B, Table B-1). NRC based its assessment of license renewal impacts on its evaluation of impacts from current plant operations. The NRC codification and the GEIS discuss the following types of environmental issues:

- Surface water quality, hydrology, and use
- Aquatic ecology
- Groundwater use and quality
- Terrestrial resources
- Air quality
- Land use

- Human health
- Postulated accidents
- Socioeconomics
- Uranium fuel cycle and waste management
- Decommissioning

The codification identified 92 potential environmental issues, 69 of which the NRC identified as having small impacts regardless of the plant being evaluated and termed "Category 1" issues. NRC defines "small" as:

Small – For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purpose of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small as the term is used in this table (10 CFR 51, Subpart A, Appendix B, Table B-1)

In its decision-making for plant-specific license renewal applications, absent new and significant information to the contrary, NRC relies on its codified findings, as amplified by supporting information in the GEIS, for assessment of environmental impacts from Category 1 issues [10 CFR 51.95(c)(4)]. Dominion has adopted by reference the NRC findings and GEIS analyses for all 50[1] applicable Category 1 issues.

The GEIS identified 21 issues as "Category 2," and 2 additional ones that were assigned a category "NA". License renewal applicants must submit additional site-specific information for the 21 Category 2 issues.[2] Of these 21 issues, 11 apply to KPS[3], some with relevance to the coastal zone. The 11 applicable issues and Dominion's conclusions are listed below.

- Entrainment of fish and shellfish in early life stages – This issue addresses impact on organisms small enough to pass through the plant's circulating cooling water system. During the first years of operation, a Clean Water Act 316(b) demonstration was conducted that determined impacts were small. The WDNR concurred with that determination (Ref. E-12). On July 18, 2005, the Wisconsin Department of Natural Resources (WDNR) issued a WPDES permit to KPS (WI-00001571-06). In issuing the plant's discharge permit, Wisconsin approved the plant's intake structure as best available technology to minimize impact.

  As required by EPA's New Phase II 316(b) rules, in March 2006 Dominion initiated studies on the KPS cooling water system. In accordance with the WPDES permit, study results were scheduled to be provided to WDNR by January 7, 2008. However, in January 2007, the U.S. Court of Appeals for the Second Circuit decided large portions of EPA's rule did not comply with the Clean Water Act. On July 9, 2007, the Phase II regulation was formally suspended.

1. The remaining Category 1 issues do not apply to KPS either because they are associated with design or operational features that KPS does not have (e.g., cooling towers) or to an activity, refurbishment, that KPS will not undertake.
2. 10 CFR 51, Subpart A, Appendix B, Table B-1 also identifies 2 issues as "NA" because NRC could not come to a conclusion regarding categorization. Dominion believes that these issues, chronic effects of electromagnetic fields and environmental justice, do not affect the "coastal zone" as that phrase is defined by the Coastal Zone Management Act [16 USC 1453(1)].
3. The remaining Category 2 issues do not apply to KPS either because they are associated with design or operational features the KPS does not have (e.g., cooling towers) or to an activity, refurbishment, that KPS will not undertake.

As a result of the suspension, the WDNR modified the submittal requirements contained in the permit (Ref. E-1). Results of the impingement and entrainment field study continued to be a requirement.

EA Engineering submitted its "Impingement Mortality and Entrainment Characterization Report, Kewaunee Power Station, March 2006 – February 2007" to Dominion Resources in August 2007. With respect to entrainment, the report noted that the vast majority of organisms entrained at KPS were invertebrates (Ref. E-2). Smaller numbers of ichthyoplankton were entrained, primarily eggs and larvae of burbot, common carp, alewife, and rainbow smelt. Species whose eggs and larvae were entrained were largely those that spawn in shallow, inshore areas.

On January 4, 2008, Dominion submitted a letter containing the "Information Requirements Related to Cooling Water Intake Structures, WPDES Permit WI-000-071571" (Ref. E-3), including a copy of the Characterization Report. The submittal concluded that:

"The information provided in [the study] suggests that differences noted in impingement and entrainment estimates between 1975-1976 and 2006-2007 are attributed to differences in fish abundance near the KPS as a reflection of fish community changes in Lake Michigan in the years between the studies. Any environmental impacts to Lake Michigan fishes are still considered minimal with no additional structural or operational actions necessary at this time, pending new rule development…"

Based on the existing 316(b) demonstration and determination, and as supported by the results of the recent studies, DEK concludes that any environmental impact from entrainment of fish and shellfish in early life stages at KPS is SMALL and does not require further mitigation.

- Impingement of fish and shellfish – This issue addresses impact on organisms large enough to be caught by intake screens before passing through the plant's circulating cooling water system. The intake screenwash system washes trapped debris and fish to the lake via a discharge tunnel. The studies (both past and recent) and permit discussed in the entrainment section above also address impingement. Dominion concludes, based on the studies and on the 316(b) determination referenced above, that these impacts are SMALL during current operations and has no plans that would change this conclusion for the license renewal term.

- Heat shock – This issue addresses mortality of aquatic organisms by exposure to heated plant effluent. Heated effluent studies were conducted and concluded that "the discharge of waste from the plant has caused no harm to the representative species in the discharge zone and has no effect on the representative species immediately outside the discharge zone." WDNR concurred with this conclusion (Ref. E-5).

- Threatened or endangered species – This issue addresses effects that KPS operations could have on species listed under federal law as threatened or endangered. In analyzing this issue, Dominion has also considered species that are protected under Wisconsin law. Federal and state protected species recorded in the counties associated with KPS and associated transmission lines (Brown, Kewaunee, Manitowoc and Outagamie counties) are listed in Table 2.5-1 of the License Renewal Application Environmental Report.

Plant and transmission line maintenance practices are not expected to change significantly during the license renewal term. Current operations of KPS and vegetation management practices along transmission line rights-of-way do not affect any listed terrestrial or aquatic species or their habitat. Therefore, no adverse impacts to threatened or endangered species from current or future operations are anticipated. Dominion wrote to the WDNR and the U.S. Fish and Wildlife Service requesting information on any listed species or critical habitats that might occur on the KPS site or along the associated transmission corridors. Agency responses are provided in Appendix C of the License Renewal Application Environmental Report and indicate that license renewal is unlikely to affect any listed species.

- Electromagnetic fields, acute effects (electric shock) – This issue addresses the potential for shock from induced currents, similar to static electricity effects, in the vicinity of transmission lines. Because this strictly human-health issue does not directly or indirectly affect natural resources of concern within the Coastal Zone Management Act definition of "coastal zone" (16 USC 1453[1]), Dominion concludes that the issue is not subject to the certification requirement.

- Housing – This issue addresses impacts that additional Dominion employees required to support license renewal and the additional concomitant indirect jobs could have on local housing availability. About 705 employees work at KPS, along with approximately 30 long-term contractors. During outages the onsite workforce increases by up to 600-700 contractors for 30 to 40 days every 18 months. Dominion anticipates that no additional employees (routine operations or outage) will be needed for the license renewal period. Therefore, there would be no incremental increase to housing impacts, which are characterized as SMALL for current operations.

- Public services; public utilities, public water supply availability – This issue addresses impacts that adding license renewal workers could have on public water supply systems. Dominion anticipates that no additional employees (routine operations and outage) will be needed for the license renewal period. Additionally, KPS has its own water supply system and does not depend on a public water supply. Therefore, there would be no incremental increase to public utilities impacts, which are characterized as SMALL for current operations.

- Offsite land use – This issue addresses impacts that local government spending of tax dollars paid by the plant can have on land use patterns. KPS tax dollars disbursed by the state to Kewaunee County and the Town of Carlton comprised 3.4 percent and 69.2 percent of the revenues in 2005, respectively. If tax revenues from KPS are less than 10 percent of the total tax revenues, impacts are considered by the GEIS to be SMALL. Applying the GEIS criteria, impacts during the KPS license renewal term would be SMALL for Kewaunee County and LARGE for the Town of Carlton; however, the fact that growth in the town has been commensurate with that of the county since the plant began operations would indicate that an additional 20 years of operation would not likely result in a significant change. Therefore, impact for the town is expected to remain SMALL, and not warrant mitigation.

- Public services; transportation – This issue addresses impacts that adding license renewal workers could have on local traffic patterns. Dominion anticipates that no additional employees (routine operations or outage) will be needed for the license renewal period. Therefore, there would be no incremental increase in transportation impacts, which are characterized as SMALL for current operations.

- Historic and archaeological resources – This issue addresses impacts that license renewal activities could have on resources of historic or archaeological significance. No archaeological or historic sites on the National Register of Historic Places have been identified within 6 miles of KPS and Dominion is not currently aware of any historic or archaeological sites that are being or have been impacted by KPS operations, facility, or transmission line right-of-way management. In 2007, an archaeological survey conducted on the KPS property did not discover any significant archaeological resources. KPS does not expect current practices to change as a result of license renewal. Dominion corresponded with the State Historic Preservation Officer and has not been made aware of any issues of concern. Therefore, Dominion does not anticipate impacts to historic and archaeological resources during the renewal term.

- Severe accidents – NRC determined that the license renewal impacts from severe accidents would be SMALL, but determined that applicants should perform site-specific severe mitigation alternative analyses as part of the license renewal effort, if severe accident analyses had not been previously performed. Dominion performed the analysis and identified 14 potentially cost-beneficial SAMAs that offer a level of risk reduction. These SAMAs will be evaluated further for implementation irrespective of license renewal.

**FINDINGS**

1. NRC has found that the impacts of certain license renewal environmental issues (i.e., Category 1 issues) are SMALL. Dominion has adopted by reference NRC findings for these issues as they are applicable to KPS.

2. For other license renewal issues (i.e., Category 2) that are applicable to KPS, Dominion has determined that the environmental impacts are SMALL.

3. To the best of Dominion's knowledge, KPS is in compliance with Wisconsin's licensing and permitting requirements and is in compliance with its State-issued licenses and permits.

4. KPS's license renewal and continued operation would be consistent with the policies of the Wisconsin coastal zone management program.

