per county. According to the GEIS sparseness and proximity matrix, PBNP ranks as Category 4 in terms of sparseness (i.e., greater than or equal to 46 persons/km^2 [120 persons/mi^2] within 32 km [20 mi]), and Category 3 in terms of proximity (i.e., one or more cities with 100,000 or more persons and less than 73 persons/km^2 [190 persons/mi^2] within 80 km [50 miles]). According to the GEIS, the sparseness and proximity scores identify PBNP as being located in a high-population area.

Housing impacts are a Category 2 issue (10 CFR Part 51, Subpart A, Appendix B, Table B-1). In 10 CFR Part 51, Subpart A, Appendix B, Table B-1, the NRC states that impacts on housing availability are expected to be of SMALL significance at plants located in high-population areas where growth-control measures that limit housing development are not in effect. PBNP is located in a high-population area, and Manitowoc County is not subject to growth-control measures.

SMALL 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 is required to meet new demand (NRC 1996). NMC anticipates that the actual number of new employees will be no more than two during the license renewal term. NMC does not plan any new refurbishment activity as part of the license renewal process; therefore, employment is not anticipated to change in the area as result of license renewal. Thus, NMC concludes that there are no impacts to housing from license renewal activities (NMC 2004a).

However, to establish an upper bound on possible increased employment during the license renewal term, the GEIS assumes that no more than 60 additional permanent workers might be needed at each unit during the license renewal period to perform routine maintenance and other activities related to license renewal. Hiring of these additional 60 employees could result in 40 indirect jobs, or an increased demand for a total of 100 housing units. This demand could be met from within Manitowoc County, which currently has approximately 1800 vacant units available. However, in light of the relatively high unemployment rate in the County, it is probable that most of these jobs would be filled by current County residents.

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources. Using this information, the staff has evaluated the potential housing impacts resulting from operation of PBNP during the license renewal term. The staff concludes that the potential housing impacts during the renewal term would be SMALL and mitigation is not warranted.

4.4.2 Public Services: Public Utility Impacts during Operations

Impacts on public utility services are considered to be SMALL if there is little or no change in the ability of the system to respond to the level of demand, and thus, there is no need to add capital facilities. Impacts are considered MODERATE if overtaxing of service capabilities occurs during periods of peak demand. Impacts are considered LARGE if existing levels of service (e.g., water or sewer services) are substantially degraded and additional capacity is needed to meet ongoing demands for services. The GEIS indicates that, in the absence of new and significant information to the contrary, the only impacts on public utilities that could be significant are impacts on public water supplies (NRC 1996).

PBNP obtains its water supply from private wells, and does not use water from local water suppliers (NMC 2004a). Consequently, the plant itself would have no impact on local water supplies. The maximum total capacity of all the water suppliers in Manitowoc County is approximately 53 million L/day (14 million gpd) greater than the current average daily use, or about 2.5 times the current use (Table 2-4). For individual water suppliers, the capacity ranges from 1.5 to 10 times the current use. There is ample additional capacity to supply any potential increase in demand due to license renewal.

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources. Using this information, the staff has evaluated the potential impacts of increased water use resulting from the potential increase in employment. NMC assumes that no more than one or two additional employees will be needed to support PBNP operations during the renewal term. The staff concludes that the potential impacts of increased water use resulting from the potential increase in employment during the renewal term would be SMALL and that no additional mitigation efforts would be warranted.

4.4.3 Offsite Land Use during Operations

Offsite land use during the license renewal term is a Category 2 issue (10 CFR Part 51, Subpart A, Appendix B, Table B-1). Table B-1 of 10 CFR Part 51 Subpart A, Appendix B, notes that "significant changes in land use may be associated with population and tax revenue changes resulting from license renewal."

Sections 3.7.5 and 4.7.4 of the GEIS define the magnitude of land-use changes as a result of plant operation during the license renewal term as follows:

SMALL – Little new development and minimal changes to an area's land-use pattern.

MODERATE – Considerable new development and some changes to the land-use pattern.

LARGE – Large-scale new development and major changes in the land-use pattern.

Tax revenue can affect land use because it enables local jurisdictions to provide the public services (e.g., transportation and utilities) necessary to support development. Section 4.7.4.1 of the GEIS states that the assessment of tax-driven land-use impacts during the license renewal term should consider (1) the size of the plant's payments relative to the community's total revenues, (2) the nature of the community's existing land-use pattern, and (3) the extent to which the community already has public services in place to support and guide development. If the plant's tax payments are projected to be small relative to the community's total revenue, tax-driven land-use changes during the plant's license renewal term would be SMALL, especially where the community has pre-established patterns of development and has provided adequate public services to support and guide development. Section 4.7.2.1 of the GEIS states that if tax payments by the plant owner are less than 10 percent of the taxing jurisdiction's revenue, the significance level would be SMALL. If the plant's tax payments are projected to be medium to large relative to the community's total revenue, new tax-driven land-use changes would be MODERATE. If the plant's tax payments are projected to be a dominant source of the community's total revenue, new tax-driven land-use changes would be LARGE. This would be especially true where the community has no pre-established pattern of development or has not provided adequate public services to support and guide development.

Manitowoc County and the Town of Two Creeks receive Shared Utility Payments because PBNP is located within their jurisdictions. Table 2-12 shows that the Town of Two Creeks received between $190,100 and $217,100 per year between 1996 and 2002, which corresponded to between 13.7 and 72 percent of the town's budget. Note that the 72 percent occurred in 1999, which was an anomalous year. Except for 1999, the highest portion of the town's budget provided by PBNP revenues was 24.5 percent. Table 2-13 shows that Manitowoc County has received approximately $800,000 per year between 1996 and 2002, which constituted between 1.2 and 2.0 percent of the County budget.

For the Town of Two Creeks, these revenues represent a significant portion of its budget (between 13.7 and 24.5 percent), and are expected to continue through the renewal period. These revenues constitute only a very small portion of the budget of Manitowoc County, and would not be expected to influence offsite development whether or not the PBNP operating license is renewed. Using NRC's criteria, PBNP's Shared Utility Payments have a MODERATE to LARGE impact on the Town of Two Creeks. However, NMC does not anticipate refurbishment or major construction during the license renewal period and, therefore, does not anticipate any increase in the assessed value of PBNP due to refurbishment-related

improvements, nor any related tax-increase-driven changes to offsite land use and development patterns (NMC 2004a). PBNP will continue to be a significant source of revenue for the Town of Two Creeks. However, despite having this income source since the plant was constructed, the Town of Two Creeks has experienced relatively little land use change over the past several decades. The Town of Two Creeks does not currently have a land use plan, but does use zoning to preserve it's rural character. In addition, no new major land use changes are planned for the Town of Two Creeks (NMC 2004a). For these reasons, NMC does not anticipate changes to local land use and development patterns as a result of license renewal.

NMC has identified that no more than one or two additional employees would be needed to support PBNP operations during the license renewal term, which is well below the assumption in the GEIS. This additional staffing is within normal employment variances at PBNP (NMC 2004a). In Section 3.7.5 of the GEIS (NRC 1996), the staff found that if plant-related population growth is less than five percent of the study area's total population, then offsite land-use changes would be SMALL. This is especially pertinent if the study area has established patterns of residential and commercial development, a population density of at least 23 persons/km^2 (60 persons/mi^2), and at least one urban area with a population of 100,000 or more within 80 km (50 mi). In the case of PBNP, population growth will be less than five percent of the County's total population, and Manitowoc County has established patterns of residential and commercial development guided by local comprehensive plans. In addition, there is a population density of 75 persons/km^2 (195 persons/mi^2) within an 80-km (50-mi) radius, and there is an urban area (Green Bay) with a population of over 100,000 within 80 km (50 mi). Consequently, the staff concludes that population changes resulting from license renewal are likely to result in SMALL offsite land-use impacts.

The staff has evaluated the potential impacts of offsite land use resulting from operation of PBNP. Because NMC does not anticipate refurbishment activities, the population growth related to license renewal of PBNP is expected to be relatively small, and there would be no new tax impacts on local land use, the staff concludes that the potential impacts of tax revenue changes resulting from license renewal would be likely to result in SMALL offsite land-use impacts.

4.4.4 Public Services: Transportation Impacts during Operations

On October 4, 1999, 10 CFR 51.53(c)(3)(ii)(J) and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, were revised to clearly state that "Public Services: Transportation Impacts During Operations" is a Category 2 issue (see NRC 1999 for more discussion of this clarification). The issue is treated as such in this SEIS.

Employees access PBNP primarily via State Route 42. Assuming an upper bound of 60 new employees to be hired during the license renewal period, the traffic on State Route 42 would

increase approximately 1.6 percent. During refueling events, approximately 300 additional personnel are employed at PBNP. This could increase the traffic on State Route 42 by 8 percent, which will have a negligible impact on the free flow of traffic.

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources. Using this information, the staff evaluated the potential impacts to transportation service resulting from operation of PBNP. The staff concludes that the potential impacts to transportation service during the renewal term would be SMALL and no mitigation efforts are warranted.

4.4.5 Historic and Archaeological Resources

The National Historic Preservation Act (NHPA) requires that Federal agencies take into account the effects of their undertakings on historic properties (16 USC 470 et seq.). The historic preservation review process, mandated by Section 106 of the NHPA, is outlined in regulations issued by the Advisory Council on Historic Preservation in 36 CFR Part 800. Renewal of a nuclear power plant OL is an undertaking that could potentially affect historic properties within the area of effect. Therefore, according to the NHPA, the NRC is to make a reasonable effort to identify historic properties in the areas of potential effects. If no historic properties are present or affected, the NRC is required to notify the State Historic Preservation Office (SHPO) before proceeding. If it is determined that historic properties are present, the NRC is required to assess and resolve possible adverse effects of the undertaking.

Prior to submitting its license renewal application to the NRC, NMC requested information from the Wisconsin SHPO about potential impacts of continued plant operation (NMC 2003b). The NMC initially concluded that there should be no impacts or minimal impacts to cultural resources because it anticipated that there would be little refurbishment or change in operations. In its response, in a letter dated January 6, 2004, the SHPO stated that cultural resources would need to be identified first to conclude that there were no adverse impacts (Wisconsin Historical Society [WHS] 2004). The SHPO further noted that the fishing shed, described in Section 2.2.9.2, would need to be evaluated for eligibility for the National Register of Historic Places (NRHP). The PBNP site, but not necessarily the area within direct plant control, contains leased farm lands and the SHPO noted that "continued plowing of a significant archaeological site may lead to the destruction of the site." Consequently, NMC initiated activities to identify the cultural resources that may be affected, to examine the architectural significance of the fishing shed, and to conduct surveys of the leased farm lands.

NMC (NMC 2004c) forwarded available information from its contractor, AVD Archaeological Services, Inc. (AVD), to the SHPO to provide additional historical context for the fishing shed. In a letter dated March 11, 2004, the SHPO responded to NMC that additional evaluation was

needed and also suggested that an archaeological survey be completed or that NMC enter into a programmatic agreement with the SHPO (WHS 2004). Subsequently, an architectural historian was engaged by NMC to examine the fishing shed for significance under the NHPA. As a result of this examination, on October 21, 2004, the WHS issued a Determination of Eligibility stating that the shed is not eligible for inclusion on the NRHP (We Energies 2004c).

NMC's contractor, AVD, conducted further examinations to inventory cultural remains on leased farmlands outside the area of direct plant control. Approximately 45 ha (112 ac) were not inventoried. This land was not inventoried because it was either designated as part of the cropland reserve program, which is set aside for natural revegetation, or it was too heavily vegetated to survey. The area surveyed comprises 440 ha (1085 ac), or approximately 86 percent of the PBNP site. Four artifact scatters within the surveyed area were recommended for avoidance or, in the event that avoidance is not possible, for additional evaluation. NMC stated that these recommendations would be implemented for any future construction in those areas (We Energies 2004a). Agricultural activities can be expected to continue in those areas during the period of license renewal. Therefore, some continued disturbance and soil loss at these four artifact scatters is possible. The four scatters appear to be limited in size and complexity. The remaining PBNP site area has either been heavily disturbed by construction of the plant and ancillary facilities or consists of second-growth wooded areas.

NMC maintains an internal procedure entitled "Control of Excavation" (NP 8.4.19) that establishes reviews to be conducted prior to excavation. As a result of interactions with the Wisconsin SHPO, proposed revisions to this procedure set criteria for preliminary cultural resource reviews. In addition, the proposed revisions provide for monitoring (to be conducted during excavation), and must include observations for cultural resources. Work will be stopped if unanticipated historic or prehistoric archaeological remains are encountered. We Energies' review of excavations includes consultation with the SHPO prior to disturbance of known or suspected cultural resources. The SHPO would be notified immediately upon the discovery of unanticipated cultural resources as well. By implementing its environmental review procedure, the licensee would take care during normal ground-disturbing operations and maintenance to ensure that historic properties are not inadvertently impacted. When modified, these procedures would ensure that cultural resources are protected through the period of the renewed license.

Major refurbishment of PBNP is not anticipated during the license renewal period; consequently, it is not expected that currently undeveloped portions of the site will be used for operations during the renewal period. No change in the amount or type of ground-disturbing activities is expected at the PBNP site, the leased lands, or in conjunction with transmission line

maintenance. Operation of PBNP, as outlined in NMC's application for license renewal, would protect undiscovered historic or archaeological resources on the site because the undeveloped natural landscape and vegetation would remain undisturbed and access to the site would remain restricted.

The staff concludes that adverse impacts on identified historic properties are minimal. This conclusion is based on the following: the staff's cultural resources analyses and consultation with the SHPO; NMC's conclusions that major refurbishment activities or changes in type or amount of ground disturbance will not be undertaken during the license renewal period; WHS's determination that the fishing shed is not eligible for the NRHP; the limited size and complexity of the artifact scatters; and the protection afforded to the other known archaeological site, which is in a cropland reserve program and is not expected to be disturbed. Therefore, potential impacts on historic and archaeological resources are expected to be SMALL, and no additional mitigation is warranted. Based on the further examinations conducted by NMC, the proposed revisions to procedures governing land-disturbing activities, and measures to notify the SHPO, the staff concludes that it is unnecessary at this time to enter into a cultural resources programmatic agreement with the SHPO to protect cultural resources.

4.4.6 Environmental Justice

Environmental justice refers to a Federal policy requiring Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental impacts of its actions on minority[a] or low-income populations. The memorandum accompanying Executive Order 12898 (59 FR 7629) directs Federal executive agencies to consider environmental justice under the National Environmental Policy Act of 1969 (NEPA). The Council on Environmental Quality (CEQ) has provided guidance for addressing environmental justice (CEQ 1997). Although the executive order is not mandatory for independent agencies, the NRC has voluntarily committed to undertake environmental justice reviews. On August 24, 2004, the Commission published a Final Policy Statement in the *Federal Register* on the treatment of environmental justice matters in NRC regulatory and licensing actions (NRC 2004e). The Final Policy Statement reaffirms that the Commission is committed to full compliance with the requirements of NEPA. Specific guidance is provided in NRC Office of Nuclear Reactor Regulation Office Instruction LIC-203, Revision 1, *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues* (NRC 2004c).

(a) The NRC guidance for performing environmental justice reviews defines "minority" as American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific Islander, Black races, or Hispanic ethnicity. "Other" races and multiracial individuals may be considered as separate minorities (NRC 2004c).

The scope of the review as defined in NRC guidance (NRC 2004c) includes identification of impacts on minority and low-income populations, the location and significance of any environmental impacts during operations on these populations, and information pertaining to mitigation. It also includes evaluation of whether these impacts are likely to be disproportionately high and adverse.

The staff looks for minority and low-income populations within the 80-km (50-mi) radius of the site. For the purposes of the staff's review, a minority population exists in a census block group[(a)] if the percentage of each minority and aggregated minority category within the census block group exceeds the corresponding percentage of minorities in the state of which it is a part by 20 percent, or if the percentage of minorities within the census block group is at least 50 percent. A low-income population exists if the percentage of low-income population in a census block group within the area of study exceeds the percentage of low-income population in the State of which it is a part by 20 percent, or if the percentage of low-income population within a census block group is at least 50 percent.

The staff examined the geographic distribution of minority and low-income populations within 80 km (50 mi) of the PBNP site, employing GEn&SIS to analyze the 2000 census data (NRC 2004b). The staff supplemented its analysis with field inquiries to county planning departments and municipal officials.

Within an 80-km (50-mi) radius of PBNP, there are 567 block groups. Based on the NRC criteria, and using the population of Wisconsin as the comparative population, the staff made the following determinations:

(1) No populations of Native Hawaiian or other Pacific Islander, other single minorities, or multiracial minorities exist in the geographic area.
(2) American Indian or Alaskan Native minority populations exist in five block groups. These populations are located in Brown and Outagamie counties and are associated with the Oneida reservation.
(3) Asian minority populations exist in a single block group located in Brown County.
(4) Black minority populations exist in a single block group also located in Brown County.
(5) The GEn&SIS database did not identify any block groups with Hispanic populations that exceeded the 20-percent criterion.

(a) A census block group is a combination of census blocks, which are statistical subdivisions of a census tract. A census block is the smallest geographic entity for which the USCB collects and tabulates decennial census information. A census tract is a small, relatively permanent statistical subdivision of counties delineated by local committees of census data users in accordance with USCB guidelines for the purpose of collecting and presenting decennial census data. Census block groups are subsets of census tracts (USCB 2001).

The "greater than 50 percent" criterion did not apply to any block group.

Figure 4-1 shows the locations of block groups that meet the criteria for minority populations.

NRC guidance defines "low-income" by using USCB statistical poverty thresholds (NRC 2004c). A block group is considered to be low income if the following criteria are satisfied:

(1) The low-income population of the census tract or environmental impact site exceeds 50 percent, or
(2) 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.

According to the USCB, 5.6 percent of households in Wisconsin have incomes below the poverty level (USCB 2000b).

Based on the "more than 20 percentage points" criterion, eight block groups contain a low-income population. All are found in Brown County. Figure 4-2 shows their locations.

After identifying the locations of minority and low-income populations, the staff evaluated whether any of the environmental impacts of the proposed action could affect these populations in a disproportionately high and adverse manner. Based on staff guidance (NRC 2004c), air, land, and water resources within approximately 80 km (50 mi) of the PBNP site were examined. Within that area, a few potential environmental impacts could affect human populations, but all of these impacts were considered to be SMALL for the general population.

The pathways through which the environmental impacts associated with PBNP license renewal can affect human populations are discussed in each associated section of this report. During the staff's review of the information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources, the staff has found no unusual resource dependencies or practices, such as subsistence agriculture, hunting, or fishing, through which minority and/or low-income populations could be disproportionately highly and adversely affected. In addition, the staff has not identified any location-dependent disproportionately high and adverse impacts that would affect these minority and low-income populations. The staff concludes that potential offsite impacts from PBNP to minority and low-income populations during the renewal term would be SMALL and no mitigation measures would be warranted.

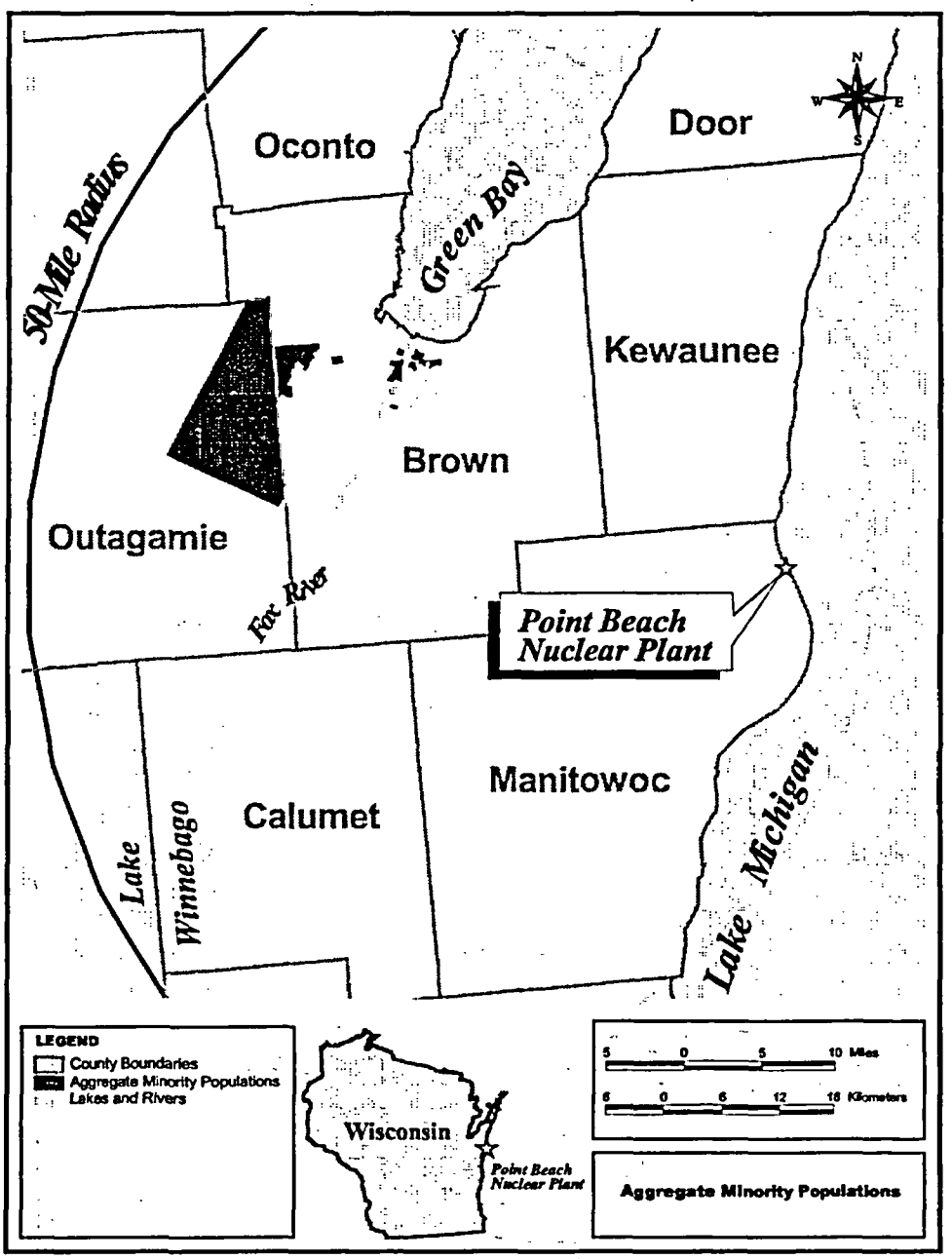

Figure 4-1. Geographic Distribution of Minority Populations (Shown in Shaded Areas) within 80 km (50 mi) of PBNP Based on Census Block Group Data[a]

(a) Note: Some of the census block groups extend into open water.

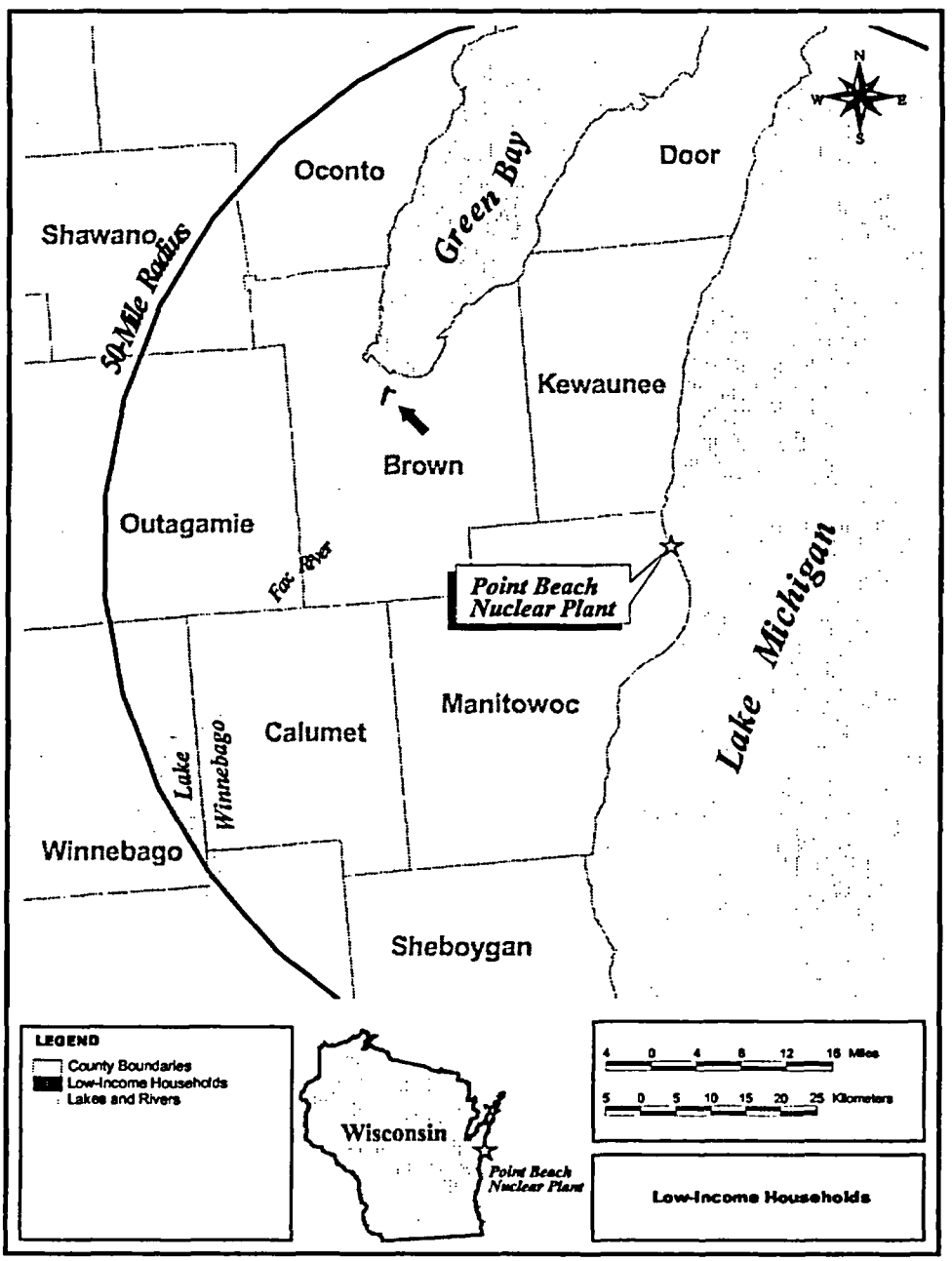

Figure 4-2. Geographic Distribution of Low-Income Populations (Shown in Shaded Areas) within 80 km (50 mi) of the PBNP Site Based on Census Block Group Data [(a)]

(a) Note: Some of the census block groups extend into open water.

4.5 Groundwater Use and Quality

The Category 1 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that is applicable to PBNP groundwater use and quality is listed in Table 4-9. NMC stated in its ER that it is not aware of any new and significant information associated with the renewal of the PBNP OLs (NMC 2004a). The staff has not identified any new and significant information related to groundwater use and quality resulting from operations at PBNP during its independent review of the NMC ER (NMC 2004a), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts related to this issue beyond those discussed in the GEIS. For these issues, the GEIS concluded that the impacts would be SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-9. Category 1 Issue Applicable to Groundwater Use and Quality during the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
GROUNDWATER USE AND QUALITY	
Groundwater use conflicts (potable and service water; plants that use <100 gpm).	4.8.1.1

A brief description of the staff's review and the GEIS conclusions, as codified in Table B-1, 10 CFR Part 51, follows.

- Groundwater use conflicts (potable and service water; plants that use <100 gpm). Based on information in the GEIS, the Commission found that

  > Plants using less than 100 gpm are not expected to cause any groundwater use conflicts.

  As discussed in Section 2.2.2, PBNP groundwater use is less than 380 L/min (100 gpm). WDNR has verified that currently there are no groundwater-related issues of concern to WDNR at PBNP, and no discharges to groundwater from PBNP requiring permits by regulatory agencies (WDNR 2005). The staff has not identified any new and significant information during its independent review of the NMC ER, the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no groundwater use conflicts during the renewal term beyond those discussed in the GEIS.

There are no Category 2 issues related to groundwater use and quality for PBNP.

4.6 Threatened or Endangered Species

Threatened or endangered species are listed as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. This issue is listed in Table 4-10.

Table 4-10. Category 2 Issue Applicable to Threatened or Endangered Species during the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
THREATENED OR ENDANGERED SPECIES (FOR ALL PLANTS)			
Threatened or endangered species	4.1	E	4.6

This issue requires consultation with appropriate agencies to determine whether threatened or endangered species are present and whether they would be adversely affected by continued operation of the nuclear plant during the license renewal term. The presence of threatened or endangered species in the vicinity of the PBNP site is discussed in Sections 2.2.5 and 2.2.6.

The staff initiated informal consultation with the FWS (NRC 2004a) and the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NRC 2004d) by letter requesting information on species protected under the Endangered Species Act of 1973 (ESA) that occur in the vicinity of the PBNP site and its associated transmission line ROWs. No response was received from the National Marine Fisheries Service; however, the FWS responded by letter (FWS 2004) indicating no known occurrences of Federally listed threatened or endangered species, proposed species, candidate species, or designated or proposed critical habitats on the PBNP site. The FWS also noted that beach habitat near PBNP could be suitable nesting habitat for piping plover (*Charadrius melodus*). The NRC staff identified three other potentially occurring Federally listed species: the bald eagle (*Haliaeetus leucocephalus*), the dune (or Pitcher's) thistle (*Cirsium pitcheri*), and the dwarf lake iris (*Iris lacustris*). Copies of the consultation correspondence, including the FWS's approval of the staff's Biological Assessment (BA) on May 5, 2005, are contained in Appendix E.

4.6.1 Aquatic Species

The staff has reviewed the information provided by the applicant and public information and has contacted the FWS and the WDNR. No Federally listed threatened or endangered aquatic species occur in Lake Michigan in the vicinity of the PBNP site (We Energies 2004b), and no

Federally listed threatened or endangered species occur in the streams crossing the transmission line ROWs in the vicinity of the PBNP site. Therefore, license renewal would have no effect on any Federally listed aquatic species.

4.6.2 Terrestrial Species

There are no Federally listed threatened or endangered terrestrial species known to occur at the PBNP site or associated transmission line ROWs (NMC 2004a; We Energies 2004b). There are four Federally listed threatened or endangered terrestrial species that have been identified as potentially occurring in the vicinity of PBNP and its associated transmission line ROWs. Three species have been recorded in Manitowoc County: the bald eagle, the piping plover, and the dune (or Pitcher's) thistle (WDNR 2004b). The dwarf lake iris, also a Federally listed species, has been recorded in Brown County, which is traversed by a PBNP transmission line.

The staff has reviewed the information provided by the applicant, the FWS, WDNR, the scoping process, and public comments on the draft SEIS. No Federally listed threatened or endangered terrestrial species have been reported to occur on the PBNP site or within the associated transmission line ROWs. Four Federally listed terrestrial species have the potential to occur at the PBNP site or along associated transmission line ROWs. The staff has evaluated the potential impact likely to result from operation of the PBNP for an additional 20 years during the renewal term and has documented its conclusions in a biological assessment (BA) transmitted to the FWS by letter dated November 22, 2004. A supplement to the BA was submitted on April 21, 2005 (Appendix E), that included a detailed framework for piping plover monitoring and reporting. In a letter dated May 5, 2005 (FWS 2005), the FWS concurred with the staff's determination that the proposed action may affect but would not adversely affect the piping plover, thus concluding consultations with the NRC under Section 7 of the ESA. The staff's determination is that license renewal for the PBNP may affect, but is not likely to adversely affect, the bald eagle and the piping plover, and would have no effect on the dune (or Pitcher's) thistle or dwarf lake iris.

4.6.3 Conclusions

Based on the discussion above, the staff concludes that the potential impacts of continued operation of the PBNP and its associated transmission line ROWs for an additional 20 years during the renewal term on threatened or endangered species would be SMALL. During the course of the staff's evaluation, the staff considered mitigation measures for continued

operation of the PBNP. Based on this evaluation, the staff expects that measures in place at the PBNP and its associated transmission line ROWs are appropriate (as described in the amended BA submitted to the FWS [Appendix E]), and no additional mitigation measures are warranted.

4.7 Evaluation of Potential New and Significant Information on Impacts of Operations during the Renewal Term

The staff reviewed the discussion of environmental impacts associated with operation during the renewal term in the GEIS and has conducted its own independent review, including public scoping meetings, to identify issues with new and significant information. The staff has not identified new and significant information on environmental issues listed in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, related to operation during the renewal term. Processes for identification and evaluation of new information are described in Section 1.2.2.

4.8 Cumulative Impacts of Operations during the Renewal Term

The staff considered potential cumulative impacts during the evaluation of information applicable to each of the potential impacts of operations of PBNP during the renewal term. The impacts of the proposed license renewal are combined with other past, present, and reasonably foreseeable actions to determine whether cumulative impacts exist. For the purposes of this analysis, past actions were those related to the resources at the time of the plant licensing and construction, present actions are those related to the resources at the time of current operation of the power plant, and future actions are considered to be those that are reasonably foreseeable through the end of plant operation. Therefore, the analysis considers potential impacts through the end of the current license term, and through the 20-year license renewal term. The geographical area to be evaluated over which past, present, and future actions that could contribute to cumulative impacts would occur is dependent on the type of action considered and is described below for each impact area.

The impacts of the proposed action, as described in Section 4, are combined with the impacts of other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. These combined impacts are defined as "cumulative" in 40 CFR 1508.7 and include individually minor but collectively significant actions taking place over a period of time. It is possible that an impact that may be SMALL by itself could result in a MODERATE or LARGE impact when considered in

combination with the impacts of other actions on the affected resource. Likewise, if a resource is regionally declining or imperiled, even a SMALL individual impact could be important if it contributes to or accelerates the overall resource decline.

4.8.1 Cumulative Impacts Resulting from Operation of the Plant Cooling System

For the purposes of this analysis, the geographic area considered for cumulative impacts resulting from operation of the PBNP cooling system is primarily the western portion of Lake Michigan within an 80-km (50-mi) radius of PBNP. As described in Section 4.1, the staff found no new and significant information indicating that the conclusions regarding any of the Category 1 issues related to the PBNP cooling system are inconsistent with the conclusions in the GEIS (NRC 1996). Additionally, the staff has determined that none of the Category 2 issues related to the PBNP cooling system are likely to have greater than a SMALL impact on local water quality or aquatic resources.

Section 2.2.5 discusses the major changes and modifications within Lake Michigan that have had the greatest impacts on aquatic resources. These include physical and chemical stresses, lakefront developments, overfishing, and introduction of non-native species. The following physical and chemical stresses have impacted Lake Michigan: urban, industrial, and agricultural contaminants (e.g., nutrients, toxic chemicals, sediments); stream modifications (e.g., dams); land-use changes (e.g., residential, recreational, agricultural, and industrial development); dredging; shoreline modifications; wetland elimination and modification; water diversions (e.g., canals); impingement and entrainment in water-intake structures; thermal loading from cooling water; ice control for navigation; and major degradative incidents or catastrophes (Francis et al. 1979; Fuller et al. 1995). These, in turn, can affect fish, benthos, and plankton populations; cause a loss of habitat; cause deformities or tumors in fish and other biota; and contaminate fish, which leads to restrictions on human consumption (Eshenroder et al. 1995).

The dramatic changes to fish communities caused by habitat modification and development, overfishing, and non-native species introductions have been reviewed for the period from the 1800s to 1970 (Wells and McLain 1973) and from 1970 to 2000 (Madenjian et al. 2002). Disruptions in the native fish community (primarily caused by introduction of the sea lamprey [*Petromyzon marinus*] and alewife [*Alosa pseudoharengus*]), coupled with habitat alterations and degradation, contributed to the decline of important commercial and sport fisheries by the end of the 1950s. The alewife is believed to have contributed to the extinction of three deepwater cisco species (*Coregonus* spp.) and the suppression of burbot (*Lota lota*), emerald shiner (*Notropis atherinoides*), lake herring (*Coregonus artedi*), yellow perch (*Perca flavescens*), deepwater sculpin (*Myoxocephalus thompsoni*), and spoonhead sculpin (*Cottus ricei*). The alewife has recently been implicated as a possible factor inhibiting the success of lake trout (*Salvelinus namaycush*) reproduction, as alewives have been observed eating lake

trout fry (Eshenroder et al. 1995). In the 1960s, programs to extend control of sea lamprey, stocked trout, and salmon (*Oncerhynchus*) species began to rehabilitate the Lake Michigan fish community, control alewife numbers, and provide recreational fisheries (Eshenroder et al. 1995).

Future contributions to cumulative impacts to aquatic resources within Lake Michigan would generally occur from those actions that currently cause impacts (e.g., human habitation, urban and industrial development, agriculture, commercial and recreational fisheries, and spread of non-native species). The primary management challenges would be to keep the salmonid community in balance with the available forage base, while keeping alewife levels suppressed at a level that does not threaten native species (Eshenroder et al. 1995). Remaining problems include inadequate natural reproduction of salmonids, low abundance or complete loss of many native fish stocks, continued problems with exotic species, continued difficulties in suppressing sea lampreys, and continued unacceptable levels of pollution and toxic chemicals (Eshenroder et al. 1995).

The potential exists for severe impacts to aquatic resources from large oil or chemical spills within Lake Michigan, but the risk of such spills is relatively small. The probability of smaller spills is higher, but the impacts from such spills would probably be small, temporary, and unlikely to severely affect aquatic resources, especially if spill response activities are undertaken when such events occur.

The potential exists for the expansion of non-native species that have already begun to occur in Lake Michigan, and for additional non-native species to become established within the lake (Ricciardi and MacIsaac 2000; Ricciardi and Rasmussen 1998). Any future ecological changes that may be associated with global climate change would occur much more slowly than those induced by invasions of non-native species (Madenjian et al. 2002).

The lake water supply is adequate to meet the cooling-water needs of PBNP under all conditions. As discussed in the NMC ER, KNPP is located on the western shore of Lake Michigan in Kewaunee County, approximately 8 km (5 mi) north of the PBNP site. Studies conducted of the hydrologic characteristics of this portion of Lake Michigan indicate that the discharge heat of KNPP does not interact with the discharge heat of PBNP (Wisconsin Public Service Corporation 1972). The staff, while preparing this assessment, assumed that other industrial, commercial, or public installations could be located in the general vicinity of the PBNP site prior to the end of PBNP operations. The discharge of water to Lake Michigan from these facilities would be regulated by the WDNR. The discharge limits are set considering the overall or cumulative impact of all of the other regulated activities in the area. Compliance with the CWA and the WPDES permit minimizes PBNP's cumulative impacts on aquatic resources. Continued operation of PBNP would require renewed discharge permits from the WDNR, which would address cumulative water-quality objectives.

The staff also considered cumulative impacts to threatened or endangered aquatic species. As discussed in Section 2.2.5, there are no Federally listed threatened or endangered aquatic species known to occur in the offshore areas associated with the PBNP site (NMC 2004a). For these reasons, the staff has determined that the continued operation of PBNP would not contribute to a regional cumulative impact to these species, regardless of whether other actions occur that could have adverse impacts.

Therefore, the staff concludes that the SMALL impacts of PBNP cooling system operations, including entrainment and impingement of fish and shellfish, heat shock, impacts on threatened or endangered species, or any of the cooling system related Category 1 issues, are not contributing to an overall decline in water quality, the status of the fishery, or other aquatic resources. Therefore, the staff concludes that the potential cumulative impacts of operation of the cooling system of PBNP would be SMALL and that no mitigation measures are warranted.

4.8.2 Cumulative Impacts Resulting from Continued Operation of the Transmission Lines

The continued operation of the electrical transmission facilities connecting PBNP to the transmission grid was evaluated to determine if there is the potential for interactions with other past, present, and future actions that could result in adverse cumulative impacts. The staff considered potential cumulative impacts to terrestrial resources (such as wildlife populations and the size and distribution of habitat areas), aquatic resources (such as wetlands, floodplains, and stream crossings), and both the acute and chronic effects of electromagnetic fields. For the purposes of this analysis, the geographic area that encompasses the past, present, and foreseeable future actions that could contribute to adverse cumulative effects is the area that contains the transmission lines associated with the PBNP site. As described in Section 4.2, the staff found no new and significant information indicating that the conclusions regarding any of the Category 1 issues related to the PBNP transmission lines are inconsistent with the conclusions in the GEIS.

As discussed in Section 4.6, ATC implements a ROW inspection and maintenance program for transmission lines associated with PBNP using vegetation management procedures that are protective of wildlife and habitat resources over all of its ROWs (ATC 2004). None of the management procedures are expected to alter wetland or floodplain hydrology or adversely affect vegetation characteristics of these or other habitats. The ATC maintenance procedures also ensure minimal disturbance to wildlife. Continued operation and maintenance of these ROWs are not likely to contribute to a regional decline in wildlife and habitat resources during the license renewal term.

There are no known or planned activities within the 80-km (50-mi) radius area of consideration that could potentially produce additional impacts associated with transmission lines. Therefore, the staff has determined that the cumulative impacts of the continued operation of the PBNP transmission lines would be SMALL, and that no mitigation measures are warranted.

4.8.3 Cumulative Radiological Impacts

The EPA and NRC established radiological dose limits for protection of the public and workers from both acute and long-term exposure to radiation and radioactive materials. These dose limits are codified in 40 CFR Part 190 and 10 CFR Part 20. As described in Section 2.2.7, the public and occupational doses resulting from operation of PBNP are well below regulatory limits, and as described in Section 4.3, the impacts of these exposures would be SMALL. For the purposes of this analysis, the geographical area considered is the area included within an 80-km (50-mi) radius of the PBNP site (Figure 2-1).

EPA regulations at 40 CFR Part 190 limit the dose to members of the public from all sources in the nuclear fuel cycle, including nuclear power plants, fuel fabrication facilities, waste disposal facilities, and transportation of fuel and waste. In addition, as stated in Section 2.2.7, NMC has conducted a radiological environmental monitoring program around the PBNP site since before operations began in 1970. This program measures radiation and radioactive materials from all sources, including PBNP.

NMC also conducts a radiological environmental monitoring program on and in the vicinity of KNPP, which is located on the western shore of Lake Michigan in Kewaunee County, approximately 8 km (5 mi) north of the PBNP site. Radionuclide concentrations from the environmental monitoring program are compared to levels measured at control locations and in preoperational studies, and any influence of KNPP on PBNP doses (and vice versa) is taken into account.

The NRC would regulate any future actions associated with PBNP that could contribute to cumulative radiological impacts. Therefore, the staff has determined that the cumulative radiological impacts of continued operation of PBNP would be SMALL and that additional mitigation is not warranted.

4.8.4 Cumulative Socioeconomic Impacts

The continued operation of PBNP is not likely to result in significant cumulative impacts for any of the socioeconomic impact measures assessed in Section 4.4 (public services, housing, and offsite land use) because operating expenditures, staffing levels, and local tax payments during

renewal would be similar to those during the current license period. Similarly, the proposed action is not likely to result in significant cumulative impacts on historic and archaeological resources.

When combined with the impact of other potential activities likely in the area surrounding the PBNP site, socioeconomic impacts resulting from PBNP license renewal would not produce an incremental change in any of the impacts identified. The staff therefore determined that the impacts on employment, personal income, housing, local public services, utilities, and education occurring in the local socioeconomic environment as a result of license renewal activities, in addition to the impacts of other potential economic activity in the area, would be SMALL.

The staff determined that the impact on offsite land use would be SMALL because no refurbishment activities are planned at PBNP, and no new incremental sources of or changes to plant related tax payments are expected that could influence land use by fostering considerable growth. The impacts of license renewal on transportation and environmental justice would also be SMALL. The staff identified the locations of minority and low-income populations, and evaluated whether any of the environmental impacts of the proposed action could affect these populations in a disproportionately high and adverse manner. Based on staff guidance (NRC 2004c), air, land, and water resources within approximately 80 km (50 mi) of the PBNP site were examined. Within that area, a few potential environmental impacts could affect human populations, but all of these impacts were considered to be SMALL for the general population. There are no reasonably foreseeable scenarios that would alter these conclusions in regard to cumulative impacts.

Based on the archaeological surveys conducted to date at the PBNP site (discussed in Section 4.4.5) and the very small likelihood that significant undiscovered cultural resources exist within the site boundaries, it does not appear that the proposed license renewal would adversely affect these resources. The applicant has indicated that no refurbishment or replacement activities, including additional ground-disturbing activities, at the plant site (or along existing transmission line ROWs) are planned for the license renewal period (NMC 2004a). Therefore, continued operation of PBNP would likely protect any cultural resources present within the PBNP site boundary by protecting those lands from development and providing secured access. Prior to ground-disturbing activity in an undisturbed area, the applicant evaluates the potential for impacts to cultural resources, in consultation with the SHPO and appropriate Native American tribes as required under Section 106 of the NHPA. The staff therefore determined that the contribution to a cumulative impact on cultural resources by continued operation of PBNP during the license renewal period is considered to be SMALL.

Therefore, the staff has determined that the cumulative socioeconomic impacts of continued operation of PBNP would be SMALL and that additional mitigation is not warranted.

4.8.5 Cumulative Impacts on Groundwater Use and Quality

As discussed in Section 2.2.2, water for drinking and sanitary purposes at PBNP is withdrawn from groundwater by five active onsite domestic supply wells having an average flow rate of about 24 L/min (6.5 gpm), or 35,000 L/day (9300 gpd). PBNP groundwater use is not expected to increase significantly during the license renewal period.

As discussed in Section 4.5, the impact of current plant operations and groundwater withdrawals on the aquifer is considered to be SMALL and the staff did not identify any new and significant information to indicate the possibility of groundwater use conflicts during the renewal term beyond those discussed in the GEIS. There are no known current or planned projects requiring groundwater withdrawals in the vicinity of PBNP that, if implemented in addition to license renewal, would potentially cause an adverse impact on groundwater use and quality. Therefore, the staff has determined that the cumulative impacts of continued operation of PBNP on groundwater use and quality during the license renewal period would be SMALL and that no mitigation measures are warranted.

4.8.6 Conclusions Regarding Cumulative Impacts

The staff considered the potential impacts resulting from operation of PBNP during the license renewal term and other past, present, and future actions in the vicinity of PBNP. For each impact area, the staff has determined that the potential cumulative impacts resulting from PBNP operation during the license renewal term would be SMALL and mitigation is not warranted.

4.9 Summary of Impacts of Operations during the Renewal Term

Neither NMC nor the staff is aware of information that is both new and significant related to any of the applicable Category 1 issues associated with the PBNP operation during the renewal term. Consequently, the staff concludes that the environmental impacts associated with these issues are bounded by the impacts described in the GEIS. For each of these issues, the GEIS concluded that the impacts would be SMALL and that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

Plant-specific environmental evaluations were conducted for 10 Category 2 issues applicable to PBNP operation during the renewal term and for environmental justice and chronic effects of electromagnetic fields. For all 10 issues and environmental justice, the staff has concluded that the potential environmental impact of renewal term operations of PBNP would be of SMALL significance in the context of the standards set forth in the GEIS and that additional mitigation

would not be warranted. In addition, the staff has determined that a consensus has not been reached by appropriate Federal health agencies regarding chronic adverse effects from electromagnetic fields. Therefore, the staff did not evaluate this issue further. Finally, the staff has considered potential cumulative impacts resulting from PBNP operation during the license renewal term and has determined that the cumulative impacts of continued operation of PBNP during the license renewal term would be SMALL.

4.10 References

10 CFR Part 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for Protection Against Radiation."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

36 CFR Part 800. Code of Federal Regulations, Title 36, *Parks, Forests, and Public Property*, Part 800, "Protection of Historic and Cultural Resources."

40 CFR Part 190. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

40 CFR Part 1508. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 1508, "Terminology and Index."

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5.0 Environmental Impacts of Postulated Accidents

Environmental issues associated with postulated accidents are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been 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 characteristics.

(2) Single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high level waste and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1 and, therefore, additional plant-specific review of these issues is required.

This chapter describes the environmental impacts from postulated accidents that might occur during the license renewal term.

5.1 Postulated Plant Accidents

Two classes of accidents are evaluated in the GEIS. These are design-basis accidents (DBAs) and severe accidents, as discussed below.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

5.1.1 Design-Basis Accidents

In order to receive NRC approval to operate a nuclear power facility, an applicant for an initial operating license must submit a safety analysis report (SAR) as part of its application. The SAR presents the design criteria and design information for the proposed reactor and comprehensive data on the proposed site. The SAR also discusses various hypothetical accident situations and the safety features that are provided to prevent and mitigate accidents. The NRC staff reviews the application to determine whether the plant design meets the Commission's regulations and requirements and includes, in part, the nuclear plant design and its anticipated response to an accident.

DBAs are those accidents that both the licensee and the NRC staff evaluate to ensure that the plant can withstand normal and abnormal transients, and a broad spectrum of postulated accidents, without undue hazard to the health and safety of the public. A number of these postulated accidents are not expected to occur during the life of the plant, but are evaluated to establish the design basis for the preventive and mitigative safety systems of the facility. The acceptance criteria for DBAs are described in Title 10 of the Code of Federal Regulations (CFR) Part 50 and 10 CFR Part 100.

The environmental impacts of DBAs are evaluated during the initial licensing process, and the ability of the plant to withstand these accidents is demonstrated to be acceptable before issuance of the operating licenses (OLs). The results of these evaluations are found in license documentation such as the applicant's final safety analysis report (FSAR), the staff's safety evaluation report (SER), the final environmental statement (FES), and Section 5.1 of this supplemental environmental impact statement (SEIS). A licensee is required to maintain the acceptable design and performance criteria throughout the life of the plant, including any extended-life operation. The consequences for these events are evaluated for the hypothetical maximum exposed individual; as such, changes in the plant environment will not affect these evaluations. Because of the requirements that continuous acceptability of the consequences and aging management programs be in effect for license renewal, the environmental impacts as calculated for DBAs should not differ significantly from initial licensing assessments over the life of the plant, including the license renewal period. Accordingly, the design of the plant relative to DBAs during the extended period is considered to remain acceptable and the environmental impacts of those accidents were not examined further in the GEIS.

The Commission has determined that the environmental impacts of DBAs are of SMALL significance for all plants because the plants were designed to successfully withstand these accidents. Therefore, for the purposes of license renewal, DBAs are designated as a Category 1 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. The early resolution of the DBAs makes them a part of the current licensing basis of the plant; the current licensing basis of the plant is to be maintained by the licensee under its current license and, therefore,

under the provisions of 10 CFR 54.30, is not subject to review under license renewal. This issue, applicable to Point Beach Nuclear Plant Units 1 and 2 (PBNP), is listed in Table 5-1.

Table 5-1. Category 1 Issue Applicable to Postulated Accidents during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
Postulated Accidents	
Design basis accidents	5.3.2; 5.5.1

Based on information in the GEIS, the Commission found that:

> The NRC staff has concluded that the environmental impacts of design basis accidents are of small significance for all plants.

Nuclear Management Company, LLC (NMC) stated in its Environmental Report (ER) (NMC 2004) that it is not aware of any new and significant information associated with the renewal of the PBNP OLs. The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts related to DBAs beyond those discussed in the GEIS.

5.1.2 Severe Accidents

Severe nuclear accidents are those that are more severe than DBAs because they could result in substantial damage to the reactor core, whether or not there are serious offsite consequences. In the GEIS, the staff assessed the impacts of severe accidents during the license renewal period, using the results of existing analyses and site-specific information to conservatively predict the environmental impacts of severe accidents for each plant during the renewal period.

Severe accidents initiated by external phenomena such as tornadoes, floods, earthquakes, fires, and sabotage have not traditionally been discussed in quantitative terms in FESs and were not specifically considered for the PBNP site in the GEIS (NRC 1996). However, in the GEIS the staff did evaluate existing impact assessments performed by the NRC and by the industry at 44 nuclear plants in the United States and concluded that the risk from sabotage and beyond design basis earthquakes at existing nuclear power plants is SMALL. Additionally, the staff concluded that the risks from other external events are adequately addressed by a generic consideration of internally initiated severe accidents.

Based on information in the GEIS, the Commission found that:

> The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, 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.

Therefore, the Commission has designated mitigation of severe accidents as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. This issue, applicable to PBNP, is listed in Table 5-2.

Table 5-2. Category 2 Issue Applicable to Postulated Accidents during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
	Postulated Accidents		
Severe accidents	5.3.3; 5.3.3.2; 5.3.3.3; 5.3.3.4; 5.3.3.5; 5.3.4; 5.4; 5.5.2	L	5.2

The staff has not identified any new and significant information with regard to the consequences from severe accidents during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, and public comments on the draft SEIS. Therefore, the staff concludes that there are no impacts of severe accidents beyond those discussed in the GEIS. However, in accordance with 10 CFR 51.53(c)(3)(ii)(L), the staff has reviewed severe accident mitigation alternatives (SAMAs) for PBNP. The results of its review are discussed in Section 5.2.

5.2 Severe Accident Mitigation Alternatives

Section 51.53(c)(3)(ii)(L) requires that license renewal applicants consider alternatives to mitigate severe accidents if the staff has not previously evaluated SAMAs for the applicant's plant in an environmental impact statement (EIS) or related supplement or in an environmental assessment. The purpose of this consideration is to ensure that plant changes (i.e., hardware, procedures, and training) with the potential for improving severe accident safety performance are identified and evaluated. SAMAs have not been previously considered for PBNP; therefore, the remainder of Chapter 5 addresses those alternatives.

5.2.1 Introduction

This section presents a summary of the SAMA evaluation for PBNP conducted by NMC and described in the ER and the NRC's review of those evaluations. The details of the review are described in the NRC staff evaluations that were prepared with contract assistance from Pacific Northwest National Laboratory. The entire evaluation is presented in Appendix G.

The SAMA evaluations for PBNP were conducted with a four-step approach. In the first step NMC quantified the level of risk associated with potential reactor accidents using the plant-specific probabilistic risk assessment (PRA) and other risk models.

In the second step NMC examined the major risk contributors and identified possible ways (SAMAs) of reducing that risk. Common ways of reducing risk are changes to components, systems, procedures, and training. NMC initially identified 202 potential SAMAs. NMC screened out SAMAs that were not applicable to PBNP or had already been implemented at PBNP (or the PBNP design met the intent of the SAMA). This screening reduced the list of potential SAMAs to 65.

In the third step NMC estimated the benefits and the costs associated with each of the remaining SAMAs. Estimates were made of how much each SAMA could reduce risk. Those estimates were developed in terms of dollars in accordance with NRC guidance for performing regulatory analyses (NRC 1997). The cost of implementing the proposed SAMAs was also estimated.

Finally, in the fourth step, the costs and benefits of each of the remaining SAMAs were compared to determine whether the SAMA was cost-beneficial, meaning the benefits of the SAMA were greater than the cost (a positive cost-benefit). NMC concluded that none of these 65 SAMAs would be cost-beneficial for PBNP (NMC 2004). However, the staff has concluded that one of the SAMAs may be cost-beneficial.

This SAMA does not relate to adequately managing the effects of aging during the period of extended operation; therefore, it need not be implemented as part of license renewal pursuant to 10 CFR Part 54. NMC's SAMA analysis and the NRC's review are discussed in more detail below.

5.2.2 Estimate of Risk

NMC submitted an assessment of SAMAs for PBNP as part of the ER (NMC 2004). This assessment was based on the most recent PBNP PRA available at that time, a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code

System 2 (MACCS2) computer program, and insights from the PBNP Individual Plant Examination (IPE) (WEPCO 1993) and IPE of External Events (IPEEE) (WEPCO 1995).

The baseline core damage frequency (CDF) for the purpose of the SAMA evaluation is approximately 3.59×10^{-5} per year. This CDF is based on the risk assessment for internally initiated events. NMC did not include the contribution to risk from external events within the PBNP risk estimates; however, it did account for the potential risk reduction benefits associated with external events by increasing the estimated benefits by an amount equal to the ratio of the sum of the internal and external event CDF to the internal event CDF. This ratio is approximately two. The breakdown of CDF by initiating event is provided in Table 5-3.

As shown in Table 5-3, steam generator tube rupture (SGTR) events, transients without the power conversion system (PCS) available, loss of component cooling water, and loss of offsite power are dominant contributors to the CDF.