## Table E-1. Environmental Authorizations for Current Operations

| Agency | Authority | Requirement | Number | Issue or Expiration Date | Activity Covered |
|---|---|---|---|---|---|
| U.S. Nuclear Regulatory Commission | Atomic Energy Act (42 USC 2011, et seq.), 10 CFR 50.10 | License to operate | DPR-43 | Expires 12/ 21/13 | Operation of KPS |
| U.S. Nuclear Regulatory Commission | 10 CFR 20.2002 | Approval | NA | Issued 11/13/95 | Disposal of contaminated WWTF sludge |
| U.S. Department of Transportation | 49 USC 5108 | Registration | 062706 552 0750Q | Expires 06/30/09 | Hazardous materials shipments |
| U.S. Environmental Protection Agency | Federal Resource Conservation and Recovery Act (42 USC 6912), Ch. 291 Wisconsin Statutes | Notification of Regulated waste Activity | EPA ID# WID00713016 | NA | Hazardous Waste Generation/ Transport |
| U.S. Army Corp of Engineers | 30 Stat. 1151; 33 U.S.C. 403, Section 10 | Permit for construction of water intake and discharge structures in Lake Michigan | NCCOD-S 69-10 | Issued 12/12/68 | Cooling water system |
| Wisconsin Department of Natural Resources | Ch. 283 Wisconsin Statutes | Permit for construction of water intake and discharge structures in Lake Michigan | 2-WP-2570 | Issued 12/04/67 | Cooling water system |
| Wisconsin Department of Natural Resources | Ch. 281 Wisconsin Statutes | Permit to construct and operate | 3430 (Note: Current WPDES permit authorizes discharges.) | Issued 11/26/85 | Sanitary sewage treatment system |

## Table E-1. Environmental Authorizations for Current Operations (Continued)

| Agency | Authority | Requirement | Number | Issue or Expiration Date | Activity Covered |
|---|---|---|---|---|---|
| Wisconsin Department of Natural Resources | Ch. 283 Wisconsin Statutes | Letter Approval (Note: Continued authorization via WPDES permit.) | NA | Issued 08/05/92 | Land spreading of WWTF Pretreatment Sludge |
| Wisconsin Department of Natural Resources | Clean Water Act (33 USC Section 1251 et seq.), Ch. 283 Wisconsin Statutes | Individual WPDES permit | WI-00001571-06 | Expires 06/30/10 | Discharges to Lake Michigan and unnamed tributary that flows into Lake Michigan: operation of cooling water intake system. |
| Wisconsin Department of Natural Resources | Clean Water Act (33 USC Section 1251 et seq.), Ch. 283 Wisconsin Statutes | General WPDES Industrial Storm Water Discharge Permit | WI-S049158-2 | Expires 03/31/06 (Authorization continues. Automatically reissued when new permit becomes available.) | Storm water runoff from industrial facilities |
| Wisconsin Department of Natural Resources | Federal Clean Air Act (42 USC 7661-7671), Ch. 285 Wisconsin Statutes | Air Pollution Control Operation Permit | 431022790-F11 (Note: DEK is considering conversion of this permit to a "Type A Registration Operation Permit," Air Pollution Control Permit Number ROP-A01, issued by the WDNR.) | Expires 06/19/07 (Note: A timely renewal application was submitted. Authorization continues under "Application shield" clause of s.285.62(8), statutes.) | Air emissions from a boiler and diesel generators |
| Wisconsin Department of Natural Resources | Chs. 280 and 281 Wisconsin Statutes | Registration | ID# 43104061 | NA | Non-transient non-community water supply registration for KPS |

## Table E-1. Environmental Authorizations for Current Operations (Continued)

| Agency | Authority | Requirement | Number | Issue or Expiration Date | Activity Covered |
|---|---|---|---|---|---|
| Wisconsin Department of Natural Resources | Ch. 281 Wisconsin Statutes | High-Capacity Well Approval | Approval #s 52802, 52803 | Issued 01/26/68 | Approval for wells with combined capacity >100,000 gpd |
| Wisconsin Department of Commerce | Ch. 101.09 Wisconsin Statutes | Aboveground Storage Tank Registration | Owner ID: 383035<br>Site ID: 679179<br>Tank ID: 463455 | NA | Aboveground storage tank |
| Wisconsin Department of Commerce | Federal Resource Conservation and Recovery Act (42 USC 6912), Ch. 101.09 Wisconsin Statutes | Underground Storage Tank Registration | Owner ID: 383035<br>Site ID: 679179<br>Tank IDs: 285236, 2852239, 406492, 771175, 978062 | Expires 05/28/06 (285236, 2852239, 978062) (Timely renewal application was submitted.)<br>Expires 10/28/08 (406492, 771175) | Underground storage tanks |
| South Carolina Department of Health and Environmental Control | South Carolina Radioactive Waste Transportation and Disposal Act (S.C. Code of Laws 13-7-110 et seq.) | Radioactive waste transport permit | 0044-48-08 | Expires 12/31/08 | Transportation of radioactive waste to disposal facility in South Carolina |
| Tennessee Department of Environment and Conservation | Tennessee Code Annotated 68-202-206 | License to ship radioactive material | T-WI003-L08 | Expires 12/31/08 | Shipments of radioactive material to processing facility in Tennessee |
| Utah Department of Environmental Quality | R313-26 of Utah Radiation Control Rules | Site Access Permit | 0704004220 | Expires 6/28/08 | Access to land disposal site |

> = greater than
gpd = gallons per day
NA = Not Applicable: one-time registration
US = United States Code
WPDES = Wisconsin Pollutant Discharge Elimination System
WWTF = Wastewater Treatment Facility

## Table E-2. Environmental Authorizations for License Renewal

| Agency | Authority | Requirement | Remarks |
|---|---|---|---|
| U.S. Nuclear Regulatory Commission | Atomic Energy Act (42 USC 2011 et seq.) | License renewal | Environmental report submitted in support of license renewal application |
| U.S. Fish and Wildlife Service (FWS) | Endangered Species Act, Section 7 (16 USC 1536) | Consultation | Requires federal agency issuing a license to consult with FWS (Attachment C) |
| Wisconsin Department of Natural Resources | Endangered and Threatened Species Laws (State Statute 29.604 & Administrative Rule NR 27) | Endangered Resources Review | Review explains what rare species, natural communities, or natural features tracked in the Natural Heritage Inventory database are found in or near the proposed project area. And any additional steps to assure compliance with the Wisconsin Endangered Species Law. (Attachment C) |
| Wisconsin Department of Natural Resources | Clean Water Act, Section 401 (33 USC 1341) | Certification | Requires State certification that proposed action would comply with Clean Water Act standards (Attachment B) |
| Wisconsin Historical Society | National Historic Preservation Act, Section 106 (16 USC 470f) | Consultation | Requires federal agency issuing a license to consider cultural impacts and consult with State Historic Preservation Officer (Attachment D) |
| Wisconsin Department of Administration | Federal Coastal Zone Management Act (16 USC 1451 et seq.) | Certification | Requires an applicant to provide certification to the federal agency issuing the license that license renewal would be consistent with the federally approved state coastal zone management program. Based on its review of the proposed activity, the State must concur with or object to the applicant's certification. (Attachment E) |

## STATE NOTIFICATION

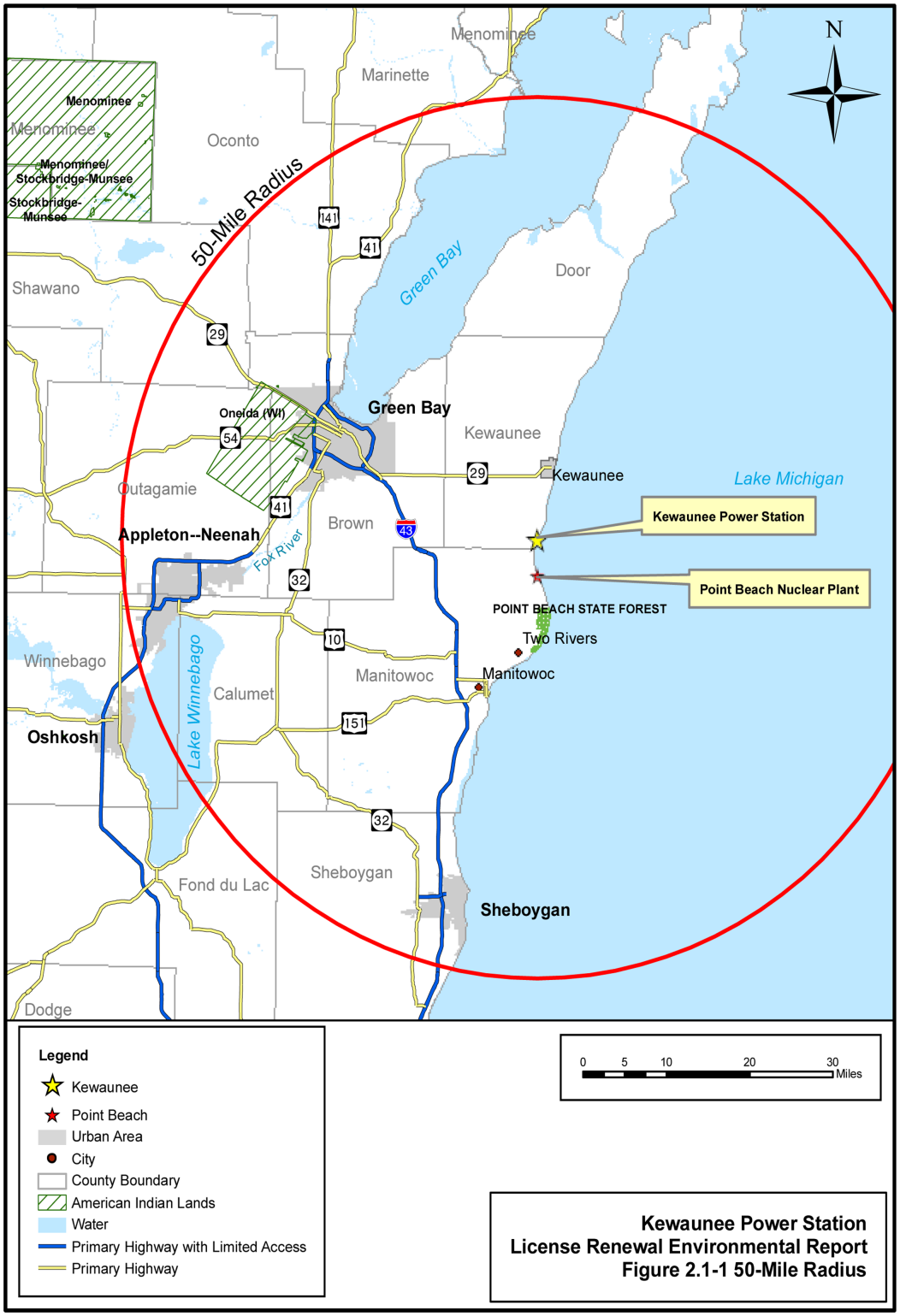
Pursuant to 16 U.S.C. § 1456(c)(3)(A) and 15 C.F.R. § 930.62(2), the State of Wisconsin is required to notify the NRC and Dominion Energy Kewaunee (DEK) at the earliest practicable time whether the State concurs with or objects to a consistency certification, and concurrence by the State is conclusively presumed if the State agency's response is not received within six months after receipt of the certification. However, pursuant to 15 CFR 930.62(b), if the State of Wisconsin has not issued a decision within three months following the commencement of State agency review, it shall notify the contacts listed below of the status of the matter and the basis for further delay. The State's concurrence, objection, or notification of review status shall be sent to:

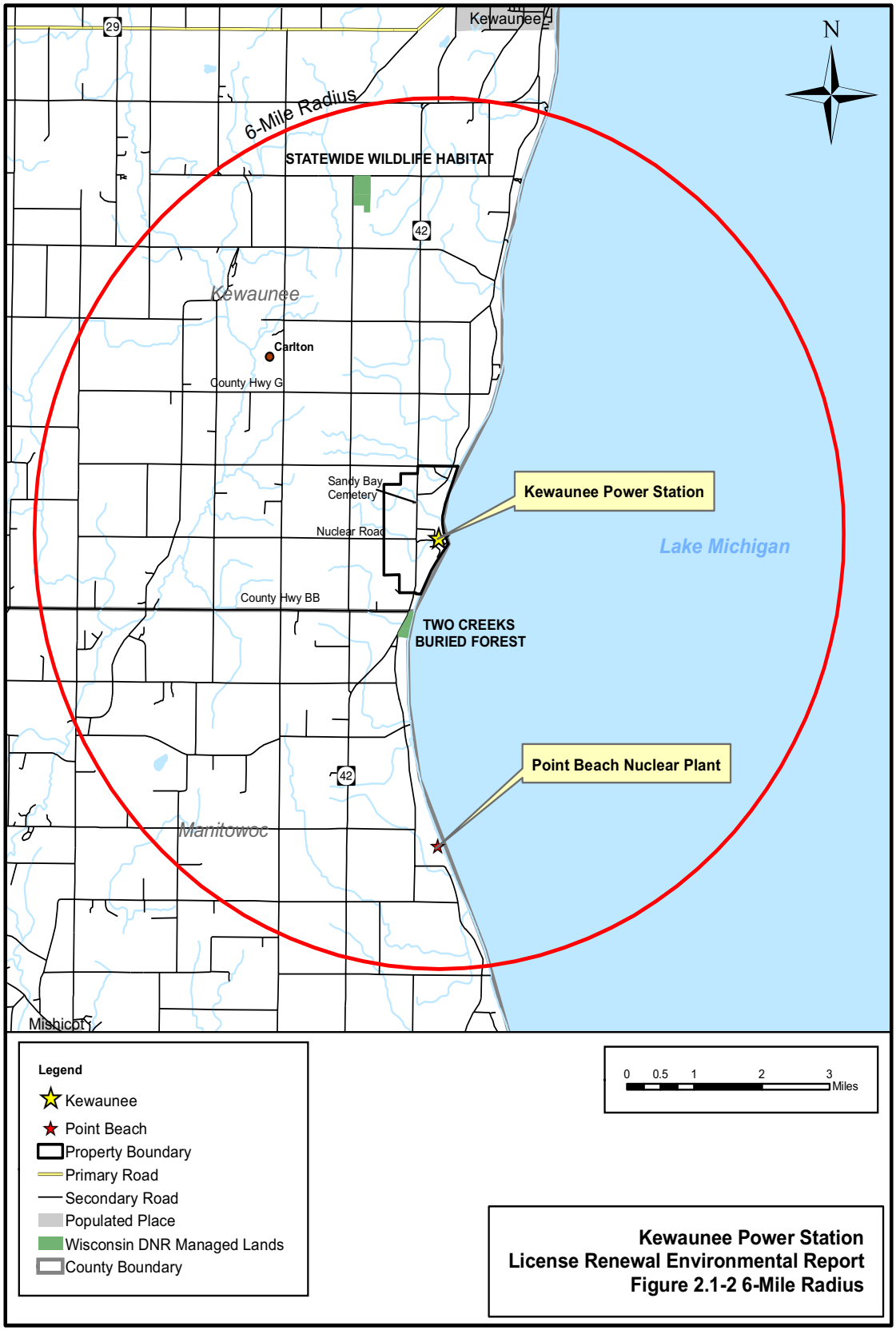
Ms. Pamela F. Faggert
Vice President and Chief Environmental Officer
Dominion
5000 Dominion Boulevard
Glen Allen, VA 23060

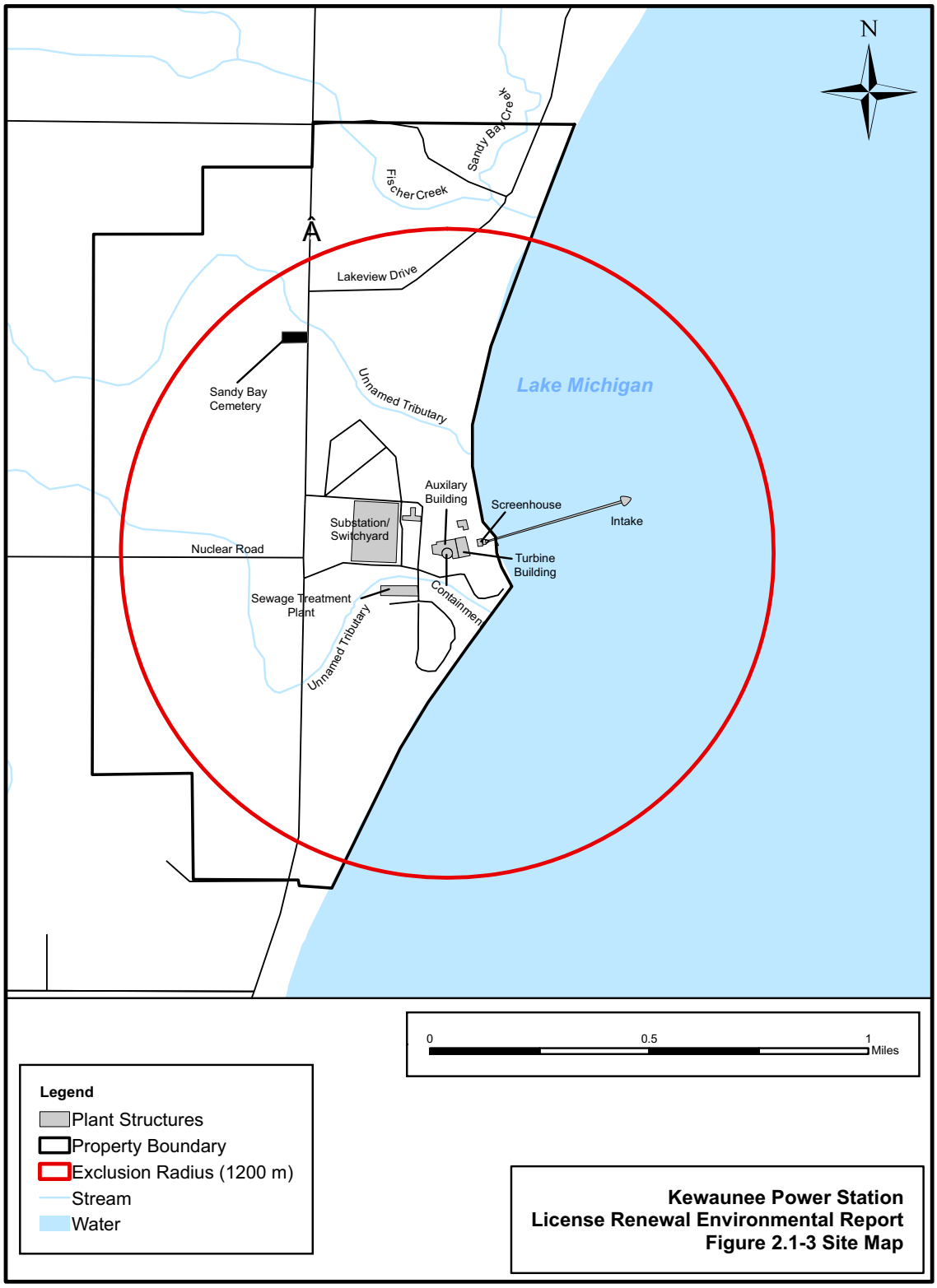
With a copy to:

Richard J. Gallagher
License Renewal Environmental Lead
Dominion Resources Services
Rope Ferry Road
Waterford, CT 06385
Richard.J.Gallagher@dom.com

Sarah Lopas
Environmental Project Manager
NRC OWFN
11555 Rockville Pike
Rockville, MD 20852


N
Menominee
Marinette
Oconto
Menominee
Menominee/
Stockbridge-Munsee
Stockbridge-
Munsee
50-Mile Radius
141
41
Green Bay
Door
Shawano
29
Oneida (WI)
Green Bay
54
Kewaunee
Kewaunee
29
Lake Michigan
Outagamie
41
Brown
Kewaunee Power Station
Appleton--Neenah
43
Fox River
32
Point Beach Nuclear Plant
POINT BEACH STATE FOREST
10
Two Rivers
Winnebago
Manitowoc
Manitowoc
Calumet
151
Oshkosh
Lake Winnebago
32
Sheboygan
Fond du Lac
Sheboygan
Dodge
Legend
Kewaunee
Point Beach
Urban Area
City
County Boundary
American Indian Lands
Water
Primary Highway with Limited Access
Primary Highway
0 5 10 20 30
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.1-1 50-Mile Radius


Kewaunee
29
6-Mile Radius
STATEWIDE WILDLIFE HABITAT
42
Kewaunee
Carlton
County Hwy G
Sandy Bay Cemetery
Nuclear Road
Kewaunee Power Station
Lake Michigan
County Hwy BB
TWO CREEKS BURIED FOREST
Point Beach Nuclear Plant
42
Manitowoc
Mishicot
N
Legend
Kewaunee
Point Beach
Property Boundary
Primary Road
Secondary Road
Populated Place
Wisconsin DNR Managed Lands
County Boundary
0 0.5 1 2 3
Miles
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.1-2 6-Mile Radius


N
Sandy Bay Creek
Fischer Creek
Â
Lakeview Drive
Sandy Bay Cemetery
Unnamed Tributary
Lake Michigan
Auxilary Building
Screenhouse
Intake
Substation/ Switchyard
Nuclear Road
Turbine Building
Sewage Treatment Plant
Containment
Unnamed Tributary
0
0.5
1
Miles
Legend
Plant Structures
Property Boundary
Exclusion Radius (1200 m)
Stream
Water
Kewaunee Power Station
License Renewal Environmental Report
Figure 2.1-3 Site Map

# ATTACHMENT 1

# WISCONSIN COASTAL ZONE MANAGEMENT POLICIES

Wisconsin's Coastal Management Council has set forth state policies for its approved Wisconsin Coastal Management Program. The policies are not enforceable themselves, but are codified in various state statutes and regulations. The specific policies and citations of the applicable state statutes and/or regulations are presented below in bold type. The source of the specific policies and citations is Attachment C of the Wisconsin Coastal Zone Management Program (Ref. E-4). KPS responses to the policies are presented after each specific policy or a grouping of specific policies.

**Specific State Coastal Policies**

**1. Coastal water quality and quantity and coastal air quality.**

**1.1) The elimination of the discharge of pollutants to water is the long range goal of the state. (See Federal Clean Water Act, 33 U.S.C 1251 and Wis. Stats. § 283.001(1)(a))**

**1.2) An interim goal is the protection and propagation of fish and wildlife and the maintenance of water quality to allow recreation in and on the water to be achieved. (See Wis. Stats. § 283.001(1)(b))**

**1.3) Discharges of effluents, including industrial, municipal and agricultural wastes, into any waters of the state shall not be allowed if they exceed federal and state water quality standards. (See Wis. Stats. §§ 283.11 – 31 and Wis. Admin. Code ch. NR 221 to 297. See also managed use #8)**

KPS Response: The KPS operates under a Wisconsin Department of Natural Resources (WDNR)-issued Wisconsin Pollutant Discharge Elimination System (WPDES) permit (#WI-00001571-06). The permit provides concentration limits for discharges to waters of the state. The permit also requires periodic monitoring of regulated parameters in the discharge and reporting results to the WDNR.

By issuing the plant's WPDES permit, Wisconsin approved the plant's cooling water intake structure as best available technology to minimize impact. As was required by the permit, Dominion conducted studies on the KPS cooling water system. Information was provided to WDNR as required. The information gathered indicates that impacts, if any, from the discharge would be characterized as SMALL.