Table 5-3. Core Damage Frequency

Initiating Event	CDF (per year)	Percent Contribution
SGTR	8.75×10^{-6}	24.4
Transient without PCS	6.40×10^{-6}	17.8
Loss of component cooling	4.39×10^{-6}	12.2
Loss of offsite power (dual unit)	4.13×10^{-6}	11.5
Steam/feed break inside containment	2.76×10^{-6}	7.7
Loss of service water	2.43×10^{-6}	6.8
Steam/feed break outside containment	1.90×10^{-6}	5.3
Medium loss-of-coolant accident (LOCA) (>2 to 6 in.)	1.80×10^{-6}	5.0
Excessive LOCA (vessel failure)	9.90×10^{-7}	2.8
Transient with PCS	6.84×10^{-7}	1.9
Station blackout (SBO)	4.41×10^{-7}	1.2
Small LOCA (3/8 to 2 in.)	3.77×10^{-7}	1.1
Loss of bus D-01	2.76×10^{-7}	0.8
Loss of instrument air	2.27×10^{-7}	0.6
Large LOCA (>6 in.)	1.39×10^{-7}	0.4
Interfacing systems LOCA (ISLOCA)	1.10×10^{-7}	0.3
Loss of bus D-02	6.74×10^{-8}	0.2
Total CDF (from internal events)	**3.59×10^{-5}**	**100**

NMC estimated the dose to the population within 80 km (50 mi) of the PBNP site from severe accidents to be approximately 0.0149 person-Sv (1.49 person-rem) per year. The breakdown of the total population dose by containment release mode is summarized in Table 5-4. SGTR events dominate the population dose risk.

The NRC staff has reviewed NMC's data and evaluation methods and concludes that the quality of the risk analyses is adequate to support an assessment of the risk reduction potential for candidate SAMAs. Accordingly, the staff based its assessment of offsite risk on the CDFs and offsite doses reported by NMC.

Table 5-4. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Population Dose (Person-Rem[1] per Year)	Percent Contribution
Late SGTR	1.09×10^{0}	73
Early SGTR	1.65×10^{-1}	11
Containment Isolation failure	8.49×10^{-4}	<0 .1
ISLOCA	1.24×10^{-1}	8
Other Core Melt Sequences	1.04×10^{-1}	7
Total Population Dose	$\mathbf{1.49 \times 10^{0}}$	**100**

[1]One person-rem = 0.01 person-Sv

5.2.3 Potential Plant Improvements

Once the dominant contributors to plant risk were identified, NMC searched for ways to reduce that risk. In identifying and evaluating potential SAMAs, NMC considered insights from the plant-specific PRA, as well as industry and NRC documents that discuss potential plant improvements, such as NUREG/CR-5630 (NRC 1991). NMC identified 202 potential risk-reducing improvements (SAMAs) to plant components, systems, procedures and training.

All but 65 of the SAMAs were removed from further consideration because they were not applicable to PBNP, or they had already been implemented at PBNP (or the PBNP design met the intent of the SAMA).

The staff concludes that NMC used a systematic and comprehensive process for identifying potential plant improvements for PBNP, and that the set of potential plant improvements identified by NMC is reasonably comprehensive and, therefore, acceptable.

5.2.4 Evaluation of Risk Reduction and Costs of Improvements

NMC evaluated the risk-reduction potential of the remaining 65 SAMAs that were applicable to PBNP. A majority of the SAMA evaluations were performed in a bounding fashion in that the SAMA was assumed to completely eliminate the risk associated with the proposed enhancement. Such bounding calculations overestimate the benefit of the risk reduction and are conservative. The benefits were increased by a factor of approximately two to account for benefits in external events.

NMC estimated the cost of implementing the 65 SAMAs through consideration of estimates from other licensee submittals for similar improvements and site-specific cost estimates. For some of the SAMAs considered, the cost estimates were sufficiently greater than the benefits calculated that it was not necessary to perform a detailed cost estimate. Cost estimates typically included procedures, engineering analysis, training, and documentation, in addition to any hardware.

The staff has reviewed NMC's bases for calculating the risk reduction for the various plant improvements and concludes that the rationale and assumptions for estimating risk reduction are reasonable and generally conservative (i.e., the estimated risk reduction is higher than what would actually be realized). Accordingly, the staff based its estimates of averted risk for the various SAMAs on NMC's risk reduction estimates.

The staff has reviewed the bases for the applicant's cost estimates. For certain improvements, the staff has also compared the cost estimates to estimates developed elsewhere for similar improvements, including estimates developed as part of other licensees' analyses of SAMAs for operating reactors and advanced light-water reactors. The staff has found the cost estimates to be reasonable and generally consistent with estimates provided in support of other plants' analyses.

The staff concludes that the risk reduction and the cost estimates provided by NMC are sufficient and adequate for use in the SAMA evaluation.

5.2.5 Cost-Benefit Comparison

The cost-benefit analysis performed by NMC was based primarily on NUREG/BR-0184 (NRC 1997) and was executed consistent with this guidance. Sensitivity calculations were performed to examine the potential impact of uncertainties, discount rates other than seven percent, and several parameters and assumptions involved in the severe accident dose calculations. As a result of this analysis, the cost-benefit analysis showed that none of the candidate SAMAs were cost-beneficial. Therefore, NMC's conclusion was that there were no cost-beneficial SAMAs.

The staff has reviewed NMC's calculation methods and assumptions and concluded that they were sound. Based on this evaluation, none of the SAMAs are cost-beneficial in the baseline analysis. However, the staff has concluded that one SAMA could be cost-beneficial when uncertainties or alternative discount rates are taken into account. This SAMA involves providing a portable generator to power the auxiliary feedwater turbine after battery depletion (SAMA 169).

The staff concludes that, with the exception of this SAMA, the costs of implementing the SAMAs would be higher than the associated benefits. This conclusion is supported by uncertainty assessment and sensitivity analysis.

5.2.6 Conclusions

The staff has reviewed the NMC analysis and concluded that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs, the generally large negative net benefits, and the inherently small baseline risks support the general conclusion that the SAMA evaluations performed by NMC are reasonable and sufficient for the license renewal submittal.

Although none of the SAMAs appear cost-beneficial in the baseline analysis, the staff has concluded that one SAMA could be cost-beneficial when uncertainties or alternative discount rates are taken into account. This SAMA involves providing a portable generator to power the auxiliary feedwater turbine after battery depletion (SAMA 169). However, this SAMA does not relate to adequately managing the effects of aging during the period of extended operation. Therefore, it need not be implemented as part of license renewal pursuant to 10 CFR Part 54.

The staff concludes that none of the other candidate SAMAs is cost-beneficial. This conclusion is consistent with the low residual level of risk indicated in the PRA for both units and the fact that PBNP has already implemented many of the plant improvements identified from the IPE and IPEEE processes.

5.3 References

10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 100. Code of Federal Regulations, Title 10, *Energy*, Part 100, "Reactor Site Criteria."

Nuclear Management Company, LLC. (NMC). 2004. *Point Beach Nuclear Plant Operating License Renewal Application Environmental Report.* Two Rivers, Wisconsin.

U.S. Nuclear Regulatory Commission (NRC). 1991. "PWR Dry Containment Parametric Studies," NUREG/CR-5630, Washington, D.C.

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

U.S. Nuclear Regulatory Commission (NRC). 1997. *Regulatory Analysis Technical Evaluation Handbook.* NUREG/BR-0184, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report*, Section 6.3—Transportation, Table 9.1, Summary of findings on NEPA issues for license renewal of nuclear power plants. NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

Wisconsin Electric Power Company (WEPCO). 1993. Letter from Bob Link, to Document Control Desk, Subject: Generic Letter 88-20 (TAC NOS. 74452 and 74453) "Summary Report on Individual Plant Examination for Severe Accident Vulnerabilities, Point Beach Nuclear Plant, Units 1 and 2," dated June 30, 1993.

Wisconsin Electric Power Company (WEPCO). 1995. Letter from Bob Link, to Document Control Desk, Subject: Generic Letter 88-20 (TAC NOS. 74452 and 74453) "Summary Report Examination of External Events for Severe Accident Vulnerabilities, Point Beach Nuclear Plant, Units 1 and 2," June 30, 1995.

6.0 Environmental Impacts of the Uranium Fuel Cycle and Solid Waste Management

Environmental issues associated with the uranium fuel cycle and solid-waste management are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS includes a determination of whether the analysis of the environmental issues could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been 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 characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste [HLW] and spent-fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1 and, therefore, additional plant-specific review of these issues is required.

This chapter addresses the issues that are related to the uranium fuel cycle and solid-waste management during the license renewal term that are listed in Table B-1 of Title 10 of the Code of Federal Regulations (CFR) Part 51, Subpart A, Appendix B, and are applicable to Point Beach Nuclear Plant Units 1 and 2 (PBNP). The generic potential impacts of the radiological and nonradiological environmental impacts of the uranium fuel cycle and transportation of nuclear fuel and wastes are described in detail in the GEIS based, in part, on the generic

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

impacts provided in 10 CFR 51.51(b), Table S-3, "Table of Uranium Fuel Cycle Environmental Data," and in 10 CFR 51.52(c), Table S-4, "Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor." The staff also addresses the impacts from radon-222 and technetium-99 in the GEIS.

6.1 The Uranium Fuel Cycle

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to PBNP from the uranium fuel cycle and solid-waste management are listed in Table 6-1.

Table 6-1. Category 1 Issues Applicable to the Uranium Fuel Cycle and Solid-Waste Management during the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
URANIUM FUEL CYCLE AND WASTE MANAGEMENT	
Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high-level waste)	6.1; 6.2.1; 6.2.2.1; 6.2.2.3; 6.2.3; 6.2.4; 6.6
Offsite radiological impacts (collective effects)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
Offsite radiological impacts (spent fuel and high-level waste)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
Nonradiological impacts of the uranium fuel cycle	6.1; 6.2.2.6; 6.2.2.7; 6.2.2.8; 6.2.2.9; 6.2.3; 6.2.4; 6.6
Low-level waste storage and disposal	6.1; 6.2.2.2;6.4.2; 6.4.3; 6.4.3.1; 6.4.3.2; 6.4.3.3; 6.4.4; 6.4.4.1; 6.4.4.2; 6.4.4.3; 6.4.4.4; 6.4.4.5; 6.4.4.5.1; 6.4.4.5.2; 6.4.4.5.3; 6.4.4.5.4; 6.4.4.6; 6.6
Mixed waste storage and disposal	6.1, 6.4.5.1; 6.4.5.2; 6.4.5.3; 6.4.5.4; 6.4.5.5; 6.4.5.6; 6.4.5.6.1; 6.4.5.6.2; 6.4.5.6.3; 6.4.5.6.4; 6.6
Onsite spent fuel	6.1; 6.4.6; 6.4.6.1; 6.4.6.2; 6.4.6.3; 6.4.6.4; 6.4.6.5; 6.4.6.6; 6.4.6.7; 6.6
Nonradiological waste	6.1; 6.5; 6.5.1; 6.5.2; 6.5.3; 6.6
Transportation	6.1; 6.3.1; 6.3.2.3; 6.3.3; 6.3.4; 6.6, Addendum 1

Nuclear Management Company, LLC (NMC) stated in its Environmental Report (ER) (NMC 2004) that it is not aware of any new and significant information associated with the renewal of the PBNP operating licenses. The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft supplemental environmental impact statement (SEIS). Therefore, the staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS. For these issues, the staff concluded in the GEIS that the impacts would be SMALL except for the collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, as discussed below, and that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

A brief description of the staff review and the GEIS conclusions, as codified in Table B-1, 10 CFR Part 51, for each of these issues follows:

- Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high-level waste). Based on information in the GEIS, the Commission found that

  > Offsite impacts of the uranium fuel cycle have been considered by the Commission in Table S-3 of this part [10 CFR 51.51(b)]. Based on information in the GEIS, impacts on individuals from radioactive gaseous and liquid releases including radon-222 and technetium-99 are small.

  The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no offsite radiological impacts of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Offsite radiological impacts (collective effects). Based on information in the GEIS, the Commission found that

  > The 100 year environmental dose commitment to the U.S. population from the fuel cycle, high level waste and spent fuel disposal excepted, is calculated to be about 14,800 person rem [148 person Sv], or 12 cancer fatalities, for each additional 20-year power reactor operating term. Much of this, especially the contribution of radon releases from mines and tailing piles, consists of tiny doses summed over large populations. This same dose calculation can theoretically be extended to include many tiny doses over additional thousands of years as well as doses outside the U. S. The result of such a calculation would be thousands of cancer fatalities from the fuel cycle, but this result assumes that even tiny doses have some statistical adverse health effect

> which will not ever be mitigated (for example no cancer cure in the next thousand years), and that these doses projected over thousands of years are meaningful. However, these assumptions are questionable. In particular, science cannot rule out the possibility that there will be no cancer fatalities from these tiny doses. For perspective, the doses are very small fractions of regulatory limits and even smaller fractions of natural background exposure to the same populations.
>
> Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA [National Environmental Policy Act] implications of these matters should be made and it makes no sense to repeat the same judgement in every case. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the collective effects of the fuel cycle, this issue is considered Category 1.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no offsite radiological impacts (collective effects) from the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Offsite radiological impacts (spent fuel and high-level waste disposal). Based on information in the GEIS, the Commission found that

> For the high level waste and spent fuel disposal component of the fuel cycle, there are no current regulatory limits for offsite releases of radionuclides for the current candidate repository site. However, if we assume that limits are developed along the lines of the 1995 National Academy of Sciences (NAS) report, "Technical Bases for Yucca Mountain Standards," and that in accordance with the Commission's Waste Confidence Decision, 10 CFR 51.23, a repository can and likely will be developed at some site which will comply with such limits, peak doses to virtually all individuals will be 100 millirem [1 mSv] per year or less. However, while the Commission has reasonable confidence that these assumptions will prove correct, there is considerable uncertainty since the limits are yet to be developed, no repository application has been completed or reviewed, and uncertainty is inherent in the models used to evaluate possible pathways to the human environment. The

NAS report indicated that 100 millirem [1 mSv] per year should be considered as a starting point for limits for individual doses, but notes that some measure of consensus exists among national and international bodies that the limits should be a fraction of the 100 millirem [1 mSv] per year. The lifetime individual risk from 100 millirem [1 mSv] annual dose limit is about 3×10^{-3}.

Estimating cumulative doses to populations over thousands of years is more problematic. The likelihood and consequences of events that could seriously compromise the integrity of a deep geologic repository were evaluated by the Department of Energy in the *Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste*, October 1980 [DOE 1980]. The evaluation estimated the 70-year whole-body dose commitment to the maximum individual and to the regional population resulting from several modes of breaching a reference repository in the year of closure, after 1,000 years, after 100,000 years, and after 100,000,000 years. Subsequently, the NRC and other federal agencies have expended considerable effort to develop models for the design and for the licensing of a high level waste repository, especially for the candidate repository at Yucca Mountain. More meaningful estimates of doses to population may be possible in the future as more is understood about the performance of the proposed Yucca Mountain repository. Such estimates would involve very great uncertainty, especially with respect to cumulative population doses over thousands of years. The standard proposed by the NAS is a limit on maximum individual dose. The relationship of potential new regulatory requirements, based on the NAS report, and cumulative population impacts has not been determined, although the report articulates the view that protection of individuals will adequately protect the population for a repository at Yucca Mountain. However, EPA's generic repository standards in 40 CFR Part 191 generally provide an indication of the order of magnitude of cumulative risk to population that could result from the licensing of a Yucca Mountain repository, assuming the ultimate standards will be within the range of standards now under consideration. The standards in 40 CFR Part 191 protect the population by imposing "containment requirements" that limit the cumulative amount of radioactive material released over 10,000 years. Reporting performance standards that will be required by EPA are expected to result in releases and associated health consequences in the range between 10 and 100 premature cancer deaths with an upper limit of 1,000 premature cancer deaths world-wide for a 100,000 metric tonne (MTHM) repository.

Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA implications of these matters should be made and it makes no sense to

repeat the same judgement in every case. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the impacts of spent fuel and high level waste disposal, this issue is considered Category 1.

On February 15, 2002, based on a recommendation by the Secretary of the Department of Energy, the President recommended the Yucca Mountain site for the development of a repository for the geologic disposal of spent nuclear fuel and HLW. The U.S. Congress approved this recommendation on July 9, 2002, in Joint Resolution 87, which designated Yucca Mountain as the repository for spent nuclear waste. On July 23, 2002, the President signed Joint Resolution 87 into law; Public Law 107-200, 116 Stat. 735 (2002) designates Yucca Mountain as the repository for spent nuclear waste. This development does not represent new and significant information with respect to the offsite radiological impacts from license renewal related to disposal of spent nuclear fuel and HLW.

The U.S. Environmental Protection Agency (EPA) developed Yucca Mountain-specific repository standards, which were subsequently adopted by the NRC in 10 CFR Part 63. In an opinion, issued July 9, 2004, the U.S. Court of Appeals for the District of Columbia Circuit (the Court) vacated EPA's radiation protection standards for the candidate repository, which required compliance with certain dose limits over a 10,000 year period. The Court's decision also vacated the compliance period in the NRC's licensing criteria for the candidate repository in 10 CFR Part 63.

Therefore, for the HLW and spent fuel disposal component of the fuel cycle, there is some uncertainty with respect to regulatory limits for offsite releases of radioactive nuclides for the current candidate repository site. However, prior to promulgation of the affected provisions of the Commission's regulations, the staff assumed that limits would be developed along the lines of the 1995 National Academy of Sciences report, *Technical Bases for Yucca Mountain Standards*, and that in accordance with the Commission's Waste Confidence Decision, 10 CFR 51.23, a repository that would comply with such limits could and likely would be developed at some site. Peak doses to virtually all individuals would be 1 mSv (100 mrem) per year or less.

Despite the current uncertainty with respect to these rules, some judgment as to the regulatory NEPA implications of offsite radiological impacts of spent fuel and HLW disposal

should be made. The staff concludes that these impacts would be acceptable in that the impacts would not be sufficiently large to require the NEPA conclusion that the option of extended operation under 10 CFR Part 54 should be eliminated.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no offsite radiological impacts related to spent fuel and HLW disposal during the renewal term beyond those discussed in the GEIS.

- Nonradiological impacts of the uranium fuel cycle. Based on information in the GEIS, the Commission found that

  > The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an operating license for any plant are found to be small.

  The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no nonradiological impacts of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Low-level waste storage and disposal. Based on information in the GEIS, the Commission found that

  > The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment will remain small during the term of a renewed license. The maximum additional on-site land that may be required for low-level waste storage during the term of a renewed license and associated impacts will be small. Nonradiological impacts on air and water will be negligible. The radiological and nonradiological environmental impacts of long-term disposal of low-level waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient low-level waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

  The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's

evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts of low-level waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- Mixed waste storage and disposal. Based on information in the GEIS, the Commission found that

> The comprehensive regulatory controls and the facilities and procedures that are in place ensure proper handling and storage, as well as negligible doses and exposure to toxic materials for the public and the environment at all plants. License renewal will not increase the small, continuing risk to human health and the environment posed by mixed waste at all plants. The radiological and nonradiological environmental impacts of long-term disposal of mixed waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient mixed waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts of mixed waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- Onsite spent fuel. Based on information in the GEIS, the Commission found that

> The expected increase in the volume of spent fuel from an additional 20 years of operation can be safely accommodated on site with small environmental effects through dry or pool storage at all plants if a permanent repository or monitored retrievable storage is not available.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts of onsite spent fuel associated with license renewal beyond those discussed in the GEIS.

- Nonradiological waste. Based on information in the GEIS, the Commission found that

> No changes to generating systems are anticipated for license renewal. Facilities and procedures are in place to ensure continued proper handling and disposal at all plants.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no nonradiological waste impacts during the renewal term beyond those discussed in the GEIS.

- Transportation. Based on information contained in the GEIS, the Commission found that

> The impacts of transporting spent fuel enriched up to 5 percent uranium-235 with average burnup for the peak rod to current levels approved by NRC up to 62,000 MWd/MTU and the cumulative impacts of transporting high-level waste to a single repository, such as Yucca Mountain, Nevada are found to be consistent with the impact values contained in 10 CFR 51.52(c), Summary Table S-4 – Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor. If fuel enrichment or burnup conditions are not met, the applicant must submit an assessment of the implications for the environmental impact values reported in § 51.52.

PBNP meets the fuel enrichment and burnup conditions set forth in Addendum 1 to the GEIS. The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts of transportation associated with license renewal beyond those discussed in the GEIS.

There are no Category 2 issues for the uranium fuel cycle and solid-waste management.

6.2 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy,* Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 63. Code of Federal Regulations, Title 10, *Energy,* Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada."

40 CFR Part 191. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Waste."

Joint Resolution approving the site at Yucca Mountain, Nevada, for the development of a repository for the disposal of high-level radioactive waste and spent nuclear fuel, pursuant to the Nuclear Waste Policy Act of 1982. 2002. Public Law 107-200, 116 Stat. 735.

National Academy of Sciences (NAS). 1995. *Technical Bases for Yucca Mountain Standards.* Washington, D.C.

National Environmental Policy Act of 1969 (NEPA), as amended. 42 United States Code (USC) 4321 et seq.

Nuclear Energy Institute, Inc. v. EPA, 373 F.3d 1251 (D.C. Circuit Court 2004).

Nuclear Management Company, LLC (NMC). 2004. *Point Beach Nuclear Plant Operating License Renewal Application Environmental Report.* Two Rivers, Wisconsin.

U.S. Department of Energy (DOE). 1980. *Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste.* DOE/EIS-0046F, Washington, D.C.

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

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report, Section 6.3—Transportation, Table 9.1, Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants, Final Report.* NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

7.0 Environmental Impacts of Decommissioning

Environmental impacts from the activities associated with the decommissioning of any reactor before or at the end of an initial or renewed license are evaluated in the *Generic Environmental Impact Statement for Decommissioning of Nuclear Facilities*, NUREG-0586, Supplement 1 (NRC 2002). The staff's evaluation of the environmental impacts of decommissioning presented in Supplement 1 resulted in a range of impacts for each environmental issue. These results may be used by licensees as a starting point for a plant-specific evaluation of the decommissioning impacts at their facilities.

The incremental environmental impacts associated with decommissioning activities resulting from continued plant operation during the renewal term are evaluated in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The evaluation in NUREG-1437 includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) The environmental impacts associated with the issue have been 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 characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high level waste and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, additional plant-specific review of these issues is required. There are no Category 2 issues related to decommissioning.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

7.1 Decommissioning

Category 1 issues in Table B-1 of Title 10 of the Code of Federal Regulations (CFR) Part 51, Subpart A, Appendix B, that are applicable to Point Beach Nuclear Plant Units 1 and 2 (PBNP) decommissioning following the renewal term are listed in Table 7-1. Nuclear Management Company, LLC (NMC) stated in its Environmental Report (ER) (NMC 2004) that it is aware of no new and significant information regarding the environmental impacts of PBNP license renewal. The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft supplemental environmental impact statement (SEIS). Therefore, the staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS. For all of these issues, the staff concluded in the GEIS that the impacts would be SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 7-1. Category 1 Issues Applicable to the Decommissioning of PBNP following the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
DECOMMISSIONING	
Radiation Doses	7.3.1; 7.4
Waste Management	7.3.2; 7.4
Air Quality	7.3.3; 7.4
Water Quality	7.3.4; 7.4
Ecological Resources	7.3.5; 7.4
Socioeconomic Impacts	7.3.7; 7.4

A brief description of the staff's review and the GEIS conclusions, as codified in Table B-1, for each of the issues follows:

- Radiation doses. Based on information in the GEIS, the Commission found that

  > Doses to the public will be well below applicable regulatory standards regardless of which decommissioning method is used. Occupational doses would increase no more than 1 man-rem [0.01 person-Sv] caused by buildup of long-lived radionuclides during the license renewal term.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no radiation dose impacts associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Waste management. Based on information in the GEIS, the Commission found that

  > Decommissioning at the end of a 20-year license renewal period would generate no more solid wastes than at the end of the current license term. No increase in the quantities of Class C or greater than Class C wastes would be expected.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts from solid waste associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Air quality. Based on information in the GEIS, the Commission found that

  > Air quality impacts of decommissioning are expected to be negligible either at the end of the current operating term or at the end of the license renewal term.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts on air quality associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Water quality. Based on information in the GEIS, the Commission found that

  > The potential for significant water quality impacts from erosion or spills is no greater whether decommissioning occurs after a 20-year license renewal period or after the original 40-year operation period, and measures are readily available to avoid such impacts.

The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts on water quality associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Ecological resources. Based on information in the GEIS, the Commission found that

  > Decommissioning after either the initial operating period or after a 20-year license renewal period is not expected to have any direct ecological impacts.

  The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no impacts on ecological resources associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Socioeconomic Impacts. Based on information in the GEIS, the Commission found that

  > Decommissioning would have some short-term socioeconomic impacts. The impacts would not be increased by delaying decommissioning until the end of a 20-year relicense period, but they might be decreased by population and economic growth.

  The staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2004), the staff's site visit, the scoping process, the staff's evaluation of other available information, or public comments on the draft SEIS. Therefore, the staff concludes that there would be no socioeconomic impacts associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

7.2 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

Nuclear Management Company, LLC (NMC). 2004. *Point Beach Nuclear Plant Operating License Renewal Application Environmental Report.* Two Rivers, Wisconsin.

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

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report, Section 6.3 – Transportation, Table 9.1, Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants, Final Report.* NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2002. *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors.* NUREG-0586, Volumes 1 and 2, Washington D.C.

8.0 Environmental Impacts of Alternatives to License Renewal

This chapter examines the potential environmental impacts associated with the following: denying the renewal of operating licenses (OLs) for the Point Beach Nuclear Plant Units 1 and 2 (PBNP) (i.e., the no-action alternative); electric generating sources other than PBNP; purchasing electric power from other sources to replace power generated by Units 1 and 2; a combination of generating and conservation measures; and other generation alternatives that were deemed unsuitable for replacement of power generated by PBNP. The environmental impacts are evaluated using the U.S. Nuclear Regulatory Commission's (NRC's) three-level standard of significance – SMALL, MODERATE, or LARGE – developed using the Council on Environmental Quality guidelines and set forth in the footnotes to Table B-1 of Title 10 of the Code of Federal Regulations (CFR) Part 51, Subpart A, Appendix B:

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 important attributes of the resource.

LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The impact categories evaluated in this chapter are the same as those used in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999)[a] with the additional impact category of environmental justice.

8.1 No-Action Alternative

The NRC's regulations implementing the National Environmental Policy Act of 1969 (NEPA) specify that the no-action alternative be discussed in an NRC environmental impact statement; see 10 CFR Part 51, Subpart A, Appendix A, Section 4. For license renewal, the no-action alternative refers to a scenario in which the NRC would not renew the PBNP OLs, and Nuclear Management Company, LLC (NMC) would then cease plant operations by the end of the current licenses and decommission Units 1 and 2.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

NMC will be required to shut down PBNP and to comply with NRC decommissioning requirements in 10 CFR 50.82 whether or not the PBNP OLs are renewed. If the PBNP OLs are renewed, then shutdown of the units and decommissioning activities will not be avoided, but will be postponed for up to an additional 20 years.

The environmental impacts associated with decommissioning following a license renewal period of up to 20 years or following the no-action alternative would be bounded by the discussion of impacts in Chapter 7 of the license renewal GEIS (NRC 1996), Chapter 7 of this supplemental environmental impact statement (SEIS), and the *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*, NUREG-0586, Supplement 1 (NRC 2002). The impacts of decommissioning after 60 years of operation are not expected to be significantly different from those occurring after 40 years of operation.

Impacts from the decision to permanently cease operations are not considered in NUREG-0586, Supplement 1.[(a)] Therefore, immediate impacts that occur between plant shutdown and the beginning of plant dismantlement are considered here. These impacts will occur when the units shut down regardless of whether the licenses are renewed or not and are discussed below, with the results presented in Table 8-1. Plant shutdown will result in a net reduction in power production capacity. The power not generated by PBNP during the license renewal term would likely be replaced by (1) power purchased from other electricity providers, (2) generating alternatives other than PBNP, (3) demand-side management (DSM) and energy conservation, or (4) some combination of these options. The environmental impacts of these options are discussed in Section 8.2.

- **Land Use**

  In Chapter 4, the staff concluded that the impacts of continued operation of PBNP on land use would be SMALL. Onsite land use will not be immediately affected by the cessation of operations. Plant structures and other facilities are likely to remain in place until decommissioning. The transmission lines associated with the project are expected to remain in service after the plants stop operating. As a result, maintenance of the transmission line rights-of-way (ROWs) will continue as before. Therefore, the staff concludes that the impacts on land use from plant shutdown would be SMALL.

(a) Appendix J of NUREG-0586, Supplement 1, discusses the socioeconomic impacts of plant closure, but the results of the analysis in Appendix J are not incorporated in the analysis presented in the main body of the NUREG (NRC 2002).