KPS has programs in place (Spill Prevention, Control, and Countermeasures [SPCC] Plan and Storm Water Pollution Prevention Plan [SWPPP]), which ensure that KPS equipment and chemical and materials storage facilities are operated in such a manner to prevent spills, directs facilities to have containment devices, and provides actions to be taken to protect surface water and groundwater in the event of accidental spills. The SWPPP employs Best Management Practices (BMP) for erosion control to further protect surface waters from sediment loading.

KPS also has a Storm Water Tier 2 Permit and storm water discharges are covered by the station's Stormwater Pollution Prevention Plan (SWPPP).

**1.3.1) Substances with the potential to cause groundwater contamination shall be regulated to ensure compliance with groundwater quality protection standards. (See Wis. Stats. ch. 160 and Wis. Admin. Code NR 140. See also managed use #33)**

KPS Response: The KPS facilities do not discharge to groundwater. As stated above, KPS has in place an SPCC Plan and SWPPP, which provide actions to be taken to protect surface water and groundwater in the event of accidental spills.

**1.4) Disposal in the waters of the state of the following defined pollutants shall be restricted: dredged spoil, solid waste, incinerator residue, sewage, garbage, refuse, oil, sewage sludge, munitions, chemical wastes, biological materials, radioactive substance, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water. (See Wis. Stats. §§ 283.01(13), 283.31(1), and 29.601. See also managed use #8 and #9)**

KPS Response: KPS does not engage in dredging. KPS disposes of its solid waste, garbage, refuse, used oil, biological materials, wrecked or discarded equipment, construction debris (such as rock, sand, and cellar dirt), and industrial waste in local municipal landfills and recycling facilities. KPS has a permitted onsite sewage treatment facility that discharges through a WPDES-permitted outfall. KPS operates under approvals for sewage sludge disposal from WDNR and NRC. KPS disposes of hazardous chemical wastes and radiological wastes at permitted facilities available regionally and nationally. KPS operates under a WDNR-issued WPDES permit for discharge from its cooling water system and wastewater treatment process that has approved alternative thermal effluent limits (Ref. E-5). KPS also operates under an operating permit from the NRC that addresses radiological releases. KPS does not generate incinerator residue, munitions, municipal, or agricultural wastes.

**1.5) Because of the importance of Lakes Superior and Michigan and Green Bay as vast water resource reservoirs, water quality standards for rivers emptying into these waters shall be as high as is practicable. (See Wis. Stat. §§ 281.11. See also managed use #8)**

**1.5.1) The state shall provide financial and technical assistance to abate point and non-point sources of water pollution. (See Wis. Stats. §§ 281.57 and 281.65, and Wis. Admin. chs. NR 120 and NR 128)**

**1.5.2) The state shall halt and reverse pollution of its waters by soil erosion by administering goals and standards for conservation of soil and water resources, providing for cost sharing, technical assistance and educational programs to improve land management practices, and enabling the regulation of harmful land use and land management practices. The state shall address construction site erosion control and storm water management through municipal ordinances and state plans for the protection of the state's groundwater, surface water, soil, and related resources. (See Wis. Stats. Ch. 92 §§ 281.33 and 283.33, and Wis. Admin. Code ch. NR 216)**

KPS Response: These policies address state actions and are not applicable to KPS. WDNR divided the state into 23 water quality planning areas. KPS is located in the Lakeshore Basin planning area. In 2001, a plan for the Lakeshore Basin was published that established 10 priority issues:

1. Loss of riparian buffers;

2. Inadequate identification and protection of wetlands, wetland corridors and groundwater recharge areas;

3. Need for better land use planning and improved local zoning;

4. Inadequate management and protection of woodlots;

5. Absence of stewardship ethic;

6. Loss of small farms and/or conversion to large farms;

7. Contamination of drinking water;

8. Illegal dumping of toxins;

9. Loss of biodiversity;

10. Loss of shoreline habitat.

Continued operation of KPS would not impact any of these priority issues. In addition, KPS operates under an Industrial Storm Water Discharge Permit (Tier 2) WI-S049158-2 which uses BMP for erosion control and has a Spill Prevention, Control, and Countermeasures Plan.

**1.6) Discharges from publicly owned treatment works shall comply with secondary treatment and best practicable waste treatment technology requirements. (See 33 U.S.C. § 1251 (Clean Water Act), and Wis. Stats. § 283.13(4). See also managed use #17)**

**1.7) Any wastewater discharger may be required to remove excess amounts of phosphorus. Effluent limitations for the total phosphorus based on surface water quality may be established where such limitations will result in an improvement in water quality, or preserve the quality of surface waters where long-term discharges may result in impairment of water quality. (See Wis. Stats. § 281.15 and Wis. Admin. Code NR 102.06. See also managed use #8)**

**1.8) Waste treatment and disposal activities may be disapproved if they are not in conformance with approved area wide water quality management plans. Sewer extensions shall be allowed only where they are consistent with and enhance the policy of the state to restore and maintain the chemical, physical and biological integrity of its waters to protect public health, safeguard fish and aquatic life and scenic and ecological values and enhance the domestic, municipal, recreational, industrial, agricultural and other uses of water. (See Wis. Stats. §§ 281.17, 281.41 and 283.83, and Wis. Admin. Code ch. NR 121 and NR 110.05. See also managed use #17)**

KPS Response: Policy 1.6 addresses publicly owned treatment works and is not applicable to KPS operations. With respect to Policies 1.7 and 1.8, KPS operates a permitted onsite wastewater treatment facility (Permit 3430 and NPDES Permit WI-00001571-06), which is in compliance with all applicable regulations.

**1.9) Thermal discharges shall not raise the receiving water temperatures more than 3 degrees F above the existing natural temperature at the boundary of mixing zones. (See Wis. Stats. § 281.15 and Wis. Admin. Code NR 102.07. See also managed use #8)**

KPS Response: KPS submitted results from impact studies for its heated discharge (Clean Water Act 316(a) demonstration) to the WDNR and requested a variance to Administrative Code NR 102.05. . WDNR granted the variance (Ref. E-5).

**1.10) The discharge of toxic pollutants in toxic amounts shall be prohibited. (See Wis. Stats. §§ 283.01(17) and 283.001(1)(c). See also managed use #8)**

KPS Response: KPS operates under a WDNR-issued WPDES permit. In developing the permit, WDNR evaluated discharge characteristics and determined that for most pollutants there was no reasonable potential to cause toxicity. Where necessary, effluent limits and/or monitoring requirements were included for protection of the aquatic resources in the receiving waterbody.

**1.11) Discharge of mercury compounds and metallic mercury to the waters of the state by any person shall be limited to fifteen-hundredths of a pound of mercury per day averaged over a 30-day period, and not more than one-half pound in any one day. (See Wis. Stats. § 281.17(7), and Wis. Admin. Code NR 100.02. See also managed use #8)**

KPS Response: KPS's mercury discharges are well within the limits outlined in Policy 1.11.

**1.12) No person may sell, distribute, use or dispose of any pesticide without obtaining any required licenses and following requirements of the Wisconsin Statutes, the Wisconsin Administrative Code, and local regulations. (See Wis. Stats. §§ 94.67-.70 and 29.601(4). See also managed use # 30)**

KPS Response: The contractors that apply pesticides on site and in the transmission rights-of-way are required to obtain pesticide licenses.

**1.13) Minimum lot sizes in shoreland areas shall be established to afford protection against danger to health, safety and welfare, and protection against pollution of the adjacent body of water. Lots served by public sanitary sewer shall have a minimum average width of 65 feet and a minimum area of 10,000 square feet. Lots not served by public sewer shall have a minimum average width of 100 ft. and a minimum area of 20,000 sq. ft. (See Wis. Stats. §§ 281.31 and 59.692 and ch. 236 and Wis. Admin. Code ch. NR 115. See also managed use #18 and 25)**

KPS Response: Policy 1.13 does not apply to KPS' operations.

**1.14) The Wisconsin Department of Natural Resources may establish, administer and maintain a safe drinking water program no less stringent than the requirements of the Safe Drinking Water Act 42 U.S.C. 300f to 300j-26. (See Wis. Stats. § 281.17(8). See also managed use #10 and #29)**

KPS Response: Policy 1.14 does not apply to KPS' operations.

**1.15) Withdrawals of water that could result in significant losses of water, through interbasin diversion or consumptive use, from the Great Lakes basin shall be regulated so as to protect public rights in navigable waters, public health, safety, and welfare, coastal ecosystems, coastal water quality, and in-basin water needs. All withdrawals of waters of the state averaging over 100,000 gallons per day shall be registered with the state so that the state may monitor water demand and availability in the interest of better water supply management. (See Wis. Stats. § 281.35(3) – (5) and Wis. Admin. Code NR 142. See also managed use #13)**

KPS Response: KPS' cooling water intake system withdrawal of water from Lake Michigan is authorized by its WDNR-issued WPDES Permit WI-00001571-06; as a result, as provided by Wis. Stat. .§ 281.35 (3)(b)3, KPS is exempt from the requirement to register the withdrawal.

**1.15.1) No person may conduct an activity for which the Wisconsin department of natural resources denies a required water quality certification. No person may violate a condition imposed by the department in a water quality certification. (See Wis. Stats. § 281.17(10))**

KPS Response: WDNR has not denied water quality certification for any activity conducted by KPS, to the best of KPS' knowledge..

**1.16) No new air contaminant stationary source shall be permitted to be constructed, installed or established which directly or indirectly emits air contaminants that make the air injurious to health, harmful for commercial or recreational use or deleterious to fish, bird, animal or plant life without complying with federal and state air quality standards. (See Wis. Stats. §§ 285.60, 281.31, and Wis. Admin. Code ch. NR 405 and 406.03)**

KPS Response: KPS operates under a state-issued air operating permit (Permit #431022790-F11) governing emissions for 1 space heating boiler and 3 emergency diesel generators. KPS is in compliance with federal and state air quality standards. KPS also operates under an NRC-issued operating license that addresses radiological emissions. KPS conducts a radiological environmental monitoring program that includes air monitoring. The annual radiological emissions are well under limits.

**1.17) If an ambient air quality standard for any air contaminant is not promulgated under Section 109 of the Federal Clean Air Act, the Wisconsin department of natural resources may promulgate an ambient air quality standard if the department finds that the standard is needed to provide adequate protection for public health or welfare. (See Wis. Stats. § 285.21(1) and Wis. Admin. Code ch. NR 404. See also managed use #28)**

KPS Response: Policy 1.17 does not apply to KPS' operations.

**1.18) The Wisconsin Department of Natural Resources, in the interest of public rights in navigable waters or to promote safety and protect life, health, and property may regulate and control the level and flow of water in all navigable waters and may erect or may order and require bench marks to be erected, upon which shall be designated the maximum level of water that may be impounded and the lowest level of water that may be maintained by any dam heretofore or hereafter constructed and maintained and which will affect the level and flow of navigable waters; and may by order fix a level for any body of navigable water below which the same shall not be lowered except as provided in the Wisconsin Statutes. The**

**construction, operation, maintenance and equipment, or any or all thereof, of dams in navigable waters shall be subject to the supervision of the department and to the orders and regulations of the department. (See Wis. Stats. § 31.02(2) and Wis. Admin Code ch. NR 333)**

**1.19) The height to which water may be raised by any milldam and the length or period of time for which it may be kept up each year, may be restricted and regulated by the orders of the Wisconsin Department of Natural Resources. No such dam shall be erected to the injury of any mill lawfully existing. (See Wis. Stats. §§ 31.33(4) and 31.32)**

**1.20) Permits to construct, operate and maintain dams may be granted to persons, corporations or municipalities. If the owner of any existing dam wishes to raise or enlarge the same, the owner may apply to the Wisconsin Department of Natural Resources for permission to do so. (See Wis. Stats. §§ 31.04 and 31.13 (1))**

KPS Response: These policies address dams in navigable waters. A gully control structure, including a small (approximately one-half acre) retention pond, was constructed on an intermittent stream during original plant construction (1972-1973). This was in response to recommendations by the U.S. Soil Conservation Service for lake shore recession prevention. WDNR was consulted, and WDNR determined that a state permit was not required (Ref. E-6).