Table 8-1. Summary of Environmental Impacts of the No-Action Alternative

Impact Category	Impact	Comment
Land Use	SMALL	Impacts are expected to be SMALL because plant shutdown is not expected to result in changes to onsite or offsite land use.
Ecology	SMALL	Impacts are expected to be SMALL because aquatic impacts are generally positive and terrestrial impacts are not expected because there will not be any land-use changes.
Water Use and Quality – Surface Water	SMALL	Impacts are expected to be SMALL because surface-water intake and discharges will decrease.
Water Use and Quality – Groundwater	SMALL	Impacts are expected to be SMALL because groundwater use will decrease.
Air Quality	SMALL	Impacts are expected to be SMALL because emissions related to plant operation and worker transportation will decrease.
Waste	SMALL	Impacts are expected to be SMALL because generation of high-level waste (HLW) will stop, and generation of low-level and mixed waste will decrease.
Human Health	SMALL	Impacts are expected to be SMALL because radiological doses to workers and members of the public, which are within regulatory limits, will be reduced.
Socioeconomics	SMALL to MODERATE	Impacts are expected to be SMALL to MODERATE because of a decrease in employment and tax revenues.
Transportation	SMALL	Impacts are expected to be SMALL because the decrease in employment would reduce traffic.
Aesthetics	SMALL	Impacts are expected to SMALL because plant structures will remain in place.
Historic and Archaeological Resources	SMALL	Impacts are expected to be SMALL because shutdown of the plant will not change land use.
Environmental Justice	SMALL	Impacts are expected to be SMALL because very few minority/low-income persons live in the immediate vicinity of PBNP. The staff did not identify any location-dependent disproportionately high and adverse impacts that would affect these minority and low-income populations.

- **Ecology**

  In Chapter 4, the staff concluded that the ecological impacts of continued operation of PBNP would be SMALL. Cessation of operations will be accompanied by a significant reduction in cooling-water flow and elimination of impingement impacts, entrainment impacts, and the thermal plume. The environmental impacts to aquatic species, including threatened and endangered species, associated with these changes are generally positive. The transmission lines associated with PBNP are expected to remain in service after PBNP stops operating. As a result, maintenance of the transmission line ROWs and subsequent impacts to the terrestrial ecosystem will continue as before. Therefore, the staff concludes that ecological impacts from shutdown of the plant would be SMALL.

- **Water Use and Quality – Surface Water**

  In Chapter 4, the staff concluded that the impacts of continued operation of PBNP on surface-water use and quality would be SMALL. When the plant stops operating, there will be an immediate reduction in the consumptive use of water because of reduction in cooling-water flow and in the amount of heat rejected to Lake Michigan. There will also be a significant reduction in biocide use. Therefore, the staff concludes that the impacts on surface-water use and quality from plant shutdown would be SMALL.

- **Water Use and Quality – Groundwater**

  In Chapter 4, the staff concluded that impacts of continued operation of PBNP on groundwater use and groundwater availability and quality would be SMALL. When the plant stops operating, there will be a reduction in the use of well water because of reduced potable water consumption and sanitary use as the plant staff decreases. Therefore, the staff concludes that impacts on groundwater use and quality from shutdown of the plant would be SMALL.

- **Air Quality**

  In Chapter 4, the staff concluded that the impacts of continued operation of PBNP on air quality would be SMALL. When the plant stops operating, there will be a reduction in emissions from activities related to plant operations, such as use of diesel generators and worker transportation. Therefore, the staff concludes that the impact on air quality from shutdown of the plant would be SMALL.

- **Waste**

  The impacts of waste generated by continued operation of PBNP are discussed in Chapter 6. The impacts of low-level and mixed waste from plant operation are characterized as SMALL. When PBNP stops operating, the plant will stop generating HLW. Generation of low-level and mixed waste associated with plant operation and maintenance will be reduced. Therefore, the staff concludes that the impact of waste generated after shutdown of the plant would be SMALL.

- **Human Health**

  In Chapter 4, the staff concluded that the impacts of continued operation of PBNP on human health would be SMALL. After the cessation of operations, the amount of radioactive material released to the environment in gaseous and liquid forms will be reduced. Therefore, the staff concludes that the impact of shutdown of the plant on human health will be SMALL. In addition, the variety of potential accidents at the plant will be reduced to a limited set associated with shutdown events and fuel handling. In Chapter 5, the staff concluded that the impacts of accidents during operation were SMALL. Therefore, the staff concludes that the impacts of potential accidents following shutdown of the plant would be SMALL.

- **Socioeconomics**

  In Chapter 4, the staff concluded that the socioeconomic impacts of continued operation of PBNP would be SMALL. There would be immediate socioeconomic impacts associated with the shutdown of the plant because of the reduction in the staff at the plant. There may also be an immediate reduction in the Shared Utility Payments for the town of Two Creeks and Manitowoc County. The staff concludes that the socioeconomic impacts of plant shutdown would range from SMALL to MODERATE. Some of these impacts could be offset if new power generating facilities are built at or near the current site. See Appendix J to NUREG-0586, Supplement 1, for additional discussion of the potential socioeconomic impacts of plant shutdown (NRC 2002).

- **Transportation**

  In Chapter 4, the staff concluded that the impacts of continued operation of PBNP on transportation would be SMALL. Cessation of operations will be accompanied by a reduction of traffic in the vicinity of the plant. Most of the reduction will be associated with a reduction in the plant workforce, but there will also be a reduction in shipment of material to and from the plant. Therefore, the staff concludes that the impacts of plant shutdown on transportation would be SMALL.

- **Aesthetics**

  In Chapter 4, the staff concluded that the aesthetic impacts of continued operation of PBNP would be SMALL. The plant structures will remain in place upon shutdown. Operational noise would be reduced or eliminated. Noise would be generated during decommissioning operations that may be detectable off site; however, the impact is unlikely to be of large significance and can normally be mitigated. Therefore, the staff concludes that the aesthetic impacts associated with the shutdown of PBNP would be SMALL.

- **Historic and Archaeological Resources**

  In Chapter 4, the staff concluded that the impacts of continued operation of PBNP on historic and archaeological resources would be SMALL. Onsite land use would not be affected immediately by the cessation of operations. Plant structures and other facilities are likely to remain in place until decommissioning. The transmission lines associated with the project are expected to remain in service after the plant stops operating. As a result, maintenance of transmission line ROWs would continue as before. Therefore, the staff concludes that the impacts on historic and archaeological resources from plant shutdown would be SMALL.

- **Environmental Justice**

  In Chapter 4, the staff concluded that the impact of continued operation of PBNP on environmental justice would be SMALL because continued operation of the plant would not have disproportionately high and adverse impacts on minority and low-income populations. Shutdown of the plant could result in the loss of employment opportunities at the PBNP site and secondary socioeconomic impacts (e.g., loss of patronage at local businesses). However, shutdown of the plant is unlikely to have disproportionately high and adverse impacts on minority and low-income populations. The staff concludes that the environmental justice impacts of plant shutdown would be SMALL. Some of these impacts could be offset if new power generating facilities are built at or near the current site. See Appendix J to NUREG-0586, Supplement 1, for additional discussion of these impacts (NRC 2002).

8.2 Alternative Energy Sources

This section discusses the environmental impacts associated with alternative sources of electric power to replace the power generated by PBNP, assuming that the OLs for Units 1 and 2 are

not renewed. The order of presentation of alternative energy sources in Section 8.2 does not imply which alternative would be most likely to occur or to have the least environmental impacts.

The following generation alternatives are considered in detail:

- Coal-fired generation at the PBNP site and a greenfield[a] alternate site (Section 8.2.1)
- Natural gas-fired generation at the PBNP site and a greenfield alternate site (Section 8.2.2)
- Nuclear generation at the PBNP site and a greenfield alternate site (Section 8.2.3).

The alternative of purchasing power from other sources to replace power generated at PBNP is discussed in Section 8.2.4. Other power generation alternatives and conservation alternatives considered by the staff and found not to be reasonable replacements for Units 1 and 2 are discussed in Section 8.2.5. Section 8.2.6 discusses the environmental impacts of a combination of generation and conservation alternatives.

Each year the Energy Information Administration (EIA), a component of the U.S. Department of Energy (DOE), issues an *Annual Energy Outlook.* In its *Annual Energy Outlook 2004 with Projections to 2025,* EIA projects that combined cycle,[b] distributed generation, or combustion turbine technology fueled by natural gas is likely to account for approximately 62 percent of new electric generating capacity between the years 2002 and 2025 (DOE/EIA 2004a). Both technologies are designed primarily to supply peak and intermediate capacity, but gas combined-cycle technology can also be used to meet baseload[c] requirements.

Coal-fired plants are projected by EIA to account for approximately one-third of new capacity during this period. Coal-fired plants are generally used to meet baseload requirements. Renewable energy sources, primarily wind and biomass units, are projected by EIA to account for the remaining 5 percent of capacity additions. EIA's projections assume that providers of new generating capacity will seek to minimize cost while meeting applicable environmental requirements. Combined-cycle plants are projected by EIA to have the lowest generation cost in 2010, followed by wind generation and then coal-fired plants (DOE/EIA 2004a). By 2025,

(a) A greenfield site is assumed to be an undeveloped site with no previous construction, and the environmental impacts are expected to be greater than those at an already developed alternate site.
(b) In a combined cycle unit, hot combustion gas in a combustion turbine rotates the turbine to generate electricity. The hot exhaust from the combustion turbine is routed through a heat-recovery boiler to make steam to generate additional electricity.
(c) A baseload plant normally operates to supply all or part of the minimum continuous load of a system and consequently produces electricity at an essentially constant rate. Nuclear power plants are commonly used for baseload generation; i.e., these units generally run near full load.

coal-fired plants are projected by EIA to have the lowest generation cost, followed by gas combined-cycle plants and then wind generation (DOE/EIA 2004a).

EIA projects that oil-fired plants will account for very little of new generation capacity in the United States during the 2002 to 2025 time period because of higher fuel costs and lower efficiencies (DOE/EIA 2004a). Consequently, an oil-fired power plant is not considered to be a reasonable alternative to replace the power generated by PBNP.

EIA also projects that new nuclear power plants will not account for any new generation capacity in the United States during the 2002 to 2025 time period because natural gas and coal-fired plants are projected to be more economical (DOE/EIA 2004a). In spite of this projection, a new nuclear plant alternative to power generated by PBNP is considered for reasons stated in Section 8.2.3. NRC established a new reactor licensing program organization in 2001 to prepare for and manage future reactor and site licensing applications (NRC 2001). Therefore, a new nuclear plant alternative for replacing power generated by PBNP is considered in this SEIS.

PBNP has a combined net rating of 1036 megawatts electric (MW[e]). For the coal-fired alternative, the staff assumed the construction of two 600 MW(e) units that would operate at about 78 percent efficiency. For the natural-gas alternative, the staff assumed four 380 MW(e) units operating at 85 percent efficiency. For the new nuclear alternative, the staff assumed construction of a plant with a net electric output of 1000 MW(e). The coal and gas alternatives are consistent with the NMC Environmental Report (ER) (NMC 2004). The ER did not discuss a new nuclear alternative.

8.2.1 Coal-Fired Generation

The coal-fired alternative is analyzed for both the PBNP site and an alternate site. For purposes of analysis, the staff assumed the coal-fired alternative would use an integrated coal gasification combined-cycle (IGCC) process, which would have lower impacts than the supercritical pulverizing process. Construction of a rail spur 16 to 24 km (10 to 15 mi) in length would be needed at the PBNP site and likely would be needed at an alternate site. Construction at an alternate site also may require the construction of a new transmission line to connect the coal-fired plant to existing lines.

Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.1 are from the NMC ER (NMC 2004). The staff reviewed this information and compared it to environmental impact information in the GEIS. Although the OL renewal period is only 20 years, the impact of operating the coal-fired alternative for 40 years is considered (as a reasonable projection of the operating life of a coal-fired plant). The staff assumed that PBNP would remain in operation while the alternative coal-fired plant was constructed.

The staff assumed the construction of two 600 MW(e) units operating at 78 percent efficiency as potential replacements for PBNP. The coal-fired plant would consume approximately 2.1 million metric tons (MT) (2.3 million tons) per year of pulverized bituminous coal (NMC 2004). NMC assumed a heat rate[a] of 2.78 J of fuel /J of electricity (9500 Btu/kWh) and a capacity factor[b] of 0.78 in its ER (NMC 2004). The IGCC process would generate about 91,000 MT (100,000 tons) of a vitrified, glass-like waste material rather than ash, which would be collected and disposed of at the PBNP site. In addition, approximately 16,000 MT (18,000 tons) of elemental sulfur would be generated and disposed of at the PBNP site.

In addition to the impacts discussed below for a coal-fired plant at the PBNP site or an alternate site, impacts would occur off site as a result of mining of coal. Impacts of mining operations include an increase in fugitive dust emissions; surface water runoff; erosion; sedimentation; changes in water quality; disturbance of vegetation and wildlife; disturbance of historic and archaeological resources; changes in land use; and impacts on employment. The magnitude of these offsite impacts would largely be proportional to the amount of land affected by mining operations. In the GEIS, the staff estimated that approximately 8900 ha (22,000 ac) would be affected for mining the coal and disposing of the waste to support a 1000 MW(e) coal plant during its operational life. Partially offsetting this offsite land use would be the elimination of the need for uranium mining to supply fuel for PBNP. In the GEIS, the staff estimated that approximately 400 ha (1000 ac) would be affected for mining the uranium and processing it during the operating life of a nuclear power plant.

Coal for a coal-fired plant sited at PBNP most likely would be delivered by rail line. Rail delivery would also be the most likely option for delivering coal to an alternate site, although barge delivery would also be a possibility.

8.2.1.1 Closed-Cycle Cooling System

The overall impacts of a coal-fired generating system using a closed-cycle cooling system and cooling towers at either the PBNP or alternate sites are discussed in the following sections and summarized in Table 8-2. The magnitude of impacts for an alternate site would depend on the location of the particular site selected. PBNP currently uses a once-through cooling system. For the purposes of comparison with an alternate site, however, it is assumed that a replacement coal-fired plant on the PBNP site would use a closed-cycle cooling system.

(a) Heat rate is the measure of generating station thermal efficiency. In English units, it is generally expressed in British thermal units (Btu) per net kilowatt-hour (kWh). It is computed by dividing the total Btu content of the fuel burned for electric generation by the resulting kWh generation. The corresponding metric unit for energy is the joule (J).

(b) The capacity factor is the ratio of electricity generated, for the period of time considered, to the energy that could have been generated at continuous full-power operation during the same period.

Table 8-2. Summary of Environmental Impacts of Coal-Fired Generation Using Closed-Cycle Cooling at the PBNP Site and an Alternate Site

	PBNP Site		Alternate Site	
Impact Category	Impact	Comments	Impact	Comments
Land Use	MODERATE to LARGE	Would use approximately 355 ha (880 ac) for plant, waste disposal, and rail spur. There would be additional offsite land impacts from coal mining.	MODERATE to LARGE	Would use approximately 700 ha (1700 ac) for plant, offices, parking, transmission line, and rail spur. There would be additional land impacts from coal mining.
Ecology	SMALL to MODERATE	Would use over 320 ha (790 ac) of undeveloped and farmland areas at the current PBNP site, plus rail corridor. There would be potential habitat loss and fragmentation and reduced productivity and biological diversity.	MODERATE to LARGE	Impact would depend on the location and ecology of the site, surface-water body used for intake and discharge, and transmission line and rail spur routes. There would be potential habitat loss and fragmentation and reduced productivity and biological diversity.
Water Use and Quality – Surface Water	SMALL	Would use parts of the existing cooling system (intake and discharge structures). Operational impacts would be similar or less than PBNP.	SMALL to MODERATE	Impact would depend on the volume of water withdrawn and discharged and the characteristics of the surface-water body.
Water Use and Quality – Groundwater	SMALL	Groundwater use would be limited.	SMALL to MODERATE	Impact would depend on the volume of water withdrawn and discharged and the characteristics of the aquifers.

Table 8-2. (contd)

	PBNP Site		Alternate Site	
Impact Category	Impact	Comments	Impact	Comments
Air Quality	MODERATE	Sulfur oxides • 795 MT/yr (876 tons/yr) Nitrogen oxides • 1856 MT/yr (2046 tons/yr) Particulates • 291 MT/yr (321 tons/yr) of total suspended particulates including PM_{10} Carbon monoxide • 1359 MT/yr (1498 tons/yr) Small amounts of mercury and other hazardous air pollutants and naturally occurring radioactive materials – mainly uranium and thorium.	MODERATE	Impacts would be potentially the same as at the PBNP site, although pollution-control standards may vary depending on location.
Waste	MODERATE	Total waste volume would be approximately 1.1×10^6 m^3 (1.4×10^6 yd^3) of waste requiring approximately 76 ha (190 ac) for disposal during the 40-year life of the plant.	MODERATE	Impacts would be the same as at the PBNP site; waste disposal constraints may vary.
Human Health	SMALL	Impacts are considered to be SMALL in the absence of more quantitative risk data.	SMALL	Impacts would be the same as at the PBNP site.
Socioeconomics	MODERATE	During construction, impacts would be MODERATE. Between 500 and 2500 additional workers would be employed during the peak of the 5-year construction period, followed by reduction from current PBNP workforce of 971 to 200; the Shared Utility Payments would continue. Impacts during operation would be SMALL.	MODERATE to LARGE	Construction impacts depend on location, but could be LARGE if the plant is located in an area that is more rural than the PBNP site. Manitowoc County and Two Rivers would experience loss of Shared Utility Payments and employment, potentially offset by proximity to Green Bay.

Table 8-2. (contd)

Impact Category	PBNP Site		Alternate Site	
	Impact	Comments	Impact	Comments
Transportation	SMALL to LARGE	Transportation impacts associated with construction workers could be MODERATE to LARGE. Transportation impacts after PBNP shutdown and startup of the coal plant are considered to be SMALL. For rail transportation of coal and lime, the impact is considered to be MODERATE to LARGE. For any barge transportation, the impact is considered to be SMALL.	SMALL to LARGE	Transportation impacts associated with construction workers could be MODERATE to LARGE. Transportation impacts after PBNP shutdown and startup of the coal plant are considered to be SMALL. For rail or barge transportation of coal and lime, the impact is considered to be MODERATE to LARGE.
Aesthetics	MODERATE	The aesthetic impact of plant units, stacks, and cooling towers would be MODERATE. Intermittent noise from construction, commuter traffic, and waste disposal; continuous noise from cooling towers and mechanical equipment; and rail transportation of coal and lime would result in MODERATE noise impacts.	MODERATE to LARGE	Impacts would depend on the characteristics of the site but would generally be similar to PBNP site impacts with additional impacts from the transmission lines and any rail spur that may be needed.
Historic and Archaeological Resources	SMALL to MODERATE	Some construction would affect previously developed parts of the PBNP site; a cultural resource inventory should minimize any impacts on undeveloped lands.	SMALL to MODERATE	An alternate site would necessitate cultural resource studies.
Environmental Justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing might occur during construction.	SMALL to MODERATE	Impacts would vary depending on population distribution and makeup at the site.

- **Land Use**

The existing facilities and infrastructure at the PBNP site would be used to the extent practicable, limiting the amount of new construction that would be required. Specifically, the staff assumed that the coal-fired replacement plant alternative would require modification and use of the switchyard, offices, and transmission line ROWs. Much of the land that would be used has been previously disturbed. However, it is assumed that PBNP would continue to operate while the new units are built.

The coal-fired generation alternative would necessitate converting roughly an additional 240 ha (600 ac) of the PBNP site for the plant and coal storage, plus an additional 77 ha (190 ac) for waste disposal (NMC 2004). Although the PBNP site has an existing once-through cooling system, the system would need to be significantly modified to accommodate a coal plant with a closed-cycle cooling system. It is assumed that the once-through cooling system would be used for the continued safe operation of PBNP while the new units are built. Therefore, some of the leased farm lands on the PBNP site would be converted to industrial use under this alternative. In addition, 24 to 36 ha (60 to 90 ac) would be disturbed to construct a rail spur for coal delivery. Additional land-use changes would occur off site in an undetermined coal mining area to supply coal for the plant.

The impact of a coal-fired generating unit on land use at the existing PBNP site is best characterized as MODERATE to LARGE. The impact would be greater than the OL renewal alternative.

Construction of the coal-fired plant at an alternate site could impact up to 700 ha (1700 ac) (NRC 1996). While transmission facilities would factor into the site selection process, new transmission lines may be necessary, and additional land may be disturbed if a rail spur is needed for coal delivery. This alternative would result in MODERATE to LARGE land-use impacts.

- **Ecology**

Locating a coal-fired plant at the PBNP site would alter ecological resources because of the need to convert roughly 320 ha (790 ac) of land to industrial use (plant, coal storage, vitrified waste and elemental sulfur disposal). Additional land would be disturbed for the construction and use of the closed-cycle cooling system and rail spur. However, some of the land on PBNP has already been disturbed. Therefore, the impacts to terrestrial resources would be considered to be SMALL to MODERATE. Impacts to aquatic resources would be reduced and remain SMALL should closed-cycle cooling replace the once-through system.

Locating a coal-fired plant at an alternate site would alter ecological resources because of the need to convert up to roughly 700 ha (1700 ac) (NRC 1996) of previously undisturbed land to

industrial use (plant, coal storage, vitrified waste and elemental sulfur disposal). Additional land likely would be disturbed for a rail spur and any new transmission facilities. Impacts could include wildlife habitat loss, reduced productivity, and a local reduction in biological diversity. The closed-cycle cooling system alternative would likely have a SMALL impact to aquatic resources. Overall, the ecological impacts at an alternate site would be MODERATE to LARGE.

- **Water Use and Quality - Surface Water**

Coal-fired generation at the PBNP site would likely use water from Lake Michigan for cooling. It is possible that some of the existing intake and discharge structures could be used, but the construction of additional cooling infrastructure would be needed to accommodate a closed-cycle cooling system. Plant discharges would consist mostly of cooling-tower blowdown, primarily characterized by an increased temperature and concentration of dissolved solids relative to the receiving water body and intermittent, low concentrations of biocides (e.g., chlorine). Treated process waste streams and sanitary wastewater may also be discharged. All discharges would be regulated by the Wisconsin Department of Natural Resources (WDNR) through a Wisconsin Pollutant Discharge Elimination System permit. There would be a consumptive use of water due to evaporation from the cooling towers. Some erosion and sedimentation would likely occur during construction (NRC 1996). The staff considers the impacts to surface-water use and quality of a new coal-fired plant with a closed-cycle cooling system located at the PBNP site to be SMALL.

Cooling water at an alternate site would likely be withdrawn from a surface-water body and would be regulated by permit. Depending on the source water body, the impacts of water use for cooling system makeup water and the effects on water quality due to cooling-tower blowdown could have noticeable impacts. Therefore, the staff considers the impacts of a new coal-fired plant utilizing a closed-cycle cooling system at an alternate site to be SMALL to MODERATE.

- **Water Use and Quality - Groundwater**

The staff assumed that groundwater wells would continue to be used for PBNP related activities. Groundwater withdrawals would be equal to or less than the no-action and license renewal alternatives. Overall, impacts of a coal-fired power plant with a closed-cycle cooling system at the PBNP site on groundwater use and quality are considered to be SMALL. Use of groundwater for a coal-fired plant located at an alternate site is a possibility. Groundwater withdrawals at an alternate site would likely require a State permit. The impacts will depend on the characteristics of the site and the amount of groundwater used. Therefore, the impacts at an alternate site are considered to be SMALL to MODERATE, depending on the volume of groundwater withdrawn.

- **Air Quality**

The air-quality impacts of coal-fired generation vary considerably from those of nuclear generation because burning coal emits sulfur oxides (SO_x), nitrogen oxides (NO_x), particulates, carbon monoxide, hazardous air pollutants such as mercury, and naturally occurring radioactive materials.

PBNP is located in the Lake Michigan Intrastate Air Quality Control Region (AQCR), formerly known as the Menominee-Escanaba (Michigan)-Marinette (Wisconsin) Interstate AQCR. The AQCR is currently in attainment for all air-quality criteria pollutants, with the exception of ozone. The U.S. Environmental Protection Agency (EPA) designated Manitowoc County, Wisconsin, as a "basic" nonattainment area for the 8-hour ozone standard, with June 2009 as the latest date to achieve attainment. The County must comply with the more general nonattainment requirements of the Clean Air Act of 1970 (CAA) (42 United States Code [USC] 7491). Therefore, improved emissions controls likely would be required for a new coal-fired plant located at the PBNP site.

A new coal-fired generating plant located in Wisconsin would need an operating permit under the CAA. The plant would need to comply with the new source performance standards set forth in 40 CFR Part 60, Subpart Da. The standards establish limits for particulate matter and opacity (40 CFR 60.42(a)), for sulfur dioxide (SO_2) (40 CFR 60.43(a)), and for NO_x (40 CFR 60.44(a)). The facility would be designed to meet best available control technology or lowest achievable emissions rate standards, as applicable, for control of criteria air pollutants.

The EPA has various regulatory requirements for visibility protection in 40 CFR Part 51, Subpart P, including a specific requirement for review of any new major stationary source in an area designated as attainment or unclassified under the CAA. PBNP and nearby alternate sites are in areas designated as being in attainment or unclassified for criteria pollutants with the exception of ozone.

Section 169A of the CAA establishes a national goal of preventing future impairment of visibility and remedying existing impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. The EPA issued a new regional haze rule in 1999 (EPA 1999). The rule specifies that for each mandatory Class I Federal area, the State must establish goals that provide for reasonable progress towards achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period (40 CFR 51.308(d)(1)). If a coal-fired plant were located close to a mandatory Class I area, additional air pollution control requirements could be imposed. There are no Class I areas within 160 km (100 mi) of the PBNP site.

Impacts for particular pollutants are as follows:

- Sulfur oxides. A new coal-fired power plant would be subject to the requirements in Title IV of the CAA. Title IV was enacted to reduce emissions of SO_2 and NO_x, the two principal precursors of acid rain, by restricting emissions of these pollutants from power plants. Title IV caps aggregate annual power plant SO_2 emissions and imposes controls on SO_2 emissions through a system of marketable allowances. EPA issues one allowance for each ton of SO_2 that a unit is allowed to emit. New units do not receive allowances, but are required to have allowances to cover their SO_2 emissions. Owners of new units must therefore purchase allowances from owners of other power plants or reduce SO_2 emissions at other power plants they own. Allowances can be banked for use in future years. Thus, a new coal-fired power plant would not add to net SO_2 emissions, although it might do so locally. Regardless, SO_2 emissions would be greater for the coal alternative than the OL renewal alternative.

  NMC estimates that by using the best technology to minimize SO_x emissions, the total annual stack emissions would be approximately 795 MT (876 tons) of SO_x (NMC 2004).

- Nitrogen oxides. Section 407 of the CAA establishes technology-based emission limitations for NO_x emissions. The market-based allowance system used for SO_2 emissions is not used for NO_x emissions. A new coal-fired power plant would be subject to the new source performance standards for such plants at 40 CFR 60.44a(d)(1). This regulation (EPA 1998) limits the discharge of any gases that contain nitrogen oxides (expressed as NO_2) in excess of 200 ng/J of gross energy output (1.6 lb/MWh), based on a 30-day rolling average.

  NMC estimates that the total annual NO_x emissions for a new coal-fired power plant would be approximately 1856 MT (2046 tons) (NMC 2004). This level of NO_x emissions would be greater than the OL renewal alternative.

- Particulates. NMC estimates that the total annual stack emissions would be about 291 MT (321 tons) of total suspended particulates and particulate matter having an aerodynamic diameter less than or equal to 10 μm (PM_{10}) (NMC 2004). Fabric filters or electrostatic precipitators likely would be used for control. In addition, coal-handling equipment would introduce fugitive particulate emissions. Particulate emissions would be greater under the coal alternative than the OL renewal alternative.

  During the construction of a coal-fired plant, fugitive dust would be generated. In addition, exhaust emissions would come from vehicles and motorized equipment used during the construction process.

- Carbon monoxide. NMC estimates that the total carbon monoxide emissions would be approximately 1359 MT (1498 tons) per year for a coal-fired power plant (NMC 2004). This level of emissions is greater than the OL renewal alternative.

- Hazardous air pollutants including mercury. In December 2000, the EPA issued regulatory findings on emissions of hazardous air pollutants from electric utility steam-generating units (EPA 2000a). The EPA determined that coal- and oil-fired electric utility steam-generating units are significant emitters of hazardous air pollutants. Coal-fired power plants were found by the EPA to emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, hydrogen fluoride, lead, manganese, and mercury (EPA 2000a). The EPA concluded that mercury is the hazardous air pollutant of greatest concern. The EPA found that (1) there is a link between coal consumption and mercury emissions, (2) electric utility steam-generating units are the largest domestic source of mercury emissions, and (3) certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures resulting from consumption of contaminated fish (EPA 2000a). Accordingly, the EPA added coal- and oil-fired electric utility steam-generating units to the list of source categories under Section 112(c) of the CAA for which emission standards for hazardous air pollutants will be issued (EPA 2000a).