**1.21) The Wisconsin department of natural resources shall establish water quality objectives for each water basin and for each priority watershed and priority lake and identify the best management practices to achieve the water quality objectives. In cooperation with the Wisconsin department of agriculture, trade and consumer protection and the appropriate governmental unit, the Wisconsin department of natural resources shall prepare watershed plans for all priority watersheds. The watershed plan shall consist of a watershed assessment, a detailed program for implementation, and a project evaluation strategy. (See Wis. Stats. §§ 281.65 and 281.20, and Wis. Admin. Code ch. NR 120)**

KPS Response: Policy 1.21 does not require any action by KPS.

**1.22) New or substantially altered manure storage facilities shall be designed, constructed and maintained to minimize the risk of structural failure of the facility, minimize leakage of the facility in order to comply with groundwater standards, and maintain one foot of freeboard storage or adequate freeboard storage to the equivalent volume of a 25-year, 24-hour storm, whichever is greater. Manure facilities shall be closed in a manner that will prevent future contamination of groundwater and surface water. (See Wis. Stats. §§ 281.16 and 281.65, and Wis. Admin. Code chs. NR 151, Sub. II, and DATCP 50)**

**1.23) Runoff shall be diverted away from contacting feedlot, manure storage areas and barnyard areas within water quality management areas except that a diversion to protect a private well is required only when the feedlot, manure storage area or barnyard area is located upslope from the private well. (See Wis. Stats. §§ 281.16 and 281.65, and Wis. Admin. Code chs. NR 151, Sub. II, and ATCP 50)**

**1.24) Manure, commercial fertilizer and other nutrients shall be applied in conformance with a nutrient management plan. (See Wis. Stats. §§ 281.16 and 281.65, and Wis. Admin. Code chs. NR 151, Sub. II, and ATCP 50)**

**1.25) All livestock producers shall have no overflow of manure storage facilities; shall have no unconfined manure pile in a water quality management area; shall have no direct runoff from a feedlot or stored manure into the waters of the state. A livestock operation may not allow unlimited access by livestock to waters of the state in a location where high concentrations of animals prevent the maintenance of adequate sod or self-sustaining vegetative cover. (See Wis. Stats. §§ 281.16 and 281.65, and Wis. Admin. Code ch. NR 151, Sub. II, and ATCP 50)**

KPS Response: Policies 1.22 through 1.25 do not apply to KPS' operations because KPS is not a livestock producer, does not operate a feed lot, and does not utilize manure storage facilities.

**1.26) For a construction site that has 5 or more acres of land disturbing construction activity, a written plan shall be developed and implemented, incorporating best management practices, to control 80% of the sediment load. A written storm water management plan shall be developed and implemented for each Postconstruction site. (See Wis. Stats. § 281.65 and Wis. Admin. Code ch. NR 151, Sub. III)**

KPS Response: No construction is planned as part of the lisence renewal. In the event KPS undertakes any future construction, appropriate plans will be prepared and permits obtained.

**1.27) Municipalities with an average density of 1000 people per square mile or greater shall develop and implement storm water management programs, including the adoption and administration of any necessary ordinance. (See Wis. Stats. § 281.65 and Wis. Admin. Code ch. NR 151, Sub. III)**

**1.28) Owners or operators of municipal separate storm sewer systems shall obtain coverage from a Wisconsin pollutant discharge elimination system municipal storm water permit where the owner or operator serves an incorporated area with a population of 1000,000 or more, where the owner or operator has been notified in writing by the Wisconsin department of natural resources prior to August 1, 2004, or where the owner or operator of a municipal storm sewer system is within an urbanized area. (See Wis. Stats § 283.33, ch. 281 and Wis. Admin. Code ch. NR 216)**

**1.29) All concentrated animal feeding operations are required to be covered by a Wisconsin pollutant discharge elimination system permit. (See Wis. Stats. chs. 281 and 283 and Wis. Admin. Code ch. NR 243)**

**1.30) The purposes of the nonpoint source pollution abatement financial assistance program are to: provide the necessary administrative framework and financial assistance for the implementation of measures to meet nonpoint source water pollution abatement needs identified in area wide water quality management plans; provide coordination with all elements of the state's water quality program; provide technical and financial assistance for the application of necessary nonpoint source water pollution abatement measures; focus limited technical and financial resources in critical geographic locations where nonpoint source related water quality problems and threats are the most severe and control is the most feasible; and provide for program evaluation, subsequent modifications, and recommendations. (See Wis. Stats. § 281.65(1) and Wis. Admin. Code NR 153 and 154)**

**1.31) The Wisconsin department of natural resources shall administer an urban nonpoint source water abatement and storm water management program in a manner that promotes: management of urban storm water and runoff from existing and developing urban areas to achieve water quality standards, to minimize flooding and to protect groundwater; coordination of urban nonpoint source management activities and the municipal storm water discharge permit program; and implementation of nonpoint source performance standards. The department may provide a cost-sharing grant for projects. (See Wis. Stats. § 281.66 and Wis. Admin. Code NR 155)**

KPS Response: Policies 1.27 through 1.31 do not apply to KPS' operations because KPS is not a municipality, does not operate a concentrated animal feeding operation, is not eligible for non point source pollution abatement financial assisstance, and is not responsible for administration of WDNR's urban non point source programs.

**2. Coastal natural areas, wildlife habitat and fisheries.**

**2.1) State natural areas are designated for the purposes of scientific research, the teaching of conservation and natural history, and preservation of native plant and animal communities or individual members of these communities and archeological sites. The Wisconsin department of natural resources shall not permit any use of a designated state natural area which is inconsistent with or injurious to its natural values. (See Wis. Stats. § 23.26-28. See also SCA #1 and #5)**

**2.2) State parks are to be established for public recreation and education. An area may qualify by reason of the area's scenery, its plants and wildlife or its historical, archeological or geological interest. and the Wisconsin Department of Natural Resources may classify park areas as to their most logical employment and greatest usefulness. (See Wis. Stats. § 27.01(1) and (2). See also SCA #1)**

**2.3) The Wisconsin department of natural resources shall manage state forests to benefit the present and future generations of residents of this state, recognizing that the state forests contribute to local and statewide economies and to a healthy natural environment. The department shall assure the practice of sustainable forestry and use it to assure that state forests can provide a full range of benefits for present and future generations. The department shall also assure that the management of state forests is consistent with the ecological capability of the state forest land and with the long-term maintenance of sustainable forest communities and ecosystems. (See Wis. Stats. § 28.04. See also SCA #1 and #5)**

**2.4) Taxation of agricultural land and undeveloped land need not be uniform. An owner may apply for a farmland preservation agreement if the county in which the land is located has a certified agricultural preservation plan in effect or the land is in an area zoned for exclusive agricultural use under a certified ordinance. (See Article VIII, Sec. 1 of the Wis. Constitution, Wis. Stats. §§ 71.57-71.67 and ch. 91)**

**2.5) No person may hunt or trap on land located in state parks or state fish hatcheries unless the department of natural resources has authorized by rule the hunting of that type of game in the state park or portion of the state park, and the person holds the approval required for hunting that type of game. (See Wis. Stats. § 29.089. See also SCA #1)**

**2.6) The Wisconsin Department of Natural Resources may acquire and manage lands or waters for public shooting, trapping, or fishing grounds or waters for the purpose of providing areas in which any citizen may hunt, trap, or fish. Fishery, forestry, wild resources and nonconsumptive recreational objectives will be accommodated when they do not detract significantly from the primary objectives of wildlife habitat and public hunting. (See Wis. Stats. §§ 23.09(2)(d)(3) and 23.11(1), and Wis. Admin. Code NR 1.51. See also SCA #1 and #5)**

KPS Response: Policies 2.1 through 2.6 address state actions not related to KPS operations or KPS property.

**2.7) The taking, possessing, sale, processing and distribution of fish, wildlife and plant life designated by the state and/or the U.S. as endangered, native and foreign species is prohibited. (See Wis. Stats. § 29.604 Admin. Code NR 27. See also SCA #1 and #5, and managed use #8)**

KPS Response: KPS does not engage in these activities.

**2.8) The Wisconsin Department of Natural Resources shall identify and classify trout streams to ensure adequate protection and proper management of this unique resource. (See Wis. Stats. §§ 23.09(1)-(2), and Wis. Admin. Code NR 102 and NR 1.02. See also SCA #1 and 5)**

**2.9) Sport fishing shall be managed in such a way that all have an equal opportunity to safely enjoy the aquatic resources, regulated to the extent that fish and other aquatic resources are protected and enhanced; fishing does not exceed the capabilities of the resource to sustain desirable, quality fish populations; the social, biological and economic values associated with all recreational fishing are recognized; user conflicts are minimized; and aesthetic and cultural values associated with fishing are held in trust for future generations. (See Wis. Stats. §§ 23.09(1)-(2) and Wis. Admin. Code NR 1.01(9). See also SCA #1 and 5)**

**2.9.1) The Wisconsin Department of Natural Resources will manage fishery resources of the Great Lakes in accordance with sound biological principles to attain optimum sustainable utilization. Management measures may include but are not limited to seasons, bag and quota limits, limitations on the type and amount of fishing gear, limitation as to participation in the fisheries and allocation of allowable harvest among the various users and the establishment of restricted areas. (See Wis. Stats. § 23.09(1)-(2) and Wis. Admin. Code NR 1.04(4))**

**2.10) The Wisconsin Department of Natural Resources may acquire easements in the furtherance of public rights, including the right of access and use of lands and waters for hunting and fishing and the enjoyment of scenic beauty. (See Wis. Stats. § 23.09(10). See also SCA #1 and #5)**

**2.11) Sport fishing shall be managed in such a way so that all have an equal opportunity to safely enjoy the aquatic resources, regulated to the extent that aquatic resources are protected and enhanced; fishing effort does not exceed capabilities of the resource to sustain desirable, quality fish populations; the social, biological and economic values associated with all recreational fishing, competitive and non-competitive are recognized; a sense of responsibility for the resource is inherent to all who participate and enjoy fishing;**

**user conflicts are minimized, and aesthetic and cultural values associated with fishing are held in trust for future generations. (See Wis. Stats. § 23.09 and Wis. Admin. Code NR 1.01)**

**2.11.1) The Wisconsin Department of Natural Resources may operate state fish hatcheries. The department may breed and propagate fish, distribute information regarding the propagation and conservation of fish, and receive and dispose of fish and fish eggs. The department may manage the state fish hatcheries and all other property held by the state for the propagation of fish. (See Wis. Stats. §§ 29.709-29.713)**

**2.11.2) The Wisconsin Department of Natural Resources may designate such localities as it finds reasonably necessary to secure the perpetuation of any species of fish and maintenance of an adequate supply of the fish. The purpose of the fish refuges is to provide safe retreats in which fish may breed and replenish adjacent fishing waters. (See Wis. Stats. § 23.09(2)(c) and Wis. Admin. Code ch. NR 26)**

**2.12) The Wisconsin Department of Natural Resources shall establish and maintain open and closed seasons for fish and game and any bag limits, size limits, rest days and conditions governing the taking of fish and game that will conserve the fish and game supply and ensure continued opportunities for good fishing, hunting, and trapping. The department may regulate hunting and fishing on and in all interstate boundary waters and outlying waters. (See Wis. Stats. §§ 29.014(1) and 29.041. See also Wis. Stats. §§ 29.219 – 29.237 and 29.514 – 29.539 , SCA #1 and 5, and managed use #11)**

KPS Response: Policies 2.8 through 2.12 address state actions not related to KPS operations and KPS property. There are no state-designated trout streams on KPS property (Ref. E-7).

**2.13) All counties shall adopt shoreland ordinances for all unincorporated lands within the following distances from the ordinary high-water mark of navigable waters: 1,000 feet of a lake, pond, or flowage and 300 feet of a river or stream or to the landward side of the floodplain, whichever distance is greater. Each County shall, within 6 months after receipt of final Wisconsin wetland inventory maps of the county from the Wisconsin department of natural resources, zone all shorelands within the county that are designated as wetlands on the Wisconsin wetland inventory maps, in a shoreland-wetland zoning district. Any use not permitted by rule is prohibited in a shoreland-wetland zoning district unless the wetland or portion thereof is rezoned by amendment of the county shoreland zoning ordinance. At a minimum, shoreland ordinances shall include the following provisions:**

**(a) Minimum lot sizes in the shoreland area shall be established to afford protection against danger to health, safety and welfare, and protection against pollution of the adjacent body of water.**

**(b) Building setbacks shall be established to conform to health, safety and welfare requirements, preserve natural beauty, reduce flood hazards and avoid water pollution. Unless an existing development pattern exists, a setback of 75 feet from the ordinary high-water mark of an adjacent body of water to the nearest part of a building or structure, shall be required for all buildings and structures, except piers, boat hoists and boathouses.**

**(c) The cutting of trees and shrubbery shall be regulated to protect natural beauty, control erosion and reduce the flow of effluents, sediments and nutrients from the shoreland area.**

**In the strip of land 35 feet wide in land from the ordinary high-water mark, no more than 30 feet in any 100 feet shall be clear-cut. In shoreland areas more than 35 feet inland, trees and shrub cutting shall be governed by consideration of the effect on water quality and consideration of sound forestry practices and soil conservation practices.**

**(d) Filling, grading, lagooning, dredging, ditching and excavating may be permitted only in accordance with state regulations where applicable, and only if done in a manner to designed to minimize erosion, sedimentation and impairment of fish and wildlife habitat. (See Wis. Stats. §§ 59.692 and 281.31 and Wis. Admin. Code NR 115. See also managed uses #26 and 27)**

KPS Response: Kewaunee County has a Wetland-Shoreland Ordinance. KPS is in compliance with this ordinance. An ecological field survey conducted in 2006/2007 at the KPS site did not discover any wetlands of 5 acres or greater in size.

With regard to the shoreland protective requirements detailed in the Policy 2.13, KPS is not depicted on USGS maps as having swamp or marsh land (Ref. E-8). KPS will comply with tree cutting restrictions and does not currently have construction plans that would violate the 30 feet per 100 feet restriction. KPS does not engage in dredging and does not plan to initiate dredging during the license renewal term. Construction at KPS that involves grading or filling is subject to state construction stormwater permits and KPS uses BMP for erosion control. With the exception of 3 wastewater treatment lagoons (0.6 acre total surface area) built during the original plant construction, KPS does not engage in lagooning and does not plan to construct a lagoon during the license renewal term. KPS secures construction permits as required and in compliance with local building setback codes.

**2.14) All cities and villages shall adopt and administer shoreland-wetland zoning ordinances for wetlands or portions of wetlands 5 acres or greater in size located a) within 1,000 feet of a lake and b) 300 feet from a river or stream or to the landward side of the floodplain, whichever distance is greater. Any use not permitted by rule is prohibited unless the wetland, or portion thereof, is rezoned by amendment of the city or village. (See Wis. Stats. §§ 61.351 and 62.231, and Wis. Admin. Code NR 117. See also managed use #27)**

KPS Response: KPS is located in an area that has not been incorporated into a city or village. Also, an ecological field survey conducted in 2006/2007 at the KPS site did not identify any wetlands of 5 acres or greater in size.

**2.15) The Wisconsin Department of Natural Resources shall preserve, protect, restore and manage the state's wetland communities to be sustainable, diverse, and interspersed with healthy aquatic and terrestrial communities. Department actions must be consistent with the goal of maintaining, protecting and improving water quality. The administrative rules regarding wetlands shall be applied in such a manner as to avoid or minimize the adverse effects on wetlands due to actions over which the department has regulatory or management authority and to maintain, enhance and restore wetland functions and values. (See Wis. Stats. §§ 281.12(1) and 281.11, and Wis. Admin. Code NR 1.95, NR 299, NR 103 and NR 353. See also managed use #1, 2, 3, 4, 5,6, 7, 8, 9, 17, 18, 19, 21, 22)**

KPS Response: Policy 2.15 does not require any action by KPS.

**2.16) The Wisconsin Department of Natural Resources may order and require any dam heretofore or hereafter constructed to be equipped and operated, in whole or in part, as follows:**

**(a) With slides and chutes for the passage of logs and timber products.**

**(b) With a lock, boat hoist, marine railway or other device of a size and construction sufficient to accommodate navigation.**

**(c) With good and sufficient fishways or fish ladders, or in lieu thereof, the owner may be permitted to enter into an agreement with the department to pay for or supply to the State of Wisconsin annually such quantities of game fish for stocking purposes as may be agreed upon by the owner and the department.**

**(d) With spillways or flood gates capable of permitting the passage through or over the same of freshets and floods during all seasons of the year.**

**(e) With booms, piers or other protection works ample to safeguard gates from trash or other floating material. (See Wis. Stats. § 31.02(4))**

**2.16.1) The Wisconsin Department of Natural Resources may investigate and determine all reasonable methods of construction, operation, maintenance and equipment for any dam so as to conserve and protect all public rights in navigable waters and so as to protect life, health and property; and the construction, operation, maintenance and equipment, or any or all thereof, of dams in navigable waters shall be subject to the supervision of the department and to the orders and regulations of the department. (See Wis. Stats. § 31.02(2))**

**2.17) The Wisconsin Department of Natural Resources shall operate, repair and maintain the dams and dikes constructed across drainage ditches and streams in drainage districts in the interest of drainage control, water conservation, irrigation, conservation, pisciculture, and to provide areas suitable for the nesting and breeding of aquatic wild bird life and the propagation of fur-bearing animals. (See Wis. Stats. § 31.02(6))**

**2.18) It is declared to be the policy of the state to prohibit forever the building or maintaining of any dam across the Brule river or any of its tributaries in Douglas County, except that a dam with an adequate fishway may be constructed across said Brule river at each of 3 sites including the Clevedon site, the Old Mill site, or the upper Rock Dam site. (See Wis.Stats. § 31.30)**

KPS Response: Policies 2.16, 2.16.1, and 2.17 does not require any action by KPS. In the mid-1990s, the WDNR constructed a two-acre wetland on KPS property using a dike to create a pond. Its purpose was to create wildlife habitat.

Policy 2.18 does not pertain to KPS.

**2.19) Unless the Wisconsin Department of Natural Resources has issued a permit or the legislature has granted authorization, no person may change the course of or straighten a navigable stream without a permit issued under this section or without otherwise being expressly authorized by statute to do so. (See Wis. Stats. § 30.195)**

KPS Response: KPS does not routinely engage in this activity and no navigable stream will be straightened or altered as part of the license renewal process. If any such activity were required in the future, the proper permits would be obtained.

**2.20) In order to afford the people of this state an opportunity to enjoy natural streams, it is in the interest of this state to preserve some rivers in a free-flowing condition and to protect them from development. (See Wis. Stats. § 30.26)**

**2.21) The Wisconsin Department of Natural Resources may rely upon wetland boundary determinations made by other agencies and consultants. If there is a dispute concerning a wetland boundary delineation, the review of the delineation shall be consistent with the procedures identified in the "Basic Guide to Wisconsin's Wetlands and Their Boundaries" (Wisconsin Department of Administration PUBL-WZ-029- 94) as determined by the department. (See Wis. Stats. §§ 281.11,281.12, and 281.36(36(3) and Wis. Admin. Code NR 103.08(1m)) NOTE: This guide is based upon the "Corps of Engineers Wetlands Delineation Manual, 1987" which has been regionalized for Wisconsin. For the purposes of delineating nonfederal wetlands, the Wisconsin Department of Natural Resources shall use the procedures contained in the wetlands delineation manual published by the U.S. Army Corps of Engineers. The edition of the manual that shall be used shall be the 1987 edition of the manual and any document the U.S. Army Corps of Engineers issues interpreting that manual.**

KPS Response: Policies 2.20 and 2.21 do not require any action by KPS.

**2.22) No person may discharge dredged or fill material into a nonfederal wetland unless the discharge is authorized by a water quality certification issued by the Wisconsin Department of Natural Resources. No person may violate any condition imposed by the department in a water quality certification. The department may not issue a water quality certification for a nonfederal wetland unless it determines that the discharge will comply with all applicable water quality standards. (See Wis. Stats. § 281.36(2)(a))**

KPS Response: KPS does not routinely engage in dredging or filling of wetlands and no impacts to wetlands are contemplated as part of the license renewal process. If such activities were required in the future, the proper permits would be obtained.

**3. Coastal erosion and flood hazard areas.**

**3.0.1) The Wisconsin department of natural resources shall prepare a model zoning ordinance for the construction site erosion control at sites where the construction activities do not include the construction of a building in the form of an administrative rule. (See Wis. Stats. § 281.33(5) and Wis. Admin. Code NR 152.)**

KPS Response: This Policy does not require any action by KPS.

**3.1) Counties, cities and villages shall adopt reasonable and effective floodplain zoning ordinances for those parts of their jurisdiction subject to serious flood damage. These ordinances shall provide that construction be strictly regulated in floodways. Construction in floodplains and flood fringe areas will also be regulated. In addition, no development shall be allowed in floodplains along Lake Superior or Lake Michigan which will be adversely**

**affected by wave run-up or which is associated with high flood damage potential. (See Wis. Stats. § 87.30, and Wis. Admin. Code ch. NR 116. See also managed use #15)**

KPS Response: The FEMA Map for the KPS area (Ref. E-10) shows that land within approximately 125 feet of Lake Michigan is designated as Special Flood Hazard Area Zone A2 (area of 100-year flood). FEMA defines a 100-year flood as the flood elevation that has a 1-percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most Federal and state agencies, is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance. A structure located within a special flood hazard area shown on an NFIP map has a 26 percent chance of suffering flood damage within 30 years. FEMA further defines floodplain as any land area susceptible to being inundated by flood waters from any source. The remainder of the KPS property is designated as Zone C (areas of minimal flooding). With the exception of the plant's intake and discharge structures, which are designed to withstand flooding and were permitted by the WDNR and U.S. ACE, all KPS structures are more than 150 feet away from Lake Michigan's shore.