- Uranium and thorium. Uranium and thorium occur naturally in coal. Uranium concentrations are generally in the range of 1 to 10 parts per million. Thorium concentrations are generally about 2.5 times greater than uranium concentrations (Gabbard 1993). One estimate is that a typical coal-fired plant released roughly 4.7 MT (5.2 tons) of uranium and 11.6 MT (12.8 tons) of thorium in 1982 (Gabbard 1993). The population dose equivalent from the uranium and thorium releases and daughter products produced by the decay of these isotopes has been calculated to be significantly higher than that from nuclear power plants (Gabbard 1993).

- Carbon dioxide. A coal-fired plant would also have unregulated carbon dioxide emissions that could contribute to global warming. The level of emissions from a coal-fired plant would be greater than the OL renewal alternative.

- Summary. The GEIS analysis did not quantify emissions from coal-fired power plants but implied that air impacts would be substantial. The GEIS also mentioned global warming from unregulated carbon dioxide emissions and acid rain from SO_x and NO_x emissions as potential impacts (NRC 1996). Adverse human health effects such as cancer and emphysema have been associated with the products of coal combustion. The appropriate characterization of air impacts from coal-fired generation would be MODERATE. The impacts would be clearly noticeable, but would not destabilize air quality.

Siting a coal-fired generation plant at a site other than PBNP would not significantly change air-quality impacts from those described above, although it could result in installing more or less stringent pollution-control equipment to meet applicable local requirements. Therefore, the impacts would be MODERATE.

- **Waste**

The IGCC coal combustion technology would generate a vitrified, glass-like waste material (slag). Two 600-MW(e) coal-fired plants would generate approximately 1.1×10^6 m^3 (1.4×10^6 cu yds) of this waste over 40 years. The waste would be disposed of on site and account for approximately 77 ha (190 ac) of land area over the 40-year plant life. Waste impacts to groundwater and surface water could extend beyond the operating life of the plant if leachate and runoff from the waste storage area occur. Disposal of the waste could noticeably affect land use and groundwater quality, but with appropriate management and monitoring, it would not destabilize any resources. After closure of the waste site and revegetation, the land could be available for other uses. Debris would be generated during construction activities.

In May 2000, the EPA issued a "Notice of Regulatory Determination on Wastes From the Combustion of Fossil Fuels" (EPA 2000b). EPA concluded that some form of national regulation is warranted to address coal combustion waste products because (1) the composition of these wastes could present danger to human health and the environment under certain conditions; (2) EPA has identified 11 documented cases of proven damages to human health and the environment by improper management of these wastes in landfills and surface impoundments; (3) present disposal practices are such that, in 1995, these wastes were being managed in 40 percent to 70 percent of landfills and surface impoundments without reasonable controls in place, particularly in the area of groundwater monitoring; and (4) the EPA identified gaps in State oversight of coal combustion wastes. Accordingly, the EPA announced its intention to issue regulations for disposal of coal combustion waste under Subtitle D of the Resource Conservation and Recovery Act. EPA held a stakeholders meeting on minefill practices for coal combustion residue in May 2003 and a series of "listening" meetings on coal combustion byproducts in April and May 2004, but has not yet issued regulations for the disposal of coal combustion waste.

Siting the coal-fired power plant at PBNP or at an alternate site other than PBNP would not alter waste generation, although other sites might have more constraints on disposal locations. Therefore, the waste impacts would be MODERATE.

- **Human Health**

Coal-fired power generation introduces worker risks from fuel and limestone mining, from fuel and lime/limestone transportation, and from disposal of coal combustion waste. In addition there are public risks from inhalation of stack emissions. Emission impacts can be widespread and health risks difficult to quantify. The coal alternative also introduces the risk of coal-pile fires and attendant inhalation risks.

In the GEIS, the staff stated that there could be human health impacts (cancer and emphysema) from inhalation of toxins and particulates, but it did not identify the significance of these impacts (NRC 1996). In addition, the discharges of uranium and thorium from coal-fired plants can potentially produce radiological doses in excess of those arising from nuclear power plant operations (Gabbard 1993).

Regulatory agencies, including the EPA and State agencies, set air emission standards and requirements based on human health impacts. These agencies also impose site-specific emission limits as needed to protect human health. As discussed previously, the EPA has recently concluded that certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures from sources such as coal-fired power plants. However, in the absence of more quantitative data, human health impacts from radiological doses and inhaling toxins and particulates generated by burning coal are characterized as SMALL.

- **Socioeconomics**

Construction of the coal-fired alternative would take approximately 5 years. The staff assumed that construction would take place while PBNP continues operation and would be completed by the time Units 1 and 2 permanently cease operations. The workforce would be expected to vary between 1200 and 2500 workers during the 5-year construction period (NRC 1996), although NMC estimated approximately 500 to 600 construction workers (NMC 2004). These workers would be in addition to the approximately 971 workers employed at PBNP. During construction, the surrounding communities would experience demands on housing and public services that could have MODERATE impacts. These impacts would be tempered by construction workers commuting to the site from other parts of Manitowoc County or from other counties. After construction, the communities would be impacted by the loss of the construction jobs.

If the coal-fired replacement plant were constructed at the PBNP site and Units 1 and 2 were shut down, there would be a loss of approximately 971 permanent jobs. Approximately 200 permanent jobs would be created to operate the coal-fired plant. There would be a reduction in demand on socioeconomic resources and contribution to the regional economy commensurate with the loss of 771 permanent jobs. The economic projections for the area

suggest that the slow growth likely would not temper or offset the projected loss of jobs from the shutdown of Units 1 and 2. However, the proximity to Green Bay likely would mitigate the impacts. The coal-fired plants would provide for Shared Utility Payments to at least partially offset the loss of these payments associated with the nuclear units. For all of these reasons, the appropriate characterization of nontransportation socioeconomic impacts for a coal-fired plant constructed at the PBNP site would be MODERATE.

Construction of a replacement coal-fired power plant at an alternate site would relocate some socioeconomic impacts, but would not eliminate them. The communities around PBNP would still experience the impact of PBNP operational job losses, and the communities around the new site would have to absorb the impacts of a large, temporary workforce (up to 2500 workers at the peak of construction) and a permanent workforce of approximately 200 workers. In the GEIS, the staff stated that socioeconomic impacts at a rural site would be larger than at an urban site because more of the peak construction workforce would need to move to the area to work. The PBNP site is within commuting distance of the Green Bay metropolitan area and, therefore, is not considered a rural site. Alternate sites would need to be analyzed on a case-by-case basis. Socioeconomic impacts at a rural site could be MODERATE to LARGE.

- **Transportation**

During the 5-year construction period of replacement coal-fired units, up to 2500 construction workers would be working at the PBNP site in addition to the 971 workers at PBNP. The addition of these workers could place significant traffic loads on existing highways, particularly those leading to the PBNP site. Such impacts would be MODERATE to LARGE.

For transportation related to commuting of plant operating personnel, the impacts are considered to be SMALL. After PBNP shutdown and startup of the coal-fired plant, the maximum number of coal-fired plant operating personnel would be approximately 200. The current PBNP workforce is approximately 971. Therefore, traffic impacts associated with plant personnel commuting to a coal-fired plant would be expected to be SMALL compared to the current impacts from PBNP operations.

For rail transportation related to coal and lime delivery to the PBNP site, the impacts are considered to be MODERATE to LARGE. Approximately 230 trains per year would be needed to deliver the coal and lime for the two coal-fired units. A total of five train trips would be expected per week, or more than one trip per day, because for each full train delivery there would be an empty train.

Transportation-related impacts associated with commuting construction workers at an alternate site are site dependent, but could be MODERATE to LARGE. Transportation impacts related to commuting of plant operating personnel would also be site dependent, but can be characterized as SMALL to MODERATE.

At an alternate site, coal would likely be delivered by rail, although barging would be possible if located on Lake Michigan at a site with the potential for barge dock facilities. Transportation impacts would depend upon the site location. Socioeconomic impacts associated with rail transportation or barging would likely be MODERATE to LARGE.

- **Aesthetics**

If sited at PBNP, the cooling towers, plumes, and exhaust stacks of the two coal-fired units would be visible for many miles in daylight hours. The exhaust stacks would be up to 91 m (300 ft) in height. In addition, the IGCC technology would produce a flare of about 61 m (200 ft). The units and associated stacks would also be visible at night because of outside lighting and the flare. Visual impacts of a new coal-fired plant could be mitigated by landscaping and color selection for buildings that is consistent with the environment. Visual impact at night could be mitigated by reduced use of lighting and appropriate use of shielding. Overall, the addition of a coal-fired unit and the associated stack at the PBNP site would likely have a MODERATE aesthetic impact.

Coal-fired generation would introduce mechanical sources of noise that would be audible off site. Sources contributing to total noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment associated with normal plant operations. Intermittent sources include the equipment related to coal handling, solid-waste disposal, transportation related to coal delivery, use of outside loudspeakers, and the commuting of plant employees. The incremental noise impacts of a coal-fired plant compared to existing PBNP operations are considered to be MODERATE.

Noise impacts associated with rail delivery of coal to a plant at the PBNP site would be most significant for residents living in the vicinity of the facility and along the rail route. Although noise from passing trains significantly raises noise levels near the rail corridor, the short duration of the noise reduces the impact. Nevertheless, given the frequency of train transport and the many residents likely to be within hearing distance of the rail route, the impact of noise on residents in the vicinity of the facility and the rail line is considered to be MODERATE.

At an alternate site, there would be an aesthetic impact from the buildings, exhaust stacks, cooling towers, and the plume associated with the cooling towers. There would be an aesthetic impact associated with construction of a new rail spur and transmission line. Noise and light from the plant would be detectable off site. Aesthetic impacts at the plant site would be mitigated if the plant were located in an industrial area adjacent to other power plants. Noise

impacts from a rail spur would be similar to the impacts at the existing site. Overall the aesthetic impacts associated with a coal-fired plant at an alternate site can be categorized as MODERATE to LARGE.

- **Historic and Archaeological Resources**

A new coal-fired plant at the PBNP site or an alternate site would likely require a cultural resource inventory of any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse impacts from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the PBNP site or an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission line ROWs, rail lines, or other ROWs). Historic and archaeological resource impacts need to be evaluated on a site-specific basis. The impacts can generally be effectively managed, and as such, impacts would vary between SMALL to MODERATE, depending on the historic and archaeological resources that may be present and whether mitigation is necessary.

- **Environmental Justice**

No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if a replacement coal-fired plant were built at the PBNP site. Some impacts on housing availability and prices during construction might occur, which could disproportionately affect minority and low-income populations. Shutdown of PBNP would result in a decrease in employment of approximately 771 operating employees, possibly offset by growth in the area. Following construction, it is possible that the ability of local government to maintain social services could be reduced at the same time as diminished economic conditions reduce employment prospects for minority or low-income populations. Overall, impacts would be SMALL to MODERATE and would depend on potential economic growth in the area and the ability of minority or low-income populations to commute to other jobs in the area.

Impacts at an alternate site would depend upon the site chosen and the nearby population distribution but are also likely to be SMALL to MODERATE.

8.2.1.2 Once-Through Cooling System

This section discusses the environmental impacts of constructing a coal-fired plant with a once-through cooling system at the PBNP site. The impacts (SMALL, MODERATE, or LARGE) of this option are the same as the impacts for a coal-fired plant using the closed-cycle system. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8-3 summarizes the incremental differences.

Table 8-3. Summary of Environmental Impacts of Coal-Fired Generation with a Once-Through Cooling System at the PBNP Site

Impact Category	Impact	Comparison with Closed-Cycle Cooling System
Land Use	MODERATE to LARGE	Impacts may be less (e.g., through elimination of cooling towers).
Ecology	SMALL to MODERATE	Possible impacts include entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock.
Water Use and Quality – Surface Water	SMALL	Increased water withdrawal could lead to possible water-use conflicts; thermal load would be higher than with closed-cycle cooling.
Water Use and Quality – Groundwater	SMALL	No change.
Air Quality	MODERATE	No change.
Waste	MODERATE	No change.
Human Health	SMALL	No change.
Socioeconomics	MODERATE	No change.
Transportation	SMALL to LARGE	No change.
Aesthetics	MODERATE	Cooling towers would be eliminated.
Historic and Archaeological Resources	SMALL to MODERATE	No change.
Environmental Justice	SMALL to MODERATE	No change.

8.2.2 Natural Gas-Fired Generation

The environmental impacts of a natural gas-fired alternative are examined in this section for both the PBNP site and an alternate site. The staff assumed that the plant would use a closed-cycle cooling system. In Section 8.2.2.2, the staff also evaluated the impacts of using the existing once-through cooling system at the PBNP site.

The PBNP site and an alternate site would need a 61-cm (24-in.) diameter natural gas pipeline constructed from the plant site to a supply point where a reliable supply of natural gas would be available. NMC identified that a pipeline to the PBNP site would be approximately 64 km (40-mi) long and disturb about 81 ha (200 ac) of land at the site (NMC 2004).

The staff assumed that a replacement natural gas-fired plant would include four units using combined-cycle technology (NMC 2004). In a combined-cycle unit, hot combustion gases in a combustion turbine rotate the turbine to generate electricity. Waste combustion heat from the combustion turbine is routed through a heat-recovery boiler to make steam to generate additional electricity. The staff assumed that a replacement natural gas-fired plant would use combined-cycle combustion turbines as described by NMC (NMC 2004). NMC estimates that the plant would consume approximately 1.3 billion m^3 (46.2 billion ft^3) of natural gas annually (NMC 2004).

Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.2 are from the NMC ER (NMC 2004). The staff reviewed this information and compared it to environmental impact information in the GEIS. Although the OL renewal period is only 20 years, the impact of operating the natural gas-fired alternative for 40 years is considered (as a reasonable projection of the operating life of a natural gas-fired plant).

In addition to the impacts discussed below for a gas-fired plant at either the PBNP site or an alternate site, impacts would occur off site as a result of gas production and transportation. Impacts of production operations include an increase in fugitive dust emissions; surface water runoff; erosion; sedimentation; changes in water quality; disturbance of vegetation and wildlife; disturbance of historic and archaeological resources; changes in land use; and impacts on employment.

8.2.2.1 Closed-Cycle Cooling System

The overall impacts of the natural gas-fired generating system with a closed-cycle cooling system are discussed in the following sections and summarized in Table 8-4. The extent of impacts at an alternate site will depend on the location of the particular site selected.

- **Land Use**

The existing facilities and infrastructure at the PBNP site would be used to the extent practicable, limiting the amount of new construction that would be required. Specifically, the staff assumed that the natural gas-fired alternative would require modification and use of the switchyard, offices, and transmission line ROWs. Much of the land that would be used has been previously disturbed. The staff assumed that approximately 20 ha (50 ac) at PBNP would be needed for the plant and associated infrastructure (NMC 2004). There would be an additional impact to 81 ha (200 ac) for construction of a 64-km (40-mi) gas pipeline.

For construction at an alternate site, the staff assumed that 20 ha (50 ac) would be needed for the plant and associated infrastructure for a 1000 MW(e) plant (NRC 1996). In addition, construction of an underground pipeline would result in additional land disturbance at an alternate site. Regardless of where the natural gas-fired plant is built, 1500 ha (3600 ac) of additional land would be required for natural gas wells, collection stations, and pipelines (NRC 1996).

These offsite land requirements would be partially offset by eliminating the need for uranium mining to supply fuel for PBNP. In the GEIS (NRC 1996), the staff estimated that uranium mining and processing would affect approximately 400 ha (1000 ac) during the operating life of a nuclear power plant. Additional impacts from uranium mining are discussed in Section 8.2.3.1.

The impact of a natural gas-fired generating unit on land use at the existing PBNP site is best characterized as MODERATE, and the land-use impacts on an alternate site would be MODERATE to LARGE.

Table 8-4. Summary of Environmental Impacts of Natural Gas-Fired Generation Using Closed-Cycle Cooling at the PBNP Site and an Alternate Site

	PBNP Site		Alternate Site	
Impact Category	**Impact**	**Comments**	**Impact**	**Comments**
Land Use	MODERATE	20 ha (50 ac) would be required for power block, offices, roads, and parking areas. There would be an additional impact of up to approximately 80 ha (200 ac) for construction and/or upgrade of an underground gas pipeline.	MODERATE to LARGE	20 ha (50 ac) would be required for powerblock, offices, roads, and parking areas. There would be an additional impact (1500 ha [3600 ac]) for construction and/or upgrade of an underground gas pipeline and transmission line.
Ecology	MODERATE	Undeveloped areas at the current PBNP site would be used, and a gas pipeline would be constructed through habitat. Potential habitat would be lost and fragmented; productivity and biological diversity would be reduced. Likely plant sites already have power generation facilities.	MODERATE	Impact would depend on the location and ecology of the site, the surface-water body used for intake and discharge, and transmission and pipeline routes; potential habitat would be lost and fragmented; productivity and biological diversity would be reduced.
Water Use and Quality – Surface Water	SMALL	Partial use of existing cooling system (intake and discharge structures). Operational impacts would be similar or less than for PBNP.	SMALL to MODERATE	Impact would depend on the volume of water withdrawal and discharge and characteristics of surface-water body.
Water Use and Quality – Groundwater	SMALL	Little groundwater would be used.	SMALL to MODERATE	Impact would depend on the volume of water withdrawal.
Air Quality	MODERATE	Sulfur oxides • 15.9 MT/yr (17.5 tons/yr) Nitrogen oxides • 2705 MT/yr (2982 tons/yr) Particulates • 446 MT/yr (492 tons/yr) of total suspended particulates including PM_{10} Some hazardous air pollutants. Unregulated CO_2 emissions could contribute to global warming.	MODERATE	Emissions would be the same as at the PBNP site.
Waste	SMALL	A small amount of ash would be produced.	SMALL	The waste produced would be the same as at the PBNP site.

Table 8-4. (contd)

	PBNP Site		Alternate Site	
IMPACT CATEGORY	IMPACT	COMMENTS	IMPACT	COMMENTS
Human Health	SMALL	Impacts are considered to be minor.	SMALL	Impacts are considered to be minor.
Socioeconomics	SMALL to MODERATE	Up to 1200 construction workers during the peak of the 3-year construction period could create temporary demands on housing and public services. There would be a reduction in workers from 971 PBNP workers to a new plant workforce of 30. Manitowoc County would experience a reduced demand on socioeconomic resources as well as a loss of Shared Utility Payments and employment, potentially offset by the proximity of the site to Green Bay, Wisconsin.	SMALL to MODERATE	Construction impacts depend on location, but could be greater than the PBNP site if the plant is located in an area that is more rural. There would be up to 1200 temporary construction jobs during the peak of a 3-year construction period. Operation of the plant would result in 30 permanent jobs. Manitowoc County could experience greater loss of Shared Utility Payments and employment than at the PBNP site if the alternate site is outside of Manitowoc County.
Transportation	MODERATE	Transportation impacts associated with construction workers would be MODERATE. Impacts associated with operations would be SMALL.	MODERATE	Transportation impacts associated with construction workers would be MODERATE. Impacts associated with operations would be SMALL.
Aesthetics	SMALL to MODERATE	The aesthetic impact of plant units, stacks, and cooling towers would be MODERATE.	SMALL to MODERATE	Impacts would depend on characteristics of the site but would be generally similar to impacts at the PBNP site.
Historic and Archaeological Resources	SMALL to MODERATE	Some construction would affect previously developed parts of the PBNP site; a cultural resource inventory should minimize any impacts on undeveloped lands.	SMALL to MODERATE	Impacts would be the same as at the PBNP site; any potential impacts can likely be effectively managed.
Environmental Justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction.	SMALL to MODERATE	Impacts would vary depending on the population distribution and makeup at site.

- **Ecology**

Locating a natural gas-fired plant at the PBNP site would create ecological impacts to land use. Bringing a new underground gas pipeline to the site would also cause substantial ecological impacts. Ecological impacts at an alternate site would depend on the nature of the land converted for the plant and the likely need for a new gas pipeline and/or transmission line. Construction of a transmission line and construction and/or upgrading of a gas pipeline to serve the plant would be expected to have temporary ecological impacts. Ecological impacts to the plant site and utility easements could include impacts on threatened or endangered species and could cause wildlife habitat loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity. At an alternate site, the cooling makeup water intake and discharge could have aquatic resource impacts. Overall, the ecological impacts are considered to be MODERATE at either location.

- **Water Use and Quality - Surface Water**

Each of the gas-fired units would include a heat recovery boiler from which steam would turn an electric generator. Steam would be condensed and circulated back to the boiler for reuse. A natural gas-fired plant with a closed-cycle cooling system with cooling towers sited at PBNP would require the construction of additional cooling infrastructure, although it is possible that some of the existing intake and discharge structures could be used. Surface-water impacts are expected to be SMALL; the impacts would be sufficiently minor that they would not noticeably alter any important attribute of the resource.

The staff assumed that a natural gas-fired plant at an alternate site would use a closed-cycle cooling system with cooling towers. The staff assumed that surface water would be used for cooling makeup water and discharge. Intake and discharge would involve relatively small quantities of water compared to the coal-fired alternative. The impact on the surface water would depend on the volume of water needed for makeup water, the discharge volume, and the characteristics of the receiving body of water. Intake from and discharge to any surface body of water would be regulated by the State. The impacts would be SMALL to MODERATE.

Water-quality impacts from sedimentation during construction were characterized in the GEIS as SMALL. The staff also noted in the GEIS that operational water-quality impacts would be similar to, or less than, those from other generating technologies.

- **Water Use and Quality - Groundwater**

The staff assumed that the groundwater wells would continue to be used for PBNP activities. Groundwater withdrawals for a natural gas-fired plant at the PBNP site would be equal to or less than groundwater withdrawals for license renewal. Overall, impacts of a gas-fired power

plant with a closed-cycle cooling system at the PBNP site on groundwater use and quality are considered to be SMALL. Use of groundwater for a gas-fired plant located at an alternate site is a possibility. Groundwater withdrawals at an alternate site would likely require a State permit. The impacts will depend on the characteristics of the site and the amount of groundwater used. Therefore, the impacts at an alternate site are considered to be SMALL to MODERATE, depending on the volume of groundwater withdrawn.

- **Air Quality**

Natural gas is a relatively clean-burning fuel. The gas-fired alternative would release similar types of emissions, but in lesser quantities, than the coal-fired alternative.

A new gas-fired generating plant located in Wisconsin would likely need an operating permit under the CAA. A new combined-cycle natural gas power plant would also be subject to the new source performance standards for such units found in 40 CFR Part 60, Subparts Da and GG. These regulations establish emission limits for particulates, opacity, SO_2, and NO_x.

The EPA has various regulatory requirements for visibility protection in 40 CFR Part 51, Subpart P, including a specific requirement for review of any new major stationary source in an area designated attainment or unclassified under the CAA. PBNP and alternate sites are most likely in areas that are designated as attainment or unclassified for criteria pollutants with the exception of ozone.

Section 169A of the CAA establishes a national goal of preventing future, and remedying existing, impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. The EPA issued a new regional haze rule in 1999 (EPA 1999). The rule specifies that for each mandatory Class I Federal area located within a state, the State must establish goals that provide for reasonable progress towards achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period (40 CFR 51.308(d)(1)). If a natural gas-fired plant were located close to a mandatory Class I area, additional air pollution control requirements could be imposed. There are no Class I areas within 160 km (100 mi) of the PBNP site.

NMC projects the following emissions for the natural gas-fired alternative (NMC 2004):

- Sulfur oxides – 15.9 MT/yr (17.5 tons/yr)
- Nitrogen oxides – 2705 MT/yr (2982 tons/yr)
- PM_{10} particulates – 446 MT/yr (492 tons/yr)

A natural gas-fired plant would also have unregulated carbon dioxide emissions that could contribute to global warming.

In December 2000, the EPA issued regulatory findings on emissions of hazardous air pollutants from electric utility steam-generating units (EPA 2000a). Natural gas-fired power plants were found by the EPA to emit arsenic, formaldehyde, and nickel (EPA 2000a). The EPA determined that emissions of hazardous air pollutants from natural gas-fired power plants, unlike emissions from coal- and oil-fired plants, should not be regulated under Section 112 of the CAA.

Construction activities would result in temporary fugitive dust. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process.

The amount and type of emissions produced would likely be the same at PBNP or at an alternate site. Impacts from the above emissions would be clearly noticeable but would not be sufficient to destabilize air resources as a whole.

Therefore, the staff concludes that the overall air-quality impact for a new natural gas-fired plant at the PBNP site or at an alternate site is considered to be MODERATE.

- **Waste**

Burning natural gas fuel would produce spent scrubber catalysts from NO_x emissions controls and small amounts of solid-waste products (i.e., ash). In the GEIS, the staff concluded that waste generation from gas-fired technology would be minimal (NRC 1996). Natural gas firing results in very few combustion by-products because of the clean nature of the fuel. Waste-generation impacts would be so minor that they would not noticeably alter any important resource attribute. Construction-related debris would be generated during construction activities. Overall, the waste impacts would be SMALL for a natural gas-fired plant sited at PBNP or at an alternate site.

- **Human Health**

In Table 8-2 of the GEIS, the staff identifies cancer and emphysema as potential health risks from gas-fired plants (NRC 1996). The risk may be attributable to NO_x emissions that contribute to ozone formation, which in turn contributes to health risks. NO_x emissions from any gas-fired plant would be regulated. For a plant sited in Wisconsin, NO_x emissions would be regulated by the WDNR. Human health effects would not be detectable or would be sufficiently minor that they would neither destabilize nor noticeably alter any health parameter. Overall, the impacts of the natural gas-fired alternate sited at PBNP or at an alternate site on human health are considered to be SMALL.

- **Socioeconomics**

Construction of a natural gas-fired plant would take approximately 3 years. Peak employment would be approximately 1200 workers (NRC 1996), although NMC estimated a construction workforce of 300 workers (NMC 2004). The staff assumed that construction would take place while PBNP continues operation and would be completed by the time PBNP permanently ceases operations. During construction, the communities surrounding the PBNP site would experience demands on housing and public services that could have MODERATE impacts. These impacts would be tempered by construction workers commuting to the site from other counties. After construction, the communities would be impacted by the loss of jobs. The current PBNP workforce (971 workers) would decline through a decommissioning period to a minimal maintenance size. The gas-fired plant would introduce a replacement Shared Utility Payment at PBNP or an alternate site and create approximately 30 new permanent jobs. For siting at an alternate site, impacts in Manitowoc County resulting from decommissioning of Units 1 and 2 would be a loss of jobs and Shared Utility Payment that likely would not be rapidly replaced based on the slow growth projected for the region. However, the proximity to Green Bay likely would mitigate the impacts.

In the GEIS (NRC 1996), the staff concluded that socioeconomic impacts from constructing a natural gas-fired plant would not be very noticeable and that the small operational workforce would have the lowest socioeconomic impacts of any nonrenewable technology. Compared to the coal-fired and nuclear alternatives, the smaller size of the construction workforce, the shorter construction time frame, and the smaller size of the operations workforce would mitigate socioeconomic impacts. For these reasons, socioeconomic impacts associated with construction and operation of a natural gas-fired power plant would be SMALL to MODERATE for siting at PBNP or at an alternate site. Depending on other growth in the area, socioeconomic effects could be noticed, but they would not destabilize any important socioeconomic attribute.

- **Transportation**

Transportation impacts associated with construction include temporary commuter traffic for 1200 construction and operating personnel commuting to the plant site and would depend on the population density and transportation infrastructure in the vicinity of the site. The impacts can be classified as MODERATE for siting at PBNP or at an alternate site. Operational impacts from a workforce that is smaller in size than the construction workforce would be SMALL.

Overall, transportation impacts resulting from construction of a natural gas-fired plant at PBNP or an alternate site would be SMALL to MODERATE.

- **Aesthetics**

The turbine buildings, exhaust stacks (approximately 76 m [250 ft] tall), cooling towers, the plume from the cooling towers, and the associated transmission line and gas pipeline compressors would be visible from off site during daylight hours. Noise and light from the plant would be detectable off site. Overall, the aesthetic impacts associated with the construction and operation of a gas-fired plant located at the PBNP site are categorized as SMALL to MODERATE.

At an alternate site, impacts would be similar to impacts at the PBNP site but would also depend on surrounding land uses. Overall, the aesthetic impacts associated with an alternate site are categorized as SMALL to MODERATE.

- **Historic and Archaeological Resources**

Natural gas-fired generation at the PBNP site or an alternate site would likely require a cultural resource inventory of any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse impacts from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the PBNP site or an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission line ROWs, pipelines, or other ROWs). Historic and archaeological resource impacts need to be evaluated on a site-specific basis. The impacts can generally be effectively managed, and as such, impacts would vary between SMALL to MODERATE, depending on the historic and archaeological resources present, and whether mitigation is necessary.

- **Environmental Justice**

Disproportionately high and adverse environmental impacts on minority and low-income populations have not been identified for a natural gas-fired plant built at the PBNP site. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect the minority and low-income populations. The shutdown of PBNP would result in a loss of approximately 971 jobs. Only 30 employees would be needed to operate the gas-fired plant. The loss of jobs would possibly be offset by growth in the area and proximity to Green Bay. Following construction, it is possible that the ability of local government

to maintain social services could be reduced at the same time as diminished economic conditions reduce employment prospects for minority or low-income populations. Overall, impacts would be SMALL to MODERATE and would depend on potential economic growth in the area and the ability of minority or low-income populations to commute to other jobs in the area.

Impacts at other sites would depend upon the site chosen and the nearby population distribution, but are likely to also be SMALL to MODERATE.

8.2.2.2 Once-Through Cooling System

This section discusses the environmental impacts of constructing a natural gas-fired generation system at the PBNP site using once-through cooling. The impacts (SMALL, MODERATE, or LARGE) of this option are the same as the impacts for a natural gas-fired plant using the closed-cycle system. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8-5 summarizes the incremental differences.

Table 8-5. Summary of Environmental Impacts of Natural Gas-Fired Generation with Once-Through Cooling at the PBNP Site

Impact Category	Impact	Comparison with Closed-Cycle Cooling System
Land Use	MODERATE	Impacts may be less (e.g., through elimination of cooling towers).
Ecology	MODERATE	Potential impacts include entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock.
Water Use and Quality – Surface Water	SMALL	Increased water withdrawal could lead to possible water-use conflicts, and the thermal load would be higher than with closed-cycle cooling.
Water Use and Quality – Groundwater	SMALL	No change.
Air Quality	MODERATE	No change.
Waste	SMALL	No change.
Human Health	SMALL	No change.
Socioeconomics	SMALL to MODERATE	No change.
Transportation	MODERATE	No change.

Table 8-5. (contd)

Impact Category	Impact	Comparison with Closed-Cycle Cooling System
Aesthetics	SMALL to MODERATE	Cooling towers would be eliminated.
Historic and Archaeological Resources	SMALL to MODERATE	No change.
Environmental Justice	SMALL to MODERATE	No change.

8.2.3 Nuclear Power Generation

Since 1997 the NRC has certified three new standard designs for nuclear power plants under 10 CFR Part 52, Subpart B. These designs are the 1300-MW(e) U.S. Advanced Boiling Water Reactor (10 CFR Part 52, Appendix A), the 1300-MW(e) System 80+ Design (10 CFR Part 52, Appendix B), and the 600-MW(e) AP600 Design (10 CFR Part 52, Appendix C). All of these plants are light-water reactors. On September 13, 2004, the Commission issued the Final Design Approval for the AP1000 Design; the staff anticipates that the certification for this design will be finalized in December 2005 (NRC 2004). Although no applications for a construction permit or a combined license based on these certified designs have been submitted to NRC, the submission of the design certification applications indicates continuing interest in the possibility of licensing new nuclear power plants. Recent escalation in prices of natural gas and electricity have made new nuclear power plant construction more attractive from a cost standpoint. Additionally, System Energy Resources, Inc., Exelon Generation Company, LLC, and Dominion Nuclear North Anna, LLC, have recently submitted applications for early site permits for new advanced nuclear power plants under the procedures in 10 CFR Part 52, Subpart A (SERI 2003; Dominion 2003; Exelon 2003). Consequently, construction of a new nuclear power plant at either the PBNP site or an alternate site is considered in this section. The staff assumed that the new nuclear plant would have a 40-year lifetime. Consideration of a new nuclear generating plant to replace PBNP was not included in the NMC ER.

NRC has summarized environmental data associated with the uranium fuel cycle in Table S-3 of 10 CFR 51.51. The impacts shown in Table S-3 are representative of the impacts that would be associated with a replacement nuclear power plant built to one of the certified designs, sited at PBNP or an alternate site. The impacts shown in Table S-3 are for a 1000-MW(e) reactor and would need only minor scaling to reflect impacts of replacing the 1036 MW(e) of power currently provided by the PBNP plant. The environmental impacts associated with transporting fuel and waste to and from a light-water cooled nuclear power reactor are summarized in Table S-4 of 10 CFR 51.52. The summary of NRC's findings on NEPA issues for license renewal of nuclear power plants in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, is also

relevant, although not directly applicable, for consideration of environmental impacts associated with the operation of a replacement nuclear power plant. Additional environmental impact information for a replacement nuclear power plant using closed-cycle cooling is presented in Section 8.2.3.1, and for one using once-through cooling in Section 8.2.3.2.

In addition to the impacts discussed below for a nuclear plant at either the PBNP site or an alternate site, impacts would occur offsite as a result of uranium mining. Impacts of mining include an increase in fugitive dust emissions; surface water runoff; erosion; sedimentation; changes in water quality; disturbance of vegetation and wildlife; disturbance of historic and archaeological resources; changes in land use; and impacts on employment.

The magnitude of these offsite impacts would largely be proportional to the amount of land affected by mining.. However, there would be no net change in land needed for uranium mining because land needed for the new nuclear plant would offset land needed to supply uranium for fuel for Units 1 and 2.

8.2.3.1 Closed-Cycle Cooling System

The overall impacts of the nuclear generating system are discussed in the following sections. The impacts are summarized in Table 8-6. The extent of impacts at an alternate site will depend on the location of the particular site selected.

Table 8-6. Summary of Environmental Impacts of New Nuclear Power Generation Using Closed-Cycle Cooling at the PBNP Site and an Alternate Site

	PBNP Site		Alternate Site	
Impact Category	Impact	Comments	Impact	Comments
Land Use	MODERATE	Would require approximately 200 to 400 ha (500 to 1000 ac) for the plant.	MODERATE to LARGE	Same as PBNP site plus land for transmission line.
Ecology	SMALL to MODERATE	Would use up to 400 ha (1000 ac) of undeveloped and farmland areas at the current PBNP site. There would be potential habitat loss and fragmentation and reduced productivity and biological diversity.	MODERATE to LARGE	Impacts would depend on the location and ecology of the site, the surface-water body used for intake and discharge, and transmission line route. There would be potential habitat loss and fragmentation and reduced productivity and biological diversity.
Water Use and Quality – Surface Water	SMALL	Would use parts of the existing cooling system (intake and discharge structures). Operational impacts would be similar or less than PBNP.	SMALL to MODERATE	Impact would depend on the volume of water withdrawn and discharged and the characteristics of the surface-water body.
Water Use and Quality – Groundwater	SMALL	Little groundwater would be used.	SMALL to MODERATE	Impact would depend on the volume of water withdrawn and discharged and the characteristics of the surface-water or groundwater source.
Air Quality	SMALL	Fugitive emissions and emissions from vehicles and equipment during construction. Small amount of emissions from diesel generators and possibly other sources during operation.	SMALL	Impacts would be the same as at the PBNP site.
Waste	SMALL	Waste impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Impacts would be the same as at the PBNP site.

Table 8-6. (contd)

Impact Category	PBNP Site Impact	PBNP Site Comments	Alternate Site Impact	Alternate Site Comments
Human Health	SMALL	Human health impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Subpart A, Appendix B, Table B-1.	SMALL	Impacts would be the same as at the PBNP site.
Socioeconomics	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 2500 workers would be employed during the peak of the 6-year construction period. The operating workforce is assumed to be similar to PBNP; the Shared Utility Payment would be preserved. Impacts during operation would be SMALL.	MODERATE to LARGE	Construction impacts depend on location. Impacts at a rural location could be LARGE. Manitowoc County would experience loss of Shared Utility Payment and employment, possibly offset by proximity to Green Bay.
Transportation	SMALL to LARGE	Transportation impacts associated with construction workers could be MODERATE to LARGE. Transportation impacts of commuting plant personnel would be SMALL.	SMALL to LARGE	Transportation impacts of construction workers could be MODERATE to LARGE. Transportation impacts of commuting plant personnel could be SMALL to MODERATE.
Aesthetics	SMALL to MODERATE	No exhaust stacks would be needed. Cooling towers and plumes would be visible. Impact could be mitigated by landscaping and appropriate color selection for buildings. Visual impact at night could be mitigated by reduced use of lighting and appropriate shielding. Noise impacts would be relatively small and could be mitigated.	SMALL to MODERATE	Impacts would depend on characteristics of the site but would be generally similar to PBNP site impacts.
Historic and Archaeological Resources	SMALL to MODERATE	Some construction would affect previously developed parts of the PBNP site; a cultural resource inventory should minimize any impacts on undeveloped lands.	SMALL to MODERATE	Impacts would be the same as at PBNP; any potential impacts can likely be effectively managed.

Table 8-6. (contd)

Impact Category	PBNP Site		Alternate Site	
	Impact	Comments	Impact	Comments
Environmental Justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing might occur during construction.	SMALL to MODERATE	Impacts would vary depending on population distribution and makeup at the site. Impacts to minority and low-income populations associated with closure of PBNP Units 1 and 2 could be mitigated by proximity to Green Bay.

- **Land Use**

According to the GEIS, a new nuclear unit at an alternate site would require approximately 200 to 400 ha (500 to 1000 ac) of land (NRC 1996). Additional land could be needed for an electric power transmission line, a rail spur to bring construction materials to the plant site, and/or pipelines to supply cooling-water intake and discharge. Depending particularly on transmission line routing, siting a new nuclear plant with closed-cycle cooling at an alternate site would result in MODERATE to LARGE land-use impacts.

The existing facilities and infrastructure at the PBNP site would be used to the extent practicable, which would limit the amount of new construction that would be required. Specifically, the staff assumed that a replacement nuclear power plant would require a new closed-cycle system including cooling towers; however, the existing intake and discharge structures would be used if practicable. In addition, the staff assumed other existing structures would be used including the switchyard, offices, and transmission line ROWs. Much of the land that would be used has been previously disturbed by farming. It is assumed that PBNP would continue to operate while the new unit is built.

A replacement nuclear power plant at the PBNP site would alter approximately 200 to 400 ha (500 to 1000 ac) of land to industrial use. There would be no net change in land needed for uranium mining because the area of land needed for uranium mining to supply fuel for the new nuclear plant would be the same area as land needed for uranium mining to supply fuel for PBNP.

The impact of a replacement nuclear generating plant on land use at the existing PBNP site is best characterized as MODERATE. The impact would be greater than the OL renewal alternative.

Land-use impacts at an alternate site would be similar to siting at PBNP except for the land needed for a transmission line to connect to existing lines. Assuming a 64-km (40-mi) transmission line, an additional 678 ha (1675 ac) would be needed. In addition, it may be necessary to construct a rail spur to bring in equipment during construction at an alternate site. Depending particularly on transmission line routing, siting a new nuclear plant at an alternate site would result in MODERATE to LARGE land-use impacts.

- **Ecology**

Locating a replacement nuclear power plant at the PBNP site would alter ecological resources because of the need to convert roughly 200 to 400 ha (500 to 1000 ac) of land to industrial use. Most of this land, however, would have been previously disturbed; however, additional land would have to be acquired. Impacts on terrestrial resources would result from cooling tower drift. Impacts to aquatic resources would result from intake makeup water and the possible entrainment and impingement of fish and blowdown from the circulating water system affecting receiving water quality.

Siting at PBNP would have a SMALL to MODERATE ecological impact that would be greater than renewal of the Unit 1 and 2 OLs.

At an alternate site, there would be construction impacts and new incremental operational impacts. Even if the site was an already-developed alternate site, the impacts would alter the ecology. Impacts could include wildlife habitat loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity. Use of cooling makeup water from a nearby surface-water body could have adverse aquatic resource impacts. Construction and maintenance of the transmission line, if needed, would have ecological impacts. Overall, the ecological impacts at an alternate site would be MODERATE to LARGE.

- **Water Use and Quality - Surface Water**

The replacement nuclear plant alternative at the PBNP site is assumed to use a new closed-cycle cooling system (including cooling towers) and the existing intake and discharge structures. This would minimize incremental impacts to water use and quality. Surface-water impacts are expected to be SMALL; the impacts would be sufficiently minor that they would not noticeably alter any important attribute of the resource.

For alternate sites, the impact on surface water would depend on the volume of water needed for makeup water, the discharge volume, and the characteristics of the receiving body of water. Intake from and discharge to any surface body of water would be regulated by the State under its NPDES program, including compliance with revised Clean Water Act Section 316(b) requirements. The impacts would be SMALL to MODERATE.

- **Water Use and Quality - Groundwater**

The staff assumed that a new nuclear power plant located at the PBNP site would obtain potable, process, and fire-protection water from the groundwater wells used for Units 1 and 2, similar to the current practice for PBNP (see Section 2.2.2). Therefore, the impact to groundwater would be SMALL.

Use of groundwater for a nuclear power plant located at an alternate site is a possibility for the cooling system and other uses. Any groundwater withdrawal would require a permit from the WDNR. Therefore, the impact to groundwater would be SMALL to MODERATE depending on the volume of water withdrawn.

- **Air Quality**

Construction of a new nuclear plant located at the PBNP site or an alternate site would result in fugitive emissions during the six-year construction period. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process. An operating nuclear plant would have minor air emissions associated with diesel generators and other minor intermittent sources. Emissions for a plant sited in Wisconsin would be regulated under the CAA. Overall, emissions and associated impacts for a plant located at the existing PBNP site or an alternate site are considered to be SMALL.

- **Waste**

The waste impacts associated with operation of a nuclear power plant are described in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, including operational impacts such as the potential for degradation of groundwater quality or radiation exposure on- and off-site; transportation impacts; waste storage and disposal impacts; and waste generated during refurbishment and/or decommissioning. In addition, construction-related debris would be generated during construction activities and removed to an appropriate disposal site. Overall, waste impacts are considered to be SMALL.

Siting the replacement nuclear power plant at a location other than the PBNP site would not alter waste generation. Therefore, the impacts would be SMALL.

- **Human Health**

Human health impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, including the potential for on- and off-site radiation exposures during operation, refueling, waste management and transportation activities, refurbishment, and decommissioning. Overall, human health impacts are considered to be SMALL.

Siting the replacement nuclear power plant at a location other than the PBNP site would not alter human health impacts. Therefore, the impacts would be SMALL.

- **Socioeconomics**

The construction period and the peak workforce associated with construction of a new nuclear power plant are currently unquantified (NRC 1996). In the absence of quantitative data, staff assumed a construction period of 6 years and a peak workforce of 2500. The staff assumed that construction would take place while the existing nuclear units continue operation and would be completed by the time PBNP permanently ceases operation. During construction, the communities surrounding the PBNP site would experience demands on housing and public services that could have MODERATE impacts. These impacts would be tempered by construction workers commuting to the site from other counties. After construction, the communities would be impacted by the loss of the construction jobs, although this loss would be possibly offset by the proximity to Green Bay.

The replacement nuclear units are assumed to have an operating workforce comparable to the 971 workers currently working at PBNP. The replacement nuclear units would provide a new tax base to offset the loss of tax base associated with decommissioning of PBNP. For all of these reasons, the appropriate characterization of nontransportation socioeconomic impacts for replacement nuclear units constructed at the PBNP site would be SMALL to MODERATE; the socioeconomic impacts would be noticeable, but would be unlikely to destabilize the area.

Construction of a replacement nuclear power plant at an alternate site would relocate some socioeconomic impacts, but would not eliminate them. The communities around the PBNP site would still experience the impact of operational job losses at PBNP (although these losses would be potentially tempered by proximity to Green Bay). The communities around the new site would have to absorb the impacts of a large, temporary workforce (up to 2500 workers at the peak of construction) superimposed on a refueling outage workforce of approximately 300 and a permanent workforce of approximately 971 workers. In the GEIS (NRC 1996), the staff indicated that socioeconomic impacts at a rural site would be larger than at an urban site because more of the peak construction workforce would need to move to the area to work. The

PBNP site is within commuting distance of Green Bay and therefore is not considered a rural site. Alternate sites would need to be analyzed on a case-by-case basis. Socioeconomic impacts at a rural site could be LARGE.

- **Transportation**

During the 6-year construction period, up to 2500 construction workers would be working at the PBNP site in addition to the 971 workers at Units 1 and 2. The addition of the construction workers could place significant traffic loads on existing highways especially during normal refueling outages for Units 1 and 2. Such impacts would be MODERATE to LARGE. Transportation impacts related to commuting of plant operating personnel would be similar to current impacts associated with operation of PBNP and are considered to be SMALL.

Transportation-related impacts associated with commuting construction workers at an alternate site are site dependent, but could be MODERATE to LARGE. Transportation impacts related to commuting of plant operating personnel would also be site dependent, but can be characterized as SMALL to MODERATE.

- **Aesthetics**

The containment buildings for a replacement nuclear power plant sited at PBNP, other associated buildings, cooling towers, and cooling tower plumes would likely be visible over many miles in daylight hours. The replacement nuclear units would also likely be visible at night because of outside lighting. Visual impacts could be mitigated by landscaping and selecting a color for buildings that is consistent with the environment. Visual impact at night could be mitigated by reduced use of lighting and appropriate use of shielding. No exhaust stacks would be needed; however, cooling towers constructed for the closed-cycle system would be visible. Therefore, impacts can be characterized as MODERATE.

Noise impacts from a new nuclear plant would be similar to those from the existing PBNP. Mitigation measures, such as reduced use or no use of outside loudspeakers, could be employed to reduce noise levels and maintain SMALL noise impacts.

At an alternate site, there would be an aesthetic impact from the buildings, cooling towers, and the plume associated with the cooling towers. There would also be an aesthetic impact associated with construction of a new transmission line. Noise and light from the plant would be detectable off site. Overall the aesthetic impacts associated with locating a nuclear power plant at an alternate site can be categorized as SMALL to MODERATE.

- **Historic and Archaeological Resources**

A new nuclear power plant at the PBNP site or an alternate site would likely require a cultural resource inventory of any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field cultural resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse impacts from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction at the PBNP site or an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on cultural resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission line ROWs, rail lines, or other ROWs). Historic and archaeological resource impacts need to be evaluated on a site-specific basis. The impacts can generally be effectively managed, and as such, impacts would vary between SMALL and MODERATE, depending on the historic and archaeological resources present.

- **Environmental Justice**

Disproportionately high and adverse environmental impacts on minority and low-income populations have not been identified for a replacement nuclear power plant at the PBNP site. Some impacts on housing availability and prices during construction might occur, which could disproportionately affect minority and low-income populations. Shutdown activities at PBNP would result in a decrease in employment of approximately 941 operating employees, with the likelihood that a portion of these losses would be absorbed with the startup and operation of the new nuclear unit. Overall, impacts would be SMALL to MODERATE and would depend on potential economic growth in the area, the ability of minority or low-income populations to commute to other jobs in the area, and the transition of the workforce from the existing Units 1 and 2 to the new unit.

Impacts at other sites would depend upon the site chosen and the nearby population distribution but are also likely to be SMALL to MODERATE.

8.2.3.2 Once-Through Cooling System

This section discusses the environmental impacts of constructing a nuclear power plant at the PBNP site using once-through cooling. The impacts (SMALL, MODERATE, or LARGE) of this option are the same as the impacts for a nuclear power plant using a closed-cycle system. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8-7 summarizes the incremental differences.

Table 8-7. Summary of Environmental Impacts of a New Nuclear Power Plant with Once-Through Cooling at the PBNP Site

Impact Category	Impact	Comparison with Closed-Cycle Cooling System
Land Use	MODERATE	Impacts may be less (e.g., through elimination of cooling towers).
Ecology	SMALL to MODERATE	Possible impacts include entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock.
Water Use and Quality – Surface Water	SMALL	Increased water withdrawal could lead to possible water-use conflicts, and the thermal load would be higher than with closed-cycle cooling.
Water Use and Quality – Groundwater	SMALL	No change.
Air Quality	SMALL	No change.
Waste	SMALL	No change.
Human Health	SMALL	No change.
Socioeconomics	SMALL to MODERATE	No change.
Transportation	SMALL to LARGE	No change.
Aesthetics	SMALL to MODERATE	Cooling towers would be eliminated.
Historic and Archaeological Resources	SMALL to MODERATE	No change.
Environmental Justice	SMALL to MODERATE	No change.

8.2.4 Purchased Electrical Power

If available, power purchased from other sources could potentially obviate the need to renew the PBNP OLs. It is unlikely, however, that a firm power supply with a sufficient baseload would be available to replace the capacity of PBNP Units 1 and 2.

Currently, Wisconsin Electric Power Company (WEPCO) purchases about 600 MW(e) of power annually to meet customer demand and supplement power generation (NMC 2004). Similarly, Wisconsin is a net importer of power; it imported 11.4 billion kWh of electricity in 2002 (NMC 2004).

Power imported from Canada or Mexico is unlikely to be available to replace PBNP capacity. In Canada, 60 percent of the country's electrical generation capacity is derived from renewable energy sources, principally hydropower (DOE/EIA 2004b). Canada has plans to continue developing hydroelectric power: more than 6000 MW(e) of hydroelectric capacity are either under construction or planned (DOE/EIA 2004b). Canada's nuclear generation capacity is projected to increase by 23 percent by 2025, by bringing four Pickering reactor units in Ontario Province back into operation over the next several years to assist in replacing coal-fired generation (DOE/EIA 2004b). The EIA projects that total gross United States imports of electricity from Canada and Mexico will gradually increase from 38.4 billion kWh in year 2001 to 48.9 billion kWh in year 2005 and then gradually decrease to 15.2 billion kWh in year 2025 (DOE/EIA 2004b). It is unlikely that electricity imported from Canada or Mexico would be able to replace the existing PBNP capacity through the license renewal period, because less imports of electricity from Canada and Mexico will be available through the license renewal period.

If power to replace the existing PBNP capacity were to be purchased from sources within the United States or a foreign country, the generating technology would likely be one of those described in this SEIS and in the GEIS (probably coal, natural gas, or nuclear). The description of the environmental impacts of other technologies in Chapter 8 of the GEIS is representative of the purchased electrical power alternative to renewal of the PBNP OLs. Thus, the environmental impacts of imported power would still occur but would be located elsewhere within the region, nation, or another country.

8.2.5 Other Alternatives

Other generation technologies considered by NRC are discussed in the following subsections.

8.2.5.1 Wind Power

Wind power, by itself, is not suitable for large baseload capacity. As discussed in Section 8.3.1 of the GEIS, wind has a high degree of intermittency, and average annual capacity factors for wind plants are relatively low (less than 30 percent). Wind power, in conjunction with energy storage mechanisms, might serve as a means of providing baseload power. However, current energy storage technologies are too expensive for wind power to serve as a large baseload generator.

Since 1998, 55 utility scale wind turbines, each rated for 660 kW(e), have been installed at five locations in Wisconsin (NMC 2004). Wisconsin is in a wind power Class 2 region (average wind speeds at 10-m (30-ft) elevation of 5.6 to 6.4 m/s [12.6 to 14.3 mph]). On the coast, Wisconsin is in a wind power Class 3 region (average wind speeds at 10-m (30-ft) elevation of 6.4 to 7.0 m/s [14.3 to 15.7 mph]) (DOE 2004a). In wind power Class 2 areas, wind turbines are economically marginal for development, but in Class 3 areas, they may be suitable for

future technology (DOE 2004a). The staff concludes that locating a wind-energy facility on or near the PBNP site would not be economically feasible given the current state of wind-energy generation technology and because energy storage technologies are too expensive for wind power to serve as a large baseload generator.

Access to many land based wind power sites near the coast would likely require extensive road building, as well as clearing (for towers and blades) and leveling (for tower bases and associated facilities) in variable terrain. Although impacts would depend on the site chosen, common issues of concern include visual impacts, noise generation, and bird and bat collisions. Also, many of the best quality wind sites are on ridges and hilltops that could have greater archaeological sensitivity than surrounding areas. For these reasons, development of large-scale, land based wind power facilities are likely to be costly and also have MODERATE to LARGE impacts on aesthetics, archaeological resources, land use, and terrestrial ecology.

8.2.5.2 Solar Power

Solar technologies use the sun's energy and light to provide heat and cooling, light, hot water, and electricity for homes, businesses, and industry. In the GEIS, the staff noted that by its nature, solar power is intermittent. Therefore, solar power by itself is not suitable for baseload capacity and is not a feasible alternative to license renewal of PBNP. The average capacity factor of photovoltaic cells is about 25 percent, and the capacity factor for solar thermal systems is about 25 percent to 40 percent. Solar power, in conjunction with energy storage mechanisms, might serve as a means of providing baseload power. However, current energy storage technologies are too expensive to permit solar power to serve as a large baseload generator. Therefore, solar power technologies (photovoltaic and thermal) cannot currently compete with conventional fossil-fueled technologies in grid-connected applications, due to high costs per kilowatt of capacity (NRC 1996).

There are substantial impacts to natural resources (wildlife habitat, land-use, and aesthetic impacts) from construction of solar generating facilities. As stated in the GEIS, land requirements are high—14,000 ha (35,000 ac) per 1000 MW(e) for photovoltaic systems and approximately 5700 ha (14,000 ac) per 1000 MW(e) for solar thermal systems. Neither type of solar electric system would fit at the PBNP site, and both would have large environmental impacts at an alternate site.

The PBNP site receives approximately 3 to 3.5 kWh of solar radiation per square meter per day (NMC 2004), compared to 6 to 8 kWh of solar radiation per square meter per day in areas of the western United States, such as California, which are most promising for solar technologies (DOE/EIA 2000). Because of the natural resource impacts (land and ecological), the area's relatively low rate of solar radiation, and high cost, solar power is not deemed a feasible baseload alternative to renewal of the PBNP OLs. Some solar power may substitute for electric

power in rooftop and building applications. Implementation of nonrooftop solar generation on a scale large enough to replace PBNP would likely result in LARGE environmental impacts.

8.2.5.3 Hydropower

Wisconsin has an estimated 26.2 MW(e) of undeveloped hydroelectric resources (Idaho National Engineering Laboratory 1996). This amount is far less than needed to replace the 1036 MW(e) capacity of PBNP. In Section 8.3.4 of the GEIS, the staff points out 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 about flooding, destruction of natural habitat, and alteration of natural river courses.

The staff estimated in the GEIS that land requirements for hydroelectric power are approximately 400,000 ha (1 million ac) per 1000 MW(e). Replacement of PBNP generating capacity would require flooding more than this amount of land. Because of the relatively small number of undeveloped hydropower resources in Wisconsin and the large land-use and related environmental and ecological resource impacts associated with siting hydroelectric facilities large enough to replace PBNP, the staff concludes that local hydropower on its own is not a feasible alternative to renewing PBNP OLs. Any attempts to site hydroelectric facilities large enough to replace PBNP would result in LARGE environmental impacts.

8.2.5.4 Geothermal Energy

Geothermal energy has an average capacity factor of 90 percent and can be used for baseload power where available. However, geothermal technology is not widely used as baseload generation due to the limited geographical availability of the resource and immature status of the technology (NRC 1996). As illustrated by Figure 8-4 in the GEIS, geothermal plants are most likely to be sited in the western continental United States, Alaska, and Hawaii where hydrothermal reservoirs are prevalent. There is no feasible midwestern location for geothermal capacity to serve as an alternative to PBNP. The staff concludes that geothermal energy is not a feasible alternative to renewal of the PBNP OLs.

8.2.5.5 Wood Waste

The use of wood waste to generate electricity is largely limited to those states with significant wood resources, such as California, Maine, Georgia, Minnesota, Oregon, Washington, and Michigan. Electric power is generated in these states by the pulp, paper, and paperboard industries, which consume wood and wood waste for energy, benefitting from the use of waste materials that could otherwise represent a disposal problem.

A wood-burning facility can provide baseload power and operate with an average annual capacity factor of around 70 to 80 percent and with 20 to 25 percent efficiency (NRC 1996). The fuels required are variable and site specific. A significant barrier to the use of wood waste to generate electricity is the high delivered-fuel cost and high construction cost per MW of generating capacity. The larger wood-waste power plants are only 40 to 50 MW(e) in size. Estimates in the GEIS suggest that the overall level of construction impact per MW of installed capacity should be approximately the same as that for a coal-fired plant, although facilities using wood waste for fuel would be built at smaller scales. Like coal-fired plants, wood-waste plants require large areas for fuel storage and processing and involve the same type of combustion equipment.

Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a baseload generating facility, ecological impacts of large-scale timber cutting (e.g., soil erosion and loss of wildlife habitat), and high inefficiency, the staff has determined that wood waste is not a feasible alternative to renewing the PBNP OLs.

8.2.5.6 Municipal Solid Waste

Municipal waste combustors incinerate the waste and use the resultant heat to generate steam, hot water, or electricity. The combustion process can reduce the volume of waste by up to 90 percent and the weight of the waste by up to 75 percent (DOE/EIA 2004a). Municipal waste combustors use three basic types of technologies: mass burn, modular, and refuse-derived fuel (DOE/EIA 2001). Mass burning technologies are most commonly used in the United States. This group of technologies process raw municipal solid waste "as is," with little or no sizing, shredding, or separation before combustion.

Growth in the municipal waste combustion industry slowed dramatically during the 1990s after rapid growth during the 1980s. The slower growth was due to three primary factors: (1) the Tax Reform Act of 1986 (Public Law 99-514, 100 Stat. 2085), which made capital-intensive projects such as municipal waste combustion facilities more expensive relative to less capital-intensive waste disposal alternatives such as landfills; (2) the 1994 Supreme Court decision *(C&A Carbone, Inc. v. Town of Clarkstown)*, which struck down local flow control ordinances that required waste to be delivered to specific municipal waste combustion facilities rather than landfills that may have had lower fees; and (3) increasingly stringent environmental regulations that increased the capital cost necessary to construct and maintain municipal waste combustion facilities (DOE/EIA 2001).

The decision to burn municipal waste to generate energy is usually driven by the need for an alternative to landfills rather than by energy considerations. The use of landfills as a waste disposal option is likely to increase in the near term; however, it is unlikely that many landfills will begin converting waste to energy because of unfavorable economics, particularly with inflation-adjusted electricity prices declining.

Municipal solid waste combustors generate an ash residue that is buried in landfills. The ash residue is composed of bottom ash and fly ash. Bottom ash refers to that portion of the unburned waste that falls to the bottom of the grate or furnace. Fly ash represents the small particles that rise from the furnace during the combustion process. Fly ash is generally removed from flue gases using fabric filters and/or scrubbers (DOE/EIA 2001).

Currently there are approximately 89 waste-to-energy plants operating in the United States. These plants generate approximately 2500 MW(e), or an average of approximately 28 MW(e) per plant (Integrated Waste Services Association 2004), much smaller than needed to replace the 1036 MW(e) of PBNP.

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 for municipal solid waste (NRC 1996). Furthermore, estimates in the GEIS suggest that the overall level of construction impact from a waste-fired plant should be approximately the same as that for a coal-fired plant. Additionally, waste-fired plants have the same or greater operational impacts (including impacts on the aquatic environment, air, and waste disposal). Some of these impacts would be moderate, but still larger than the environmental effects of license renewal of PBNP. Therefore, municipal solid waste would not be a feasible alternative to renewal of the PBNP OLs, particularly at the scale required.

8.2.5.7 Other Biomass-Derived Fuels

In addition to wood and municipal solid-waste fuels, there are several other concepts for fueling electric generators, including burning crops, converting crops to a liquid fuel such as ethanol, and gasifying crops (including wood waste). In the GEIS, the staff points out that none of these technologies has progressed to the point of being competitive on a large scale or of being reliable enough to replace a baseload plant such as PBNP. For these reasons, such fuels do not offer a feasible alternative to renewal of the PBNP OLs.

8.2.5.8 Fuel Cells

Fuel cells work without combustion and its environmental side effects. 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.

Phosphoric acid fuel cells are generally considered first-generation technology. These fuel cells are commercially available at cost of approximately $4500 per kW of installed capacity (DOE 2004b). Higher-temperature second-generation fuel cells achieve higher fuel-to-electricity and thermal efficiencies. The higher temperatures contribute to improved efficiencies and give the second-generation fuel cells the capability to generate steam for cogeneration and combined-cycle operations.

DOE has a new initiative to reduce costs to as low as $400 per kW by the end of the decade (DOE 2004b). For comparison, the installed capacity cost for a natural gas-fired, combined-cycle plant is about $456 per kW (DOE/EIA 2004a). As market acceptance and manufacturing capacity increase, natural gas-fueled fuel cell plants in the 50- to 100-MW range are projected to become available. At the present time, however, fuel cells are not economically or technologically competitive with other alternatives for baseload electricity generation. Fuel cells are, consequently, not a feasible alternative to renewal of the PBNP OLs.

8.2.5.9 Delayed Retirement

WEPCO has no current plans to retire any existing generating units. For this reason, delayed retirement of other WEPCO generating units would not be a feasible alternative to renewal of the PBNP OLs.

8.2.5.10 Utility-Sponsored Conservation

Historically, WEPCO has maintained State-wide residential, commercial, and industrial programs to reduce both peak demands and daily energy consumption. These programs are commonly referred to as demand-side management (DSM). In 1999, these DSM programs resulted in a State-wide reduction of demand of 67 MW(e) and an energy savings of approximately 393,000 MWh (NMC 2004). These load reductions are acknowledged in load forecasts; therefore, they cannot be used as credits to offset the power generated by PBNP. An additional 1000 MW(e) of savings, or a 750 percent increase in the State-wide reduction in peak demand after 2010, would be required to offset the power generated by PBNP. Therefore, the conservation option by itself is not considered a reasonable alternative to renewing the PBNP OLs.

8.2.6 Combination of Alternatives

Even though individual alternatives to PBNP might not be sufficient on their own to replace PBNP generating capacity due to the small size of the resource or lack of cost-effective technologies, it is conceivable that a combination of alternatives might be cost effective.

As discussed in Section 8.2, PBNP has a combined net electrical output of 1036 MW(e). For the coal-fired alternative, the staff assumed the construction of two 600 MW(e) units that would operate at about 78 percent efficiency (to produce 1045 MW[e]), and for the natural gas-fired alternative, the staff assumed four 380 MW(e) units operating at 85 percent efficiency as potential replacements for PBNP.

There are many possible combinations of alternatives. Table 8-8 contains a summary of the environmental impacts if one assumed a combination of alternatives consisting of two, 380 MW(e) of combined cycle natural gas-fired units generating power at 85 percent efficiency (net 646 MW[e]) using closed-cycle cooling, 200 MW(e) of purchased power, and 190 MW(e) gained from additional DSM measures. The impacts are based on the gas-fired generation impact assumptions discussed in Section 8.2.2, adjusted for the reduced generating capacity. While the DSM measures would have few environmental impacts, operation of the new gas-fired plant would result in increased emissions and environmental impacts. The staff concludes that it is very unlikely that the environmental impacts of any reasonable combination of generating and conservation options could be reduced to the level of impacts associated with renewal of the PBNP OLs.

Table 8-8. Summary of Environmental Impacts of 646 MW(e) of Natural Gas-Fired Generation, 200 MW(e) of Purchased Power, and 190 MW(e) from Demand-Side Management Measures (Combination of Alternatives)

	PBNP Site		Alternate Site	
Impact Category	Impact	Comments	Impact	Comments
Land Use	MODERATE	Would require 10 ha (25 ac) for power block, offices, roads, and parking areas. There would be an additional impact for construction of an underground gas pipeline.	MODERATE to LARGE	Would require 10 ha (25 ac) for power block, offices, roads, and parking areas. There would be additional impacts for construction of an underground gas pipeline and a transmission line.
Ecology	MODERATE	Would use undeveloped areas and farmlands at the current PBNP site, plus gas pipeline through habitat. There would be potential habitat loss and fragmentation and reduced productivity and biological diversity.	MODERATE	Impact would depend on the location and ecology of the site, the surface-water body used for intake and discharge, and transmission and pipeline routes. There would be potential habitat loss and fragmentation and reduced productivity and biological diversity.
Water Use and Quality – Surface Water	SMALL	Would use part of the existing cooling system (intake and discharge structures). Operational impacts would be similar or less than PBNP.	SMALL to MODERATE	Impact would depend on the volume of water withdrawal and discharge and characteristics of surface-water body.
Water Use and Quality – Groundwater	SMALL	Little groundwater would be used.	SMALL to MODERATE	Impact would depend on the volume of water withdrawal and discharge.
Air Quality	MODERATE	Natural Gas-Fired Units: Sulfur oxides • 8.0 MT/yr (8.8 tons/yr) Nitrogen oxides • 1353 MT/yr (1491 tons/yr) PM_{10} particulates • 223 MT/yr (246 tons/yr) Some hazardous air pollutants would be released.	MODERATE	Impacts would be the same as siting at PBNP.

Table 8-8. (contd)

Impact Category	PBNP Site		Alternate Site	
	Impact	Comments	Impact	Comments
Waste	SMALL	A small amount of ash would be produced from gas-fired plant.	SMALL	The same waste would be produced as at PBNP.
Human Health	SMALL	Impacts are considered to be minor.	SMALL	Impacts are considered to be minor.
Socioeconomics	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 1200 additional workers would be employed during the peak of the 3-year construction period, followed by a reduction from the current PBNP workforce of 971 to 30; the Shared Utility Payment would be preserved. Impacts during operation would be SMALL.	SMALL to MODERATE	Construction impacts depend on location, but could be significant if the location is in a more rural area than PBNP. Manitowoc County would experience a loss of Shared Utility Payment and employment, potentially offset by proximity to Green Bay.
Transportation	SMALL to MODERATE	Transportation impacts associated with construction workers would be MODERATE. Impacts associated with operations would be SMALL.	SMALL to MODERATE	Transportation impacts associated with construction workers would be MODERATE. Impacts associated with operations would be SMALL.
Aesthetics	SMALL to MODERATE	Aesthetic impacts of plant units, exhaust stacks, and cooling towers would be MODERATE.	SMALL to MODERATE	Impacts would depend on characteristics of site but would be generally similar to those at the PBNP site.
Historic and Archaeological Resources	SMALL to MODERATE	Some construction would affect previously developed parts of PBNP; a cultural resource inventory should minimize any impacts on undeveloped lands and farmlands.	SMALL to MODERATE	Impacts would be the same as siting PBNP; any potential impacts could likely be effectively managed.
Environmental Justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction.	SMALL to MODERATE	Impacts would vary depending on the population distribution and makeup at the site.

8.3 Summary of Alternatives Considered

The environmental impacts of the proposed action, license renewal, are SMALL for all impact categories (except collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, for which a single significance level was not assigned). The alternative actions, i.e., no-action alternative (discussed in Section 8.1), new generation alternatives (from coal, natural gas, and nuclear discussed in Sections 8.2.1 through 8.2.3, respectively), purchased electrical power (discussed in Section 8.2.4), alternative technologies (discussed in Section 8.2.5), and the combination of alternatives (discussed in Section 8.2.6) were considered.

The no-action alternative would require the replacement of electrical generating capacity by (1) DSM and energy conservation, (2) power purchased from other electricity providers, (3) generating alternatives other than PBNP, or (4) some combination of these options. For each of the new generation alternatives (coal, natural gas, and nuclear), the environmental impacts would not be less than the impacts of license renewal. For example, the land-disturbance impacts resulting from construction of any new facility would be greater than the impacts of continued operation of PBNP. The impacts of purchased electrical power (imported power) would still occur, but would occur elsewhere. Alternative technologies are not considered feasible at this time, and it is very unlikely that the environmental impacts of any reasonable combination of generation and conservation options could be reduced to the level of impacts associated with renewal of the PBNP OLs.

The staff concludes that the alternative actions, including the no-action alternative, may have environmental impacts in at least some impact categories that reach MODERATE or LARGE significance.

8.4 References

10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy,* Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Functions."

10 CFR Part 52. Code of Federal Regulations, Title 10, *Energy,* Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

40 CFR Part 51. Code of Federal Regulations, Title 40, *Protection of Environment,* Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans."

40 CFR Part 60. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 60, "Standards of Performance for New Stationary Sources."

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9.0 Summary and Conclusions

By letter dated February 25, 2004, the Nuclear Management Company, LLC (NMC) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses (OLs) for Point Beach Nuclear Plant Units 1 and 2 (PBNP) for an additional 20-year period (NMC 2004a). If the OLs are renewed, State regulatory agencies and the Wisconsin Electric Power Company (WEPCO) will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. If the OLs are not renewed, then the plants must be shut down at or before the expiration of the current OLs, which expire on October 5, 2010, for Unit 1 and March 8, 2013, for Unit 2.

Section 102 of the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] 4321) directs that an environmental impact statement (EIS) is required for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in 10 Code of Federal Regulations (CFR) Part 51. Part 51 identifies licensing and regulatory actions that require an EIS. In 10 CFR 51.20(b)(2), the Commission requires preparation of an EIS or a supplement to an EIS for renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a]

Upon acceptance of the NMC application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct scoping (NRC 2004a) on May 13, 2004. The staff visited the PBNP site in June 2004 and held public scoping meetings on June 15, 2004, in Mishicot, Wisconsin (NRC 2004b). The staff has reviewed the NMC Environmental Report (ER) (NMC 2004b) and compared it to the GEIS, consulted with other agencies, and conducted an independent review of the issues following the guidance set forth in NUREG-1555, Supplement 1, the *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal* (NRC 2000). The staff also considered the public comments received during the scoping process for preparation of the draft supplemental environmental impact statement (SEIS) for PBNP. The public comments received during the scoping process that were considered to be within the scope of the environmental review are provided in Appendix A, Part I, of this SEIS.

The staff held two public meetings in Mishicot, Wisconsin, on March 3, 2005, to describe the preliminary results of the NRC environmental review and to answer questions in order to

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

provide members of the public with information to assist them in formulating their comments on the draft SEIS. All the comments received on the draft SEIS were considered by the staff in developing this final SEIS. These comments are presented and addressed in Appendix A, Part II.

This SEIS includes the NRC staff's analysis that considers and weighs the environmental impacts of the proposed action, including cumulative impacts, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts. This SEIS also includes the staff's recommendation regarding the proposed action.

The NRC has adopted the following statement of purpose and need for license renewal from the GEIS:

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

The evaluation criterion for the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is to determine

> ... whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that there are factors, in addition to license renewal, that will ultimately determine whether an existing nuclear power plant continues to operate beyond the period of the current OL.

NRC regulations [10 CFR 51.95(c)(2)] contain the following statement regarding the content of SEISs prepared at the license renewal stage:

> The supplemental environmental impact statement for license renewal is not required to include discussion of need for power or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, the supplemental environmental impact statement prepared at the license renewal stage need not discuss other issues not related to the environmental effects of the proposed

action and the alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b).[a]

The GEIS contains the results of a systematic evaluation of the consequences of renewing an OL and operating a nuclear power plant for an additional 20 years. It evaluates 92 environmental issues using the NRC's three-level standard of significance – SMALL, MODERATE, or LARGE – developed using the Council on Environmental Quality guidelines. The following definitions of the three significance levels are set forth in the footnotes to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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, important attributes of the resource.

LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

For 69 of the 92 issues considered in the GEIS, the staff analysis in the GEIS shows the following:

(1) The environmental impacts associated with the issue have been 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 characteristics.

(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste [HLW] and spent fuel disposal).

(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

(a) The title of 10 CFR 51.23 is "Temporary Storage of Spent Fuel after Cessation of Reactor Operations–Generic Determination of No Significant Environmental Impact."

These 69 issues were identified in the GEIS as Category 1 issues. In the absence of new and significant information, the staff relied on conclusions as amplified by supporting information in the GEIS for issues designated Category 1 in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues, environmental justice and chronic effects of electromagnetic fields, were not categorized. Environmental justice was not evaluated on a generic basis and must also be addressed in a plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

This SEIS documents the staff's consideration of all 92 environmental issues identified in the GEIS. The staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that were considered include the no-action alternative (not renewing the PBNP OLs) and alternative methods of power generation. These alternative methods of power generation were evaluated assuming that the replacement power generation plant is located at either the PBNP site or some other unspecified greenfield location.

9.1 Environmental Impacts of the Proposed Action – License Renewal

NMC and the staff have established independent processes for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. Neither NMC nor the staff has identified information that is both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. Similarly, neither the public comments, NMC, nor the staff has identified any new issue applicable to PBNP that has a significant environmental impact. Therefore, the staff relies upon the conclusions of the GEIS for all Category 1 issues that are applicable to PBNP.

NMC's license renewal application presents an analysis of the Category 2 issues that are applicable to PBNP, plus environmental justice and chronic effects from electromagnetic fields. The staff has reviewed the NMC analysis for each issue and has conducted an independent review of each issue plus environmental justice and chronic effects from electromagnetic fields. Six Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at PBNP. Four Category 2 issues are not discussed in this SEIS because they are specifically related to refurbishment. NMC has stated that its evaluation of structures and components, as required by 10 CFR 54.21, did not identify any major plant refurbishment activities or modifications as necessary to support the continued operation of

PBNP for the license renewal period (NMC 2004b). In addition, any replacement of components or additional inspection activities are within the bounds of normal plant component replacement and, therefore, are not expected to affect the environment outside of the bounds of the plant operations evaluated in the *Final Environmental Statement Related to the Operation of Point Beach Nuclear Plant Units 1 and 2* (U.S. Atomic Energy Commission 1972).

Eleven Category 2 issues related to operational impacts and postulated accidents during the renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are discussed in detail in this SEIS. Five of the Category 2 issues and environmental justice apply to both refurbishment and to operation during the renewal term and are discussed in this SEIS only in relation to operation during the renewal term. For all 11 Category 2 issues and environmental justice, the staff concludes that the potential environmental impacts would be of SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, no further evaluation of this issue is required.

For severe accident mitigation alternatives (SAMAs), the staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Based on its review of the SAMAs for PBNP and the plant improvements already made, the staff concludes that none of the candidate SAMAs is cost-beneficial. Although none of the SAMAs appear cost-beneficial in the baseline analysis, the staff concludes that one SAMA could be cost-beneficial when uncertainties or alternative discount rates are taken into account. However, this SAMA does not relate to adequately managing the effects of aging during the period of extended operation. Therefore, it need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

Mitigation measures were considered for each Category 2 issue. Current measures to mitigate the environmental impacts of plant operation were found to be adequate, and no additional mitigation measures were deemed sufficiently beneficial to be warranted.

The following sections discuss unavoidable adverse impacts, irreversible or irretrievable commitments of resources, and the relationship between local short-term use of the environment and long-term productivity.

9.1.1 Unavoidable Adverse Impacts

An environmental review conducted at the license renewal stage differs from the review conducted in support of a construction permit because the facility is in existence at the license renewal stage and has operated for a number of years. As a result, adverse impacts associated with the initial construction have been avoided, have been mitigated, or have

already occurred. The environmental impacts to be evaluated for license renewal are those associated with refurbishment and continued operation during the renewal term.

The adverse impacts of continued operation identified are considered to be of SMALL significance, and none warrants implementation of additional mitigation measures. The adverse impacts of likely alternatives if PBNP ceases operation at or before the expiration of the current OLs will not be smaller than those associated with continued operation of these units, and the adverse impacts may be greater for some impact categories in some locations.

9.1.2 Irreversible or Irretrievable Resource Commitments

The commitment of resources related to construction and operation of PBNP during the current license period was made when the facility was built. The resource commitments to be considered in this SEIS are associated with continued operation of the plants for an additional 20 years. These resources include materials and equipment required for plant maintenance and operation, the nuclear fuel used by the reactors, and, ultimately, permanent offsite storage space for the spent fuel assemblies.

The most significant resource commitments related to operation during the renewal term are the fuel and the permanent HLW storage space. Approximately one third of the fuel assemblies in each of the two PBNP units are replaced during every refueling outage, which occurs on a nominal 18-month cycle.

The likely power generation alternatives if PBNP ceases operation on or before the expiration of the current OLs will require a commitment of resources for construction of the replacement plants as well as for fuel to run the plants.

9.1.3 Short-Term Use Versus Long-Term Productivity

An initial balance between short-term use and long-term productivity of the environment at the PBNP site was set when the plants were approved and construction began. That balance is now well established. Renewal of the PBNP OLs and continued operation of the plant will not alter the existing balance, but may postpone the availability of the site for other uses. Denial of the application to renew the OLs will lead to a shutdown of the plant and will alter the balance in a manner that depends on subsequent uses of the site. For example, the environmental consequences of turning the PBNP site into a park or an industrial facility are quite different.

9.2 Relative Significance of the Environmental Impacts of License Renewal and Alternatives

The proposed action is renewal of the PBNP OLs. Chapter 2 describes the site, the power plant, and interactions of the plant with the environment. As noted in Chapter 3, no refurbishment and no refurbishment impacts are expected at PBNP. Chapters 4 through 7 discuss environmental issues associated with renewal of the PBNP OLs. Environmental issues associated with the no-action alternative and alternatives involving power generation and use reduction are discussed in Chapter 8.

The significance of the environmental impacts from the proposed action (approval of the application for renewal of the OLs); the no-action alternative (denial of the application); alternatives involving nuclear, coal-, or gas-generated power at the PBNP site and an unspecified alternate site; and a combination of alternatives are compared in Table 9-1.

Substitution of once-through cooling for the recirculating cooling system in the evaluation of the nuclear, gas-, and coal-fired generation alternatives would result in somewhat greater environmental impacts in some impact categories.

Table 9-1 shows that the significance of the environmental impacts of the proposed action would be SMALL for all impact categories (except for collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, for which a single significance level was not assigned [see Chapter 6]). The alternative actions, including the no-action alternative, may have environmental impacts in at least some impact categories that reach MODERATE or LARGE significance.

9.3 Staff Conclusions and Recommendations

Based on (1) the analysis and findings in the GEIS (NRC 1996, 1999); (2) the ER submitted by NMC (NMC 2004b); (3) consultation with Federal, State, and local agencies; (4) the staff's own independent review, and (5) the staff's consideration of public comments, the recommendation of the staff is that the Commission determine that the adverse environmental impacts of license renewal for PBNP are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

Table 9-1. Summary of Environmental Significance of License Renewal, the No-Action Alternative, and Alternative Methods of Generation (from Chapters 4 and 8)

	Proposed Action	No-Action Alternative	Coal-Fired Generation		Natural-Gas-Fired Generation		New Nuclear Generation		Combination of Alternatives	
Impact Category	License Renewal	Denial of Renewal	PBNP Site	Alternate Site	PBNP Site	Alternate Site	PBNP Site	Alternate Site	PBNP Site	Alternate Site
Land Use	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE
Ecology	SMALL	SMALL	SMALL to MODERATE	MODERATE to LARGE	MODERATE	MODERATE	SMALL to MODERATE	MODERATE to LARGE	MODERATE	MODERATE
Water Use and Quality – Surface Water	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Water Use and Quality – Groundwater	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE	SMALL	SMALL	MODERATE	MODERATE
Waste	SMALL	SMALL	MODERATE	MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Human Health	SMALL[a]	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL to MODERATE	MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to MODERATE
Transportation	SMALL	SMALL	SMALL to LARGE	SMALL to LARGE	MODERATE	MODERATE	SMALL to LARGE	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE
Aesthetics	SMALL	SMALL	MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Historic and Archaeological Resources	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Environmental Justice	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE

(a) Except for collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, for which a significance level was not assigned. See Chapter 6 for details.

9.4 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

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Appendix A

Comments Received on the Environmental Review

Appendix A

Comments Received on the Environmental Review

Part I - Comments Received During Scoping

On May 13, 2004, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the *Federal Register* (69 Federal Register 26624) to notify the public of the staff's intent to prepare a plant-specific supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, to support the renewal application for the Point Beach Nuclear Plant Units 1 and 2 (PBNP) operating licenses and to conduct scoping. The plant-specific supplement to the GEIS has been prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality guidelines, and Title 10 of the Code of Federal Regulations (CFR) Part 51. As outlined by NEPA, the NRC initiated the scoping process with the issuance of the *Federal Register* Notice. The NRC invited the applicant; Federal, State, Tribal, and local government agencies; local organizations; and individuals to participate in the scoping process by providing oral comments at the scheduled public meetings and/or submitting written suggestions and comments no later than July 14, 2004.

The scoping process included two public scoping meetings, which were held at the Fox Hills Conference Center in Mishicot, Wisconsin, on June 15, 2004. Approximately 60 members of the public attended the meetings. Both sessions began with NRC staff members providing a brief overview of the license renewal process and the NEPA process. After the NRC's prepared statements, the meetings were open for public comments. Attendees provided either oral or written statements that were recorded and transcribed by a certified court reporter. The meeting transcripts are an attachment to the Scoping Meeting Summary dated September 3, 2004. In addition to the comments received during the public meetings, 41 comment letters were received by the NRC in response to the Notice of Intent.

At the conclusion of the scoping period, the NRC staff and its contractor reviewed the transcripts and all written material to identify individual comments. All comments and suggestions received orally during the scoping meetings or in writing were considered. Each set of comments from a given commenter was given a unique identifier (commenter ID number), so that each set of comments from a commenter could be traced back to the transcript or letter by which the comments were submitted. Several commenters submitted comments through multiple sources (e.g., afternoon and evening scoping meetings and/or written comments). All of the comments received and the staff responses are included in the PBNP Scoping Summary Report, dated September 2004.

Table A-1 identifies the individuals who provided comments and the commenter ID number associated with each person's set(s) of comments. The individuals are listed in the order in which they spoke at the public meeting. To maintain consistency with the Scoping Summary Report, the unique identifier used in that report for each set of comments is retained in this appendix.

Table A-1. Individuals Providing Comments during Scoping Comment Period

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession Number[a]
PB-A	Mr. Frank Lasee	(Local) State Representative	Afternoon Scoping Meeting
PB-B	Mr. Ken Petersen	Manitowoc County Sheriff	Afternoon Scoping Meeting
PB-C	Mr. Greg Buckley	Two Rivers, WI, City Manager	Afternoon Scoping Meeting
PB-D	Mr. Meyer	Village of Mishicot, Board Representative	Afternoon Scoping Meeting
PB-E	Mr. Rick Kuester	President & CEO of We Energies Generation Group	Afternoon Scoping Meeting
PB-F	Mr. Jim Shaw	PBNP Plant Manager	Afternoon Scoping Meeting
PB-G	Mr. Curt Andersen	Clean Water Action Council	Afternoon Scoping Meeting
PB-H	Mr. Roger Hirst	Citizen	Afternoon Scoping Meeting
PB-I	Mr. Tim Schroeder	Secretary/Treasurer, Two Rivers Business Association	Afternoon Scoping Meeting
PB-J	Mr. David Jurss	Vice-Chairman, Unit 2, Local 2150 International Brotherhood of Electrical Workers (PBNP)	Afternoon Scoping Meeting
PB-K	Mr. Mike Zimmer	Executive Director, Two Rivers Main Street Program	Afternoon Scoping Meeting
PB-L	Mr. Tom Kocourek	Executive Director, Big Brothers/Big Sisters of Manitowoc County	Afternoon Scoping Meeting
PB-M	Mr. Robert Hermann	Sheriff's Department, Manitowoc County	Evening Scoping Meeting
PB-N	Mr. Dan Pawlitzke	Economic Development Supervisor, City of Two Rivers, Wisconsin	Evening Scoping Meeting
PB-O	Mr. Rick Kuester	President & CEO of We Energies Generation Group	Evening Scoping Meeting
PB-P	Mr. Jim Shaw	PBNP Plant Manager	Evening Scoping Meeting
PB-Q	Mr. Dan Rahlf	Community Member	Evening Scoping Meeting
PB-R	Mr. John Nikolai	Citizen	Evening Scoping Meeting
PB-S	Mr. John Busby	Miller Compressing Company	Letter (ML041600105)
PB-T	Mr. Kelly S. Jackson	Lac Du Flambeau Band, Lake Superior Chippewa Nation	Letter (ML041620343)
PB-U	Mr. Robert Domrois	Wisconsin Paperboard Corp.	Letter (ML041620340)
PB-V	Mr. Mark R. Honadel	Wisconsin State Assembly	Letter (ML041750351)

(a) The afternoon and evening transcripts can be found under accession number ML041960121.

Table A-1. (contd)

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession Number[a]
PB-W	D. H. Tredwell	Citizen	Letter (ML041750352)
PB-X	C. W. Fay	Citizen	Letter (ML041750353)
PB-Y	Mr. Dale Scherbert	Director, Community Memorial Hospital	Letter (ML041750356)
PB-Z	Mr. Robert Reynolds	ORBIS Corporation	Letter (ML041750358)
PB-AA	Ms. Kathryn L. Smith	Citizen	Letter (ML041750360)
PB-AB	Ms. Cheryl Brocher	Citizen	Letter (ML041750361)
PB-AC	Mr. Richard Wagner	Trega Foods	Letter (ML041750364)
PB-AD	Mr. Kenneth J. Petersen	Sheriff, Manitowoc County	Letter (ML041750365)
PB-AE	J. A. Mellowes	Charter Mfg. Co.	Letter (ML041750366)
PB-AF	Mr. Richard W. Wanta	Wisconsin Underground Contractors Association	Letter (ML041750367)
PB-AG	Mr. David J. Jenkins	Wisconsin Federation of Cooperatives	Letter (ML041750369)
PB-AH	Mr. Chad E. Cordle	Cellu Tissue Neenah	Letter (ML041830247)
PB-AI	Mr. William J. Welch	Fox Cities Chamber of Commerce and Industry	Letter (ML041830250)
PB-AJ	Mr. Zach Pahmahmie	Prairie Band Potawatomi Nation	Letter (ML041890189)
PB-AK	Mr. Steve Bongers	Outokumpu Copper Valleycast	Letter (ML041940367)
PB-AL	Mr. John H. Goetsch	Citizen	Letter (ML041940378)
PB-AM	Mr. Earl Gustafson	Wisconsin Paper Council	Letter (ML041980016)
PB-AN	Mr. James J. Graf	Alderman, City of Sheboygan	Letter (ML041980024)
PB-AO	Mr. Herman Viets	Milwaukee School of Engineering	Letter (ML041980026)
PB-AP	Mr. R. J. Pirlot	Wisconsin Manufacturers and Commerce	Letter (ML042010179)
PB-AQ	Mr. John H. Meinke	Neenah Technical Center	Letter (ML041970655)
PB-AR	Mr. Donald Kaye	Citizen	Letter (ML041970654)
PB-AS	Mr. Orville Krueger	Citizen	Letter (ML041970650)
PB-AT	Mr. Bob DeKoch	The Boldt Company	Letter (ML041980013)
PB-AU	Mr. Joseph H. Pomeroy	Mercury Marine	Letter (ML041980021)

Table A-1. (contd)

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession Number[a]
PB-AV	Mr. Allen J. Prochnow	Concordia University	Letter (ML042010181)
PB-AW	Mr. Daniel J. Sutheimer	Pierce Manufacturing	Letter (ML042170122)
PB-AX	Mr. Kenneth Westlake	U.S. Environmental Protection Agency (EPA)	Letter (ML041910394)
PB-AY	Mr. Don C. Markwardt	Chair, Legislative Review Committee, Manitowoc County Board of Supervisors	Letter (ML042150282)
PB-AZ	Mr. Joe Leibham	Wisconsin State Senator, 9th Senate District	Letter (ML042170106)
PB-BA	Mr. George P. Brown	Regional Director, Humana, Inc.	Letter (ML042170114)
PB-BB	Mr. Carl Otter	Citizen	Letter (ML042170117)
PB-BC	Ms. Carol Roessler	Wisconsin State Senator, 18th Senate District	Letter (ML042170118)
PB-BD	Dr. John G. Gonis	Dental Associates, Ltd.	Letter (ML042170119)
PB-BE	Mr. Edward J. Zore	President and Chief Executive Officer, Northwestern Mutual	Letter (ML042170120)
PB-BF	Mr. Jeffrey S. Mason	Chief Executive Officer, BayCare Health Systems, LLC	Letter (ML042170121)
PB-BG	Mr. Steve Bongers	Outokumpu Copper Valleycast	Letter (ML041970658)

Specific comments were categorized and consolidated by topic. Comments with similar specific objectives were combined to capture the common essential issues raised by the commenters. The comments fall into one of the following general groups:

- Specific comments that address environmental issues within the purview of the NRC environmental regulations related to license renewal. These comments address Category 1 or Category 2 issues or issues that were not addressed in the GEIS. They also address alternatives and related Federal actions.

- General comments (1) in support of or opposed to nuclear power or license renewal or (2) on the renewal process, the NRC's regulations, and the regulatory process. These comments may or may not be specifically related to the PBNP license renewal application.

- Questions that do not provide new information.

- Specific comments that address issues that do not fall within or are specifically excluded from the purview of NRC environmental regulations related to license renewal. These comments typically address issues such as the need for power, emergency preparedness, security, current operational safety issues, and safety issues related to operation during the renewal period.

Each comment applicable to this environmental review and the staff's responses are summarized in this section. This information, which was extracted from the PBNP Scoping Summary Report, is provided for the convenience of those interested in the scoping comments applicable to this environmental review. The comments that are general or outside the scope of the environmental review for PBNP are not included here. More detail regarding the disposition of general or inapplicable comments can be found in the summary report, which was assigned an accession number to facilitate access to the document through the Public Electronic Reading Room (ADAMS) at http://www.nrc.gov/reading-rm.html. The ADAMS accession number for the summary report is ML042510283.

The following pages summarize the comments and suggestions received as part of the scoping process that are applicable to this environmental review and discuss the disposition of the comments and suggestions. The parenthetical alpha-numeric identifier after each comment refers to the comment set (commenter ID) and the comment number.

Comments in this section are grouped in the following categories:

A.1.1 Comments Concerning Terrestrial Resource Issues

Comment: We take great strides in our daily activities to ensure that the environment is well protected. Our employees feel fortunate that the location of Point Beach is along Lake Michigan and reaches to within the Point Beach State Park area. The site is home to numerous wildlife, aquatic species and plant life. Our efforts have made Point Beach a safe and sound habitat for many years and it's our commitment to maintain that habitat for years to come. (PB-F-9)

Comment: The trees, the flowers, the weeds and grass, they're still growing, growing good. (PB-H-5)

Comment: We take great strides in our daily activities to ensure that the environment is well protected. Our employees feel fortunate that Point Beach is located on the shores of Lake Michigan. The site is home to numerous wildlife, aquatic species and plant life. Our efforts have made Point Beach a safe and sound habitat for many years and it is our commitment to maintain that habitat for many years to come.
(PB-P-9)

Response: *Terrestrial resource issues were evaluated in the GEIS and determined to be Category 1 issues. The comments do not provide new and significant information and, therefore, will not be evaluated further.*

A.1.2 Comments Concerning Aquatic Ecology Issues

Comment: We expect the draft SEIS to discuss the effects of thermal discharge on the lake and fish communities. Currently, the State of Wisconsin does not have active thermal water quality standards, though an advisory group is in the process of developing new standards. The new standards may be in place, or exist in draft form, by the time of license renewal. The draft SEIS should address the applicability of the upcoming State standards to Point Beach. Regardless of permit conditions, however, temperature effects from plant operation should be included in the draft SEIS, as part of assessing impacts to the environment.
(PB-AX-3)

Comment: During the plant audit tour it was mentioned that Point Beach will need to comply with the newly revised Clean Water Act Section 316(b), which regulates impacts of cooling water intakes. The draft SEIS should indicate modifications planned by the applicant to comply with the rule.
(PB-AX-4)

Response: *The comments relate to aquatic ecology issues and are discussed in Chapters 2 and 4 of the SEIS.*

A.1.3 Comments Concerning Water Quality Issues

Comment: As part of describing site hydrogeology, the draft SEIS should discuss the on-site drinking water wells, drinking water quality, and treatment of the drinking water. In addition, we believe the potential for ground water contamination should be described in the draft SEIS, especially with regard to the abandoned settling pond.
(PB-AX-5)

Response: *The comment is noted. Water quality, water use, and other water issues were evaluated in the GEIS and determined to be Category 1 issues. The comment does not provide new and significant information on water quality and, therefore, will not be evaluated further. Water quality is discussed in Chapters 2 and 4 of the SEIS.*

A.1.4 Comments Concerning Air Quality Issues

Comment: It's protected the environment by not having any CO_2 going into the air or mercury or sulfur dioxide.
(PB-H-3)

Comment: With respect to environmental concerns, it is significant that the southeast area of Wisconsin has been and remains a closely watched non-attainment area for purposes of federal Clean Air Act enforcement. As a result, all new sources of monitored emissions will carry added burdens of expensive remediation measures which are not required for the commensurate amount of nuclear generation produced at Point Beach. While these costs are known in some cases, as in the instance of sulfur dioxide, other remediation expenses, such as those for nitrogen oxide and mercury emissions are evolving in their estimates and could prove prohibitively expensive for new coal generation sources. The picture gets murkier when regional ozone transport issues and fine particulate emissions regulation are added. It is thus vital for Wisconsin's future air quality to keep a non-emitting source of generation the size of Point Beach in its generation portfolio.
(PB-AP-4)

Response: *The comments are related to air quality issues. Air quality issues were evaluated in the GEIS and determined to be Category 1 issues. The comments do not provide new and significant information on air quality and, therefore, will not be evaluated further.*

A.1.5 Comments Concerning Socioeconomic Issues

Comment: Now, going back 24 years we, the Sheriff's Department formed what was called an Emergency Response Unit or SWAT Team. At that point, Point Beach was their force. We needed support financially and assist with training in order to get that unit off the ground.
(PB-B-4)

Comment: The Energy Information Center has provided educational programs for more than 300,000 of these visitors. Most of these are school groups that have made our energy center a staple in their curriculum. We continue to host school groups and other organizations through reservation at this point.
(PB-F-10)

Comment: And when you go around the plant, you can't get in it anymore, there used to be some good fishing there. The fishermen are gone due to security problems. But the fish are still there.
(PB-H-4)

Comment: Point Beach itself, as a plant, is very friendly to our community. It supports a lot of our events. One of our biggest events and services is our ethnic festival and they're one of the major sponsors of that event.
(PB-I-3)

Comment: And additionally, my newest position as executive for Big Brothers/Big Sisters, I can attest that Point Beach Nuclear Power Plant has been very supportive of local non-profit

service agencies as well. Without the support of the local community these service agencies could not exist and do the good work that they do for our communities.
(PB-L-4)

Comment: All previous companies relocated to Mexico, or in Hamilton's case has a potential to leave for Mexico. Power companies do not have the luxury of leaving for Mexico. They are here for the long haul. Point Beach Nuclear Power Plant has been a good corporate citizen by annually contributing to the excellent quality of life for the families right here in Two Rivers.
(PB-N-6)

Comment: The Energy Information Center has provided educational programs for more than 300,000 of these visitors. Most of these are school groups, most of them are local school groups that have made our energy center a staple in their curriculum. We continue to host school groups and other organizations through reservations.
(PB-P-10)

Comment: We also know that when you look at socioeconomic factors that the Point Beach Plant is a huge factor in our local economy with approximately 700 high quality jobs having a significant economic impact in the communities of Two Rivers, Manitowoc and, as Representative Lasee noted, throughout northeast Wisconsin. That's in addition to the significant impact of the many contractors employed at the facility and extensive purchases of goods and services throughout the area.
(PB-C-3)

Comment: Point Beach also generates significant economic benefits to the local and state economy. Point Beach provides over 700 full time family supporting jobs. Those families purchase goods and services from local businesses, pay taxes in area communities and contribute to local charities and community organizations. Point Beach is committed to being a good neighbor and fostering continued economic growth in the region.
(PB-E-10)

Comment: Regardless of where power is being shipped right now, we believe that power generation is crucial to the future of Wisconsin, to attracting new industries, to attracting the kind of jobs that we need to rebuild from the industries that have left over the last 10 years or so. Point Beach has always provided safe, clean nuclear power to Wisconsin and wherever else that it ships it along the grid.
(PB-K-2)

Comment: And as previously stated, they employ 700 people in good quality jobs which are desperately needed in the Manitowoc County area.
(PB-L-5)

Comment: Point Beach Nuclear Power Plant started in 1969 and brought 100 employees and has seen a 700 percent increase in its workforce to the existing 700 employees in 2004. Energy production is a significant employer in our community now and hopefully will be well into the future. These are high quality jobs that are hard to find in today's economy.
(PB-N-2)

Comment: The economic impact of the 700 employees at Point Beach Nuclear Power can be felt in the local communities where they live. 69 percent of Point Beach Nuclear Plant employees live in Manitowoc County.
(PB-N-5)

Comment: Finally and in conclusion, the license renewal of Point Beach Nuclear Power Plant presents a unique opportunity to create a win-win-win scenario for the rate payers, taxpayers, the state and our community by: ...(2) preserving hundreds of well-paying jobs that help attract young, successful people to Wisconsin and the Lake Shore area.
(PB-N-10)

Comment: Point Beach also generates significant economic benefits to the local and state economy. Point Beach provides over 700 full-time family supporting jobs. These families purchase goods and services from local businesses, pay taxes in local communities and contribute to local charities and community organizations. Point Beach is committed to being a good neighbor and fostering continued economic growth in the region.
(PB-O-10)

Comment: The continued operation of Point Beach is vital to meeting Wisconsin's energy needs. It's important to the local economy and important to more than 700 employees who keep it running everyday safely.
(PB-E-11, PB-O-11)

Comment: Finally, Wisconsin benefits from the economic benefit of Point Beach and the 700 family supporting jobs that these nuclear facilities provide.
(PB-S-3)

Comment: In response to your letter dated May 14, 2004, the Lac du Flambeau Band of Lake Superior Chippewa Indians would like to express NO CONCERNS with any impacts to historic properties located within the project area of potential effect for the Point Beach Nuclear Plant, located on the western shore of Lake Michigan in Two Rivers, Wisconsin.
(PB-T-1)

Comment: Fortunately through both the business and environmental stewardship of We Energies, Wisconsin continues to be a state that supports manufacturing jobs through energy management and growth.
(PB-Z-2)

Comment: I see this as a positive item for the community. With all the manufacturing leaving this area, we are about the only place left that is a big contributor to the local economy.
(PB-AA-2)

Comment: Another important reason for Point Beach to stay is our economy. We have lost so many industrial jobs in the county. We need the jobs that Point Beach provides. Without it, our county would really be in bad shape.
(PB-AB-4)

Comment: In addition, the plant employs over 700 family supporting jobs, while providing significant economic benefits to the state and the local economy.
(PB-AE-4)

Comment: Lastly, the Point Beach Nuclear Plant provides 700 family supporting jobs in addition to other significant economic benefits to the State of Wisconsin and the local economy.
(PB-AF-3)

Comment: At this time, we are unaware of any historical cultural resources in the proposed development area. However, we do request to be immediately contacted if any inadvertent discoveries are uncovered at anytime throughout the various phases of the project.
(PB-AJ-2)

Comment: The continued operation of its two units for another 20 years will be a significant benefit to Wisconsin's economy.
(PB-AM-4)

Comment: Located in Two Creeks, the Point Beach facility employs approximately 730 area residents with family-sustaining jobs.
(PB-AN-2, PB-AR-2, PB-AT-2, PB-AU-2, PB-AZ-2, PB-BB-2, PB-BC-2, PB-BD-2, PB-BF-2)

Comment: It's significant contribution to Wisconsin's energy generation is priceless to the economic development of our region and quality of life of our residents.
(PB-AN-4, PB-AR-4, PB-AT-4, PB-AU-4, PB-AZ-4, PB-BA-4, PB-BB-4, PB-BC-4, PB-BD-4, PB-BF-4)

Comment: The stability of energy availability has been absolutely essential to the growth of my institution and the growth of the business partners who support this institution. Any interruption of these energy sources will have dire consequences, particularly for existing businesses in the area and for Wisconsin's ability to build and attract new business. It is essential to the economic success of this region to have the Point Beach Nuclear Plant's license renewed.
(PB-AO-3)

Comment: Continued operation of the Point Beach plant is key to providing an overall climate of economic health and growth in the local area as well as throughout the state.
(PB-AQ-3)

Comment: If nuclear power is no longer part of that energy mix, businesses throughout the state will be faced with serious economic issues and the potential for new businesses coming into the area will be limited.
(PB-AV-5)

Comment: The Point Beach Nuclear Plant is an important part of keeping Wisconsin business competitive in the nation and around the world.
(PB-AW-4)

Comment: The 700 permanent jobs at Point Beach and the extensive use of contracts for ongoing maintenance and special projects are recognized as vitally important to the economy of Manitowoc County and Northeast Wisconsin.
(PB-AY-3)

Comment: While the Point Beach facility employees approximately 730 area residents with family-sustaining jobs, clean, reliable, and efficient energy is critical to many businesses affecting many thousands of jobs.
(PB-BA-2)

Comment: If nuclear power is no longer part of that energy mix, business throughout the state could be faced with serious economic issues and the potential for new businesses coming into the area will be limited.
(PB-BE-4)

Response: *Public services involving education, social services, and recreation were evaluated in the GEIS and were determined to be Category 1 issues. Those comments related to these public service issues do not provide new and significant information and, therefore, will not be evaluated further. Socioeconomic issues specific to Point Beach are Category 2 issues and are addressed in Chapters 2 and 4 of the SEIS.*

A.1.6 Comments Concerning Human Health Issues

Comment: But I have some very, very serious concerns about public health.
(PB-G-5)

Comment: The draft SEIS should discuss planned or potential power uprates at Point Beach and the estimated resulting increases in radiological emissions, spent fuel, and other emissions. Although U.S. NRC's regulations (10 CFR § 51.53(c)(2)) state that an applicant's environmental report need not discuss the demand for power, we consider power uprates to be reasonably foreseeable actions that contribute to a cumulative radiological impact, under 40 CFR § 1508.7 and therefore should be discussed in U.S. NRC's draft SEIS.
(PB-AX-1)

Response: *Human health issues were evaluated in the GEIS and were determined to be Category 1 issues. The comments do not provide new and significant information on these issues and, therefore, will not be evaluated further. Human health issues are addressed in Chapter 4 of the SEIS.*

The following paragraph contains additional information that was not included in the scoping summary report dated September 2004:

The SEIS contains an evaluation of severe accident mitigation alternatives (SAMAs), as required by NRC regulations. This is contained in Chapter 5 and Appendix G. The staff notes that the Nuclear Management Company Environmental Report SAMA analysis included a sensitivity study to assess the impact of a 8.7 percent power uprate, which would increase reactor power level to 1678 MW(t). The sensitivity study found that the power uprate had no significant impact on SAMA benefits.

Although the power uprate information was considered in the SAMA analysis, the staff recognizes that the Commission has stated that for NEPA purposes, a possible future action "must at least constitute a proposal pending before the agency" for it to be considered along with the proposed action, which here is license renewal. The Commission's decision is set forth in the following case: Duke Energy Corp. (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2) CLI-02-14, 55 NRC 278, 294-297 (2002). Since Nuclear Management Company does not at this time have a proposal pending before the NRC that relates to a power uprate for PBNP, the SEIS does not address future power uprates. In addition, the Commission in that case stated that for the license renewal action and a separate proposal (such as a power uprate application) to be considered together, both actions must be "interdependent", such that one cannot go forward without the other. Should a power uprate amendment request for PBNP be filed, the staff will then consider whether there are cumulative impacts associated with the power uprate.

A.1.7 Comments Concerning Uranium Fuel Cycle and Waste Management

Comment: Some people will say that nuclear waste is an issue and I've been to Yucca Mountain and looked at it quite a bit and I'm not a science expert, although I can read things and take a good hard look at it. And I think that's a good place to put spent fuel.
(PB-A-3)

Comment: So I view Yucca Mountain, unlike the government does, the government I think views it as a permanent repository. I view it as a much more short term repository until we find a better use for that waste that we're generating here and storing on-site. And I would urge the Federal government to get going so we can move some of that stuff out of here and take it to Yucca Mountain.
(PB-A-4)

Comment: That goes to operational issues, that goes to the dry cask storage issue which we realize is still an interim fix and we want to frankly keep our federal politician's feet to the fire on a permanent solution to that issue which our rate payers have paid for.
(PB-C-6)

Comment: So the solution to the waste? It looks like it could be Wisconsin, right in our area, and the Canadian Shield, the Wolf River—which is nice and solid. It doesn't have any earthquake problems and I don't like the idea of our area being turned into a nuclear waste repository.
(PB-G-3)

Comment: Like all nuclear reactors, Point Beach produces spent fuel. The overwhelming majority of both houses of Congress have expressed their will that the spent fuel storage repository at Yucca Mountain, Nevada, be made operational.
(PB-AG-4)

Comment: In addition, the draft SEIS should discuss spent fuel storage capacity and spent fuel transportation issues that may arise from power uprates.
(PB-AX-2)

Response: *Uranium fuel cycle and waste management issues were evaluated in the GEIS and were determined to be Category 1 issues. The comments do not provide new and significant information on these public service issues and, therefore, will not be evaluated further.*

A.1.8 Comments Concerning Alternatives

Comment: Nuclear power is the way to go. We won't be here, but oil won't last forever, neither will coal.
(PB-H-2)

Comment: And I asked him what he thought about nuclear power. And he feels that nuclear power is the safest, most practical form of energy that we can have, outside of solar energy and wind power. Much more practical, much safer than coal, oil or any other forms of energy.
(PB-I-4)

Comment: If Point Beach Nuclear Power Plant's license is not renewed, its electrical generation capacity would have to be replaced. The likely replacement is some sort of fossil fuel. As air quality becomes more and more of an issue in Wisconsin, especially along the Lake Shore which sees much of its pollution, air pollution that is imported, the license renewal of Point Beach Nuclear Power Plant can serve to help protect our local environment.
(PB-N-7)

Comment: New coal plants are being proposed for southeast Wisconsin but are vigorously opposed by local residents. Wind generators are also planned but nowhere near 1000 megawatts. New natural gas plants are under construction. However, these are presumably peaking plants not base-load as is Point Beach. Further, an article in the June 14 [2004] Wall Street Journal points out that not only is natural gas becoming very expensive but that the availability is in question. To quote: "The underlying demand from the power sector is such that you are always going to be strained to meet the demand on the supply side." The Wisconsin transmission system is generally considered inadequate to import large amounts of power and new lines are planned but are also opposed by many residents.
(PB-X-2)

Comment: To replace this power production today would not only mean a large capital investment but either the environmental damage of a (sic) burning coal or the use of precious national gas which is needed for heating our homes. Nuclear plants still represent the most environmentally sound form of energy production we have available to us and keeping this plant operational as long as possible is critical to Wisconsin's economy and environment.
(PB-Y-3)

Comment: We don't need any more polluted air. Clean production of electricity is crucial to our environment.
(PB-AB-2)

Comment: Continued operation of this particular nuclear plant as such will enable our utility to have time to obtain newer nuclear technology as it becomes available. Continued operation of this particular nuclear plant as such will enable our utility to have some breathing room and transition time as they explore and act to bring much more renewable energy supplies on line.
(PB-AC-3)

Comment: Technically, nuclear energy output comes without any of the environmental impacts to the atmosphere that coal, natural gas, or other fuels have.
(PB-AC-5)

Comment: The current trend in the electric industry is to rely more heavily on natural gas-fired plants. We have seen the cost of natural gas for summer rise from $ 3.00/dth to over $6.00/dth over the last several years. Siting and constructing of new power plants is expensive and difficult. With consideration to the projected maintenance cost, usually the best investment is to maintain existing facilities.
(PB-AE-2)

Comment: Point Beach is a zero-emissions resource. Only hydroelectric and some (not all) renewable resources have zero emissions. This is especially beneficial in an area of the state which has close proximity to Lake Michigan and urban areas such as Milwaukee.
(PB-AG-3)

Comment: License renewal is expected to cost $22 million which Wisconsin Energy projects to be $474 million more economical than other options, such as building a new fossil fuel plant or purchasing replacement power.
(PB-AM-5)

Comment: Nuclear power also represents, and will continue to represent, the most cost effective electricity to produce in Wisconsin and nationwide. Recent data provided by the Nuclear Energy Institute show nuclear energy surpassing coal in overall fuel production cost effectiveness, with none of the attendant emissions-related concerns of coal-fired generation. In contrast, the alternative generation construction required to replace the output of Point Beach, in the event of an untimely retirement, would necessarily rely upon natural gas or coal. Natural gas prices have reached nearly historic levels of expense and volatility, with further use in electricity production likely to cause further price flux and supply displacement for manufacturing and home heating needs. Coal generation carries very large capital costs, long construction cycles and protracted public opposition. None of these alternatives to Point Beach represent good choices for Wisconsin ratepayers, who already face sizable rate increases once currently pending generation and transmission upgrades begin commercial operation.
(PB-AP-3)

Response: *The GEIS included an extensive discussion of alternative energy sources. Environmental impacts from reasonable alternatives to renewal of the operating licenses for the Point Beach Nuclear Plant Units 1 and 2 are evaluated in Chapter 8 of the SEIS.*

Part II - Comments Received on the Draft SEIS

Pursuant to 10 CFR Part 51, the staff transmitted the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Point Beach Nuclear Plant, Units 1 and 2, Draft Report for Comment (NUREG-1437, Supplement 23, referred to as the draft Supplemental Environmental Impact Statement [SEIS]) to Federal, State, and local government agencies; Indian tribes; and interested members of the public. As part of the process to solicit public comments on the draft SEIS, the staff

- Placed a copy of the draft SEIS into the NRC's Public Electronic Reading Room, its license renewal website, and at the Lester Public Library;
- Sent copies of the draft SEIS to the applicant, members of the public who requested copies, representatives of Indian tribes, and certain Federal, State, and local agencies;
- Published a notice of availability of the draft SEIS in the *Federal Register* on January 26, 2005 (70 FR 3744);
- Issued public announcements, such as advertisements in local newspapers and postings in public places, of the availability of the draft SEIS;
- Announced and held two public meetings in Mishicot, Wisconsin, on March 3, 2005, to describe the results of the environmental review and answer related questions;
- Issued public service announcements and press releases announcing the issuance of the draft SEIS, the public meetings, and instructions on how to comment on the draft SEIS; and
- Established an email address to receive comments on the draft SEIS.

During the comment period, the staff received a total of five written comments. No comments were received during the public meetings on the draft SEIS.

The staff has reviewed the public meeting transcripts and the five written comments that are part of the docket file for the application, all of which are available at the NRC's Public Document Room. Appendix A, Part II, Section A.2, contains a summary of the comments and the staff's responses. Related issues are grouped together. Appendix A, Part II, Section A.3, contains the comment letters.

Each comment identified by the staff was assigned a specific alphanumeric identifier (marker). That identifier is typed in the margin at the beginning of the discussion of the comment in a letter. A cross-reference of the alphanumeric identifiers, the author of the comment, the page where the comment can be found, and the section(s) of this report in which the comment is addressed is provided in Table A-2.

The staff made a determination on each comment that it was one of the following:

- A comment that was actually a question and introduces no new information.

- A comment that was either related to support or opposition of license renewal in general (or specifically, PBNP) or that makes a general statement about the license renewal process. It may make only a general statement regarding Category 1 and/or Category 2 issues. In addition, it does not provides new and significant information and does not pertain to safety considerations reviewed under 10 CFR Part 54.
- A comment about a Category 1 issue that provided new information that required evaluation during the review, or provided no new information.
- A comment about a Category 2 issue that provided information that required evaluation during the review, or provided no such information.
- A comment regarding alternatives to the proposed action.
- A comment that raised an environmental issue that was not addressed in the GEIS or the draft SEIS.
- A comment outside the scope of license renewal (not related to 10 CFR Parts 51 or 54) that includes comments regarding the need for power.
- A comment on safety issues pertaining to 10 CFR Part 54.
- A comment that was editorial in nature.

There was no new and significant information provided on Category 1 issues or information that required further evaluation on Category 2 issues. Therefore, the conclusions in the GEIS and draft SEIS remained valid and bounding, and no further evaluation was performed.

Comments without a supporting technical basis or without any new information are discussed in this appendix, and not in other sections of this report. Relevant references that address the issues within the regulatory authority of the NRC are provided where appropriate. Many of these references can be obtained from the NRC Public Document Room.

Within each section of Part II of this appendix (A.2.1 through A.2.11), similar comments are grouped together for ease of reference, and a summary description of the comments is given, followed by the staff's response. Where the comment or question resulted in a change in the text of the draft report, the corresponding response refers the reader to the appropriate section of this report where the change was made. Revisions to the text in the draft report are designated by vertical lines beside the text.

Table A-2. Comments Received on the Draft SEIS

Comment ID	Commenter	Source	Comment Location	Section(s) Where Addressed
PB-CA-1	Mr. Daniel Hahn	Electronic mail (ML050700105)	A-34	A.2.11
PB-CB-1	Mr. J. Kevin McCoy	Letter (ML050900218)	A-20	A.2.1
PB-CC-1	Mr. Dennis L. Koehl	Letter (ML051090335)	A-29	Executive Summary, A.2.10
PB-CC-2	Mr. Dennis L. Koehl	Letter (ML051090335)	A-29	Executive Summary, A.2.10
PB-CC-3	Mr. Dennis L. Koehl	Letter (ML051090335)	A-29	Executive Summary, 1.2.2, 9.0, A.2.10
PB-CC-4	Mr. Dennis L. Koehl	Letter (ML051090335)	A-29	1.0, A.2.10
PB-CC-5	Mr. Dennis L. Koehl	Letter (ML051090335)	A-29	Executive Summary, 1.2.2, 9.0, A.2.10
PB-CC-6	Mr. Dennis L. Koehl	Letter (ML