Any structures constructed in the future would be constructed in accordance with local zoning ordinances.

**3.2) Within unincorporated areas a setback of 75 ft. from the ordinary high water mark of an adjacent body of water shall be required, unless an existing development pattern exists. A county may enact a more restrictive ordinance. (See Wis. Stats. §§ 59.692 and 281.31, and Wis. Admin. Code NR 115. See also managed use #15, 26 and 27.)**

KPS Response: See Response for Policy 3.1.

**3.3) No Policy 3.3 was found in the state coastal policies.**

**3.4) All new subdivision plats, buildings, structures, roads, sanitary or other facilities which are reviewed by state agencies and which are in existing and potential flood hazard areas shall be prevented from exposing citizens to unnecessary hazards or cause future public expenditures for flood disaster relief. (See 1973 Executive Order No. 67. See also managed use #15.)**

KPS Response: See Response to Policy 3.1.

**3.5) For a structure or deposit that is not exempt and that is not subject to a general permit, a riparian owner may apply to the Wisconsin Department of Natural Resources for a required individual permit in order to place the structure for the owner's use or to deposit the material. The department shall issue an individual permit to a riparian owner for a structure or deposit application if the department finds that the structure will not materially obstruct navigation, will not be detrimental to the public interest, and will not materially reduce the flood flow capacity of a stream. [See Wis. Stats. § 30.12(3m). See also managed use #7 and 15.]**

**3.5.1) The Wisconsin Department of Natural Resources may decide to require that a person engaged in an activity that is otherwise exempt from requiring a structures permit apply for an individual permit or seek authorization under a general permit if the department has conducted an investigation and visited the site of the activity and has determined that the**

**conditions specific to the site require restrictions on the activity in order to prevent any of the following: significant adverse impacts to the public rights and interests; environmental pollution; material injury to the riparian rights of any riparian owner. [See Wis. Stats. § 30.12(2m).]**

KPS Response: With the exception of the gully control structure on an intermittent stream discussed under policy 1.18, KPS does not have structures in the navigable water bodies onsite. If KPS undertakes activity in the future that would involve placing a structure or deposit on the bed of a navigable waterbody, KPS will comply with the applicable permitting requirements

**3.6) If the Wisconsin Department of Natural Resources finds pursuant to an investigation that a dam or reservoir is not sufficiently strong or is unsafe and that the dam or reservoir is dangerous to life or property, it shall determine what alterations additions or repairs are necessary and shall order the owner or person having control of the dam or reservoir to cause those alterations, additions or repairs to be made within a time specified in the order. If the department finds pursuant to an investigation that a dam or reservoir is not sufficiently strong or is unsafe and that the dam or reservoir is dangerous to life or property, it may cause to be drawn off, in whole or in part, the water in the reservoir of impounded by the dam if it determines that this action is necessary to prevent impending danger to persons or property. (See Wis. Stats. § 31.19 (5))**

KPS Response: The requirements in Policy 3.6 would not be applicable to the small dike discussed under Policy 2.17 or the small retention pond discussed under Policy 1.18, because of the specific size, location, and configuration of each; should any order be issued, KPS would comply.

**4. Community development.**

Note: The specific policies regarding community development are largely state or local government functions and/or concern structures such as dams and bridges that KPS does not have. For the sake of brevity, these policies are not presented in their entirety.

**4.1) All coastal counties shall adopt and enforce ordinances for all unincorporated coastal shorelands. These regulations shall: maintain safe and healthful conditions; prevent and control water pollution; protect fish and aquatic life, particularly spawning grounds; control land uses, placement of structures, and building sites; reserve and protect shore cover; and protect natural beauty. (See Wis. Stats. §§ 59.692, 281.31(1), and 281.35, and Wis. Admin. Code ch. NR 115. See also managed use #26)**

KPS Response: Kewaunee County has a Wetland-Shoreland Ordinance. KPS operates under state-issued WPDES discharge and stormwater permits. The addition of any structures at KPS during the license renewal period would be in accordance with local ordinances.

**4.2) All subdivisions…**

**4.3) No Policy 4.3 was found in the state coastal policies**

**4.4) It is the public policy…**

**4.5) The state long-range public building program shall…**

**4.6) The State Historical Society…**

**4.7) State aesthetic resources shall be protected and enhanced through the regulation of billboards…**

**4.8) All subdivisions abutting navigable lakes or streams shall…**

**4.8.1) Public access facilities shall…**

**4.9) The state shall…**

**4.10) Local communities shall…**

**4.10.1) The state shall…**

KPS Response: Policies 4.2 through 4.10.1 do not pertain to KPS.

**4.11) Unless an individual or a general permit has been issued or authorization has been granted by the legislature, no person may deposit any material or place any structure upon the bed of any navigable water where no bulkhead line has been established or beyond a lawfully established bulkhead line. Exemptions from permit requirements for the placement of a structure or the deposit of material only apply where the structure or material is located in an area of special natural resource interest and does not interfere with the riparian rights of any other riparian owner. (See Wis. Stats. §§ 30.12 and 30.20. See also SCA #2; managed use #1, 2, 6 and 7)**

KPS Response: KPS does not routinely conduct dredging or filling in navigable waters onsite or off shore. KPS intake and discharge structures located in Lake Michigan were installed during construction as allowed by the construction permit and are operated to minimize impacts to aquatic ecology. The structures do not obstruct navigation or reduce effective flood flow capacity.

**4.11.1) For a structure or deposit that is not exempt and that is not subject to a general permit, a riparian owner may apply to the Wisconsin Department of Natural Resources for the individual permit that is required in order to place a structure for the owners' use or to deposit the material. The department shall issue an individual permit if the department finds that the structure or deposit will not materially obstruct navigation, the structure or deposit will not be detrimental to the public interest, and the structure or deposit will not materially reduce the flood flow capacity of a stream. (See Wis. Stats. § 30.12(3m))**

**4.11.2) Unless a contract has been entered into with the Wisconsin Department of Natural Resources or authorization has been granted by the legislature, no person may remove any material from the bed of a natural navigable lake or from the bed of any outlying waters. Unless an individual or a general permit has been issued by the department or authorization has been granted by the legislature, no person may remove any materials from the bed of any lake or any navigable stream. (See Wis. Stats. § 30.20(1))**

**4.11.3) The board of commissioners of public lands may lease to riparian owners rights to the beds of lakes and rights to fill in beds of lakes or navigable streams, held by the state in trust for the public, when the purpose of the lease is for the improvement of navigation or for the improvement or construction of harbor facilities. The board of commissioners of public lands may lease such rights to municipalities in locations where the municipality is the riparian owner, when the purpose of the lease is for the improvement or provision of recreational facilities related to navigation for public use. No leases may be executed without a prior finding of the Wisconsin Department of Natural Resources that any proposed physical change in the area contemplated as the result of the execution of any term lease is consistent with the public interest in the navigable waters involved. (See Wis. Stats. § 24.39)**

KPS Response: KPS does not routinely engage in the activities described in Policies 4.11.1 through 4.11.3. If a future activity of KPS involves any of these activities, KPS will obtain the appropriate permit.

**4.11.4) A wharf or pier which interferes with public rights in navigable waters constitutes an unlawful obstruction of navigable waters unless the wharf or pier is authorized by permit or unless other authorization for the wharf or pier is expressly provided. A wharf or pier which interferes with rights of other riparian owners constitutes an unlawful obstruction of navigable waters unless the wharf or pier is authorized under a permit or unless other authorization for the pier or wharf is expressly provided. A wharf or pier which extends into navigable waters beyond an established pier head line constitutes an unlawful obstruction of navigable waters unless a valid permit, license or authorization for the wharf or pier is granted or unless it is a permissible preexisting wharf or pier. (See Wis. Stats. § 30.13(4))**

KPS Response: This policy does not pertain to KPS.

**4.11.5) No owner of riparian land that abuts a navigable water may convey, by easement or similar conveyance, any riparian right in the land to another person, except for the right to cross the land in order to have access to the navigable water. This right to cross the land may not include the right to place any structure or material in the navigable water. This does not apply to riparian land located within the boundary of any hydroelectric project licensed or exempted by the federal government, if the conveyance is authorized under any license, rule or order issued by the federal agency having jurisdiction over the project. (See Wis. Stats. § 30.133)**

KPS Response: KPS does not intend to convey such riparian rights to another person.

**4.12) Unless an individual or a general permit has been issued by the Wisconsin Department of Natural Resources, or authorization has been granted by the legislature, no person my:**

**a) construct, dredge, or enlarge any artificial water body that connects with a navigable waterway;**

**b) construct, dredge, or enlarge any part of an artificial water body that is located within 500 feet of the ordinary high-water mark of an existing navigable waterway, including a stormwater management pond that does not discharge into a navigable waterway except as a result of storm events; or**

**c) grade or remove topsoil from the bank of any navigable waterway where the area exposed by the grading or removal will exceed 10,000 square feet.**

**For activities that are not exempt and that are not subject to a general permit, a person may apply to the department for an individual permit. The department shall issue an individual permit if it finds the activity will not be detrimental to the public interest, the activity will not cause environmental pollution, any enlargement connected to a navigable waterway complies will all of the laws relating to platting of land and sanitation, and no material injury will result to the riparian rights of any riparian owners of real property that abuts any water body that is affected by the activity. (See Wis. Stats. §§ 30.19(1g)-(4). See also managed use #3, 4 and 5)**

KPS Response: KPS does not routinely engage in these activities. If a future activity at KPS involves any of these avtivities, KPS will obtain the appropriate permit.

**4.13) Any person, firm, corporation or municipality desiring a permit to construct, operate and maintain a dam shall file an application for a permit with the Wisconsin Department of Natural Resources. The department may require the amendment of the application. If it appears that the construction, operation or maintenance of the proposed dam…**

**4.14) Any person, firm, corporation or municipality desiring a permit to operate and maintain a dam shall…**

KPS Response: KPS does not routinely engage in these activities. If a future activity at KPS involves any of these avtivities, KPS will obtain the appropriate permit.

**4.15) No transfer or assignment of any permit granted under § 31.06 or 31.08 shall be of any effect whatsoever unless it is in writing and a certified copy thereof within 10 days after the execution thereof, is filed with the department and unless such transfer or assignment is approved in writing by the department; and no such transfer or assignment shall be approved by the department except after an investigation and a finding that the transfer or assignment is not made or intended to be made for a purpose or to create conditions prohibited by § 196.665 and that the transferee or assignee has complied with § 31.14(2) or (3). No permit shall be transferred or assigned to a foreign corporation. (§ 31.21 (1))**

KPS Response: Should KPS in the future need to transfer or assign a KPS permit to some other entity, it will comply with filing requirements.

**4.16(a) It is the policy of the state to preserve the public rights in navigable waters, including those created by dams…**

**4.16(b) A permit shall not be granted for constructing ,maintaining and operating, or raising or enlarging a dam…**

**4.16(c) The Wisconsin department of natural resources may by rule require all or special classes of persons operating a dam…**

**4.17(a) The grantee of any permit and the owner of any dam…**

**4.17(b) The owner of any such permitted dam…**

**4.17(c) Except when emergency shall require the same…**

**4.17(d) The Wisconsin Department of Natural Resources shall**

**4.18) No owner of any dam…**

**4.19) No private bridge…**

**4.20) Every dam, bridge or other obstruction…**

**4.21) Each person, firm or corporation maintaining a dam on any navigable…**

**4.21.1 Unless an individual or a general permit has been issued or authorization has been granted…**

KPS Response: See KPS response to Policy 1.18.

**4.22) Any public utility may, pursuant to permit granted by resolution of the governing body of any city, village or town situated on any waters of Lake Michigan or Lake Superior or in the Great Lakes basin, construct, maintain and operate upon and under the bed thereof all cribs, intakes, basins, pipes and tunnels necessary or convenient for securing an adequate supply of water suitable for the purposes of such utility. (See Wis. Stats. § 30.21(1))**

KPS Response: This Policy is not applicable to KPS because KPS is not a public utility.

**5. Economic development.**

Note: The specific policies regarding economic development largely are state or local government functions and are therefore not applicable to KPS. For the sake of brevity, these policies are not presented in their entirety.

**5.1) The Wisconsin Department of Commerce shall…**

**5.2) The Wisconsin Department of Commerce shall…**

**5.3) The Wisconsin Department of Transportation shall…**

**5.4) The Wisconsin Department of Tourism shall…**

**5.5) The orderly and ecologically sound development of commercial tourist facilities shall be coordinated and stimulated by the Wisconsin Department of Tourism. (See SCA #2, and Wis. Stats. §§ 560.23(l)(f))**

**5.6) The Wisconsin Department of Natural Resources shall…**

**5.6.1) It is the intent of the State of Wisconsin to encourage a policy…**

**5.8) The Wisconsin Department of Natural Transportation shall…**

KPS Response: Policies 5.1 through 5.8 do not require any action by KPS.

**5.9) No person may divert water from a stream in the State of Wisconsin without an individual permit if the diversion is for the purpose of maintaining or restoring the normal level of a navigable lake or the normal flow of a navigable stream or if the diversion is for the purpose of agriculture or irrigation. No person except a person required to obtain an approval permit of a sewage system or extension plan may divert water from any lake or stream in this state without an individual permit if the diversion will result in a water loss averaging 2,000,000 gallons per day in any 30-day period above the person's authorized base level of water loss. (See Wis. Stats. § 30.18)**

KPS Response: KPS' withdrawal of water from Lake Michigan is authorized by its WDNR-issued WPDES Permit as described in the response to Policy 1.15.

**5.10) The Wisconsin Public Service Commission shall prepare a biennial strategic energy assessment that evaluates the adequacy and reliability of the state's current and future electrical supply. (See Wis. Stats. § 196.491(2)(a). See also SCA #4 and managed use #16.)**

KPS Response: Policy 5.10 does not require any action by KPS.

**5.10.1) Unless specified otherwise by the Wisconsin Statutes, no person may commence the construction of a facility unless the person has applied for and received a Certificate of Public Convenience and Necessity. (See Wis. Stats. §§ 196.491(3)(a)1 – 196.491(3b) and Wis. Admin. Code PSC 112)**

**5.10.2) The Wisconsin Public Service Commission shall approve an application for a Certificate of Public Convenience and Necessity only if the commission determines, among other findings, all of the following:**

**(a) The proposed facility satisfies the reasonable needs of the public for an adequate supply of electric energy. This does not apply to a wholesale merchant plant.**

**(b) The design and location or route is in the public interest considering alternative sources of supply, alternative locations or routes, individual hardships, engineering, economic, safety, reliability and environmental factors, except that the commission may not consider alternative sources of supply or engineering or economic factors if the application is for a wholesale merchant plant. In its consideration of the environmental factors, the commission may not determine that the design and location or route is not in the public interest because of the impact of air pollution if the proposed facility will meet statutory requirements for air pollution.**

**(c) For a high-voltage transmission line that is designed for operation at a nominal voltage of 345 kilovolts or more, the high voltage transmission line provides usage, service, or increased regional reliability benefits to the wholesale and retail customers or members in this state and the benefits of the high-voltage transmission line are reasonable in relation to the cost of the high-voltage transmission line.**

**(d) The proposed facility will not have undue adverse impact on other environmental values such as, but not limited to, ecological balance, public health and welfare, historic sites, geological formations, the aesthetics of land and water and recreational use.**

**(e) If it is a public utility, the commission may refuse to certify a project if it appears that the completion of the project will substantially impair the efficiency of the service of the public utility, provide facilities unreasonably in excess of the probable future requirements, or when placed in operation, add to the cost of service without proportionately increasing the value or available quantity of service unless the public utility waives consideration by the commission , in the fixation of rates, of such consequent increase of cost of service.**

**(f) The proposed facility will not unreasonably interfere with the orderly land use and development plans for the area involved.**

**(g) The proposed facility will not have a material adverse impact on competition in the relevant wholesale electric service market.**

**(h) For a large electric generating facility, brownfields are used to the extent practicable.**

**(i) The commission may not issue a Certificate of Public Convenience and Necessity until the Wisconsin Department of Natural Resources has issued all permits and approvals that are required prior to construction. The department shall issue, or authorize proceeding under, the necessary permits if it finds that the applicant has shown that the proposal (1) complies with environmental statutes and rules administered by the department and the federal environmental standards which the department has authority to enforce, (2) does not unduly affect public rights and interests in navigable waterways, the effective flood flow capacity of a stream, the rights of other riparian owners, or water quality. (See Wis. Stats. §§ 196.491(3) and 30.025, and Wis. Admin. Code ch. PSC 111-112)**

**5.10.3) The Wisconsin Public Service Commission may not certify any nuclear power plant unless the commission finds that a federally licensed facility, or a facility outside of the United States which the commission determines will satisfy the public welfare requirements of the people of the state, with adequate capacity to dispose of high-level nuclear waste from all nuclear power plants operating in the state will be available, as necessary, for the disposal of the waste and the proposed nuclear power plant, in comparison with feasible alternatives, is economically advantageous to ratepayers. (See Wis. Stats. § 196.493)**

KPS Response: KPS was duly authorized by the State of Wisconsin when KPS was originally built.

**5.11) If installation of utilization of a facility for which a Certificate of Convenience and Necessity has been granted is precluded or inhibited by a local ordinance, the installation and utilization of the facility may nevertheless proceed. (See Wis. Stat § 196.491(3)(i)-(j). See also SCA #4 and managed use #16)**

**5.12) The Wisconsin Department of Administration shall prepare and maintain contingency plans for responding to critical energy shortages so that when the shortages occur, they can be dealt with quickly and effectively. (See Wis. Stats. § 16.95(12))**

**KPS Response: Policies 5.11 through 5.12 address authority of the Public Service Commission of Wisconsin and are not applicable to KPS.**

**5.13) Except where the stream to be improved forms a boundary line between this and another state, no water power permit shall be granted or transferred until the applicant has filed with both the Wisconsin Department of Natural Resources and the Wisconsin Public Service Commission, in addition to all other things required by law to be filed, an agreement setting forth that, in the event any electric energy generated under said permit shall be transmitted or conveyed beyond the confines of this state to be there sold, the applicant will furnish to any resident of this of any corporation domiciled therein electric energy at reasonable rates to be determined by the commission, provided that the commission after public hearing shall find that public convenience and necessity require such service. (See Wis. Stats. § 31.095 (1))**

KPS Response: Policy 5.13 addresses permits for electrical energy generated by water power and is not applicable to KPS.

**5.14) Every corporation constructing, owning or operating a railroad shall restore every watercourse, street, highway, road or canal across, along or upon which such railroad may be constructed to its former state or to such condition that its usefulness shall not be materially impaired and thereafter maintain the same in such condition against an effects in any manner produced by such railroad. (See Wis. Stats. § 190.08)**

KPS Response: Policy 5.14 does not apply to KPS' operations.

**6. Governmental Interrelationships.**

Note: The governmental interrelationships policies address state and local government functions and actions and are therefore not applicable to KPS. They are not presented for the sake of brevity.

**7. Public Involvement.**

Note: The public involvement policies are applicable to KPS in as much as KPS and Dominion are members of the public and afforded the opportunity to participate in the state's coastal zone management activities. However, none of the policies are applicable to KPS and Dominion as the owner/operator of KPS as a facility sited and operating in Wisconsin's coastal zone; therefore, for the sake of brevity, the policies are not presented.

**References:**

E-1 WDNR (Wisconsin Department of Natural Resources) 2007. *Requirements for Cooling Water Intake Structures – WPDES Permit WI-0001571-07*. Letter to P. F. Faggert – Dominion Resources Services from D. Hantz – WDNR Wastewater Engineer on December 3, 2007.

E-2 EA Engineering (EA Engineering Science, and Technology, Inc.) 2007. Impingement Mortality and Entrainment Chracterization Report, Kewaunee Power Station, March 2006-February 2007 – Final Report. August.

E-3 Dominion (Dominion Resources Services) 2008. *Information Requirements Related to Cooling Water Intake Structures – WPDES Permit WI-0001571-07*. Letter to D. Hantz - Wisconsin Department of Natural Resources Wastewater Engineer from P. F. Faggert – Dominion Vice President and Chief Environmental Officer on January 4, 2008.

E-4 Wisconsin Department of Administration 2007. Wisconsin Coastal Management Program. October. Available at http://www.doa.state.wi.us/docview.asp?docid=7039. Accessed on June 13, 2008.

E-5 Wisconsin Department of Natural Resources. 1976. "Re: Petition of Wisconsin Public Service Corporation for the Imposition of Alternative Effluent Limitations and Thermal Mixing Zone Requirements for the Kewaunee Nuclear Power Plant, Town or Carlton, Kewaunee County." Letter and attachment, M. H. Van Susteren to A. W. Williams, et. Al., September 13.

E-6 Wisconsin Public Service Coorporation (WPSC). 1972. Letter from N.E. Knutzen, WPSC, to F. Deringer, WDNR, April 27, 1972; and Reply from R. Fassbender, WDNR, to N.E. Knutzen, WPSC, May 3, 1972.

E-7 Wisconsin Department of Natural Resources. 2003. Kewaunee County Trout Streams Map. May. Available at http://dnr.wi.gov/fish/species/trout/streammaps/troutmap_kewaunee.pdf. Accessed on January 10, 2008.

E-8 United States Geological Survey (USGS). Quad Map

E-9 Wisconsin Department of Natural Resources. 2006. Primary Sites – Northern Lake Michigan dated June 12, 2006. Available at http://dnr.wi.gov/org/land/er/publications/cw/NLMich/. Accessed on January 10, 2007.

E-10 US Department of Housing and Urban Development. 1980. Flood Insurance Rate Map County of Kewaunee, Wisconsin Unincorporated Areas, Community-Panel Number 5502120175B, September 3.

E-11 U.S. Nuclear Regulatory Commission. *Generic Environmental Impact Statement for License Renewal Nuclear Plants*, NUREG-1437, May 1996.

E-12 Wisconsin Department of Natural Resources. 1977. Letter, T.A. Kroehn, WDNR to E.W. James, WPSC, August 24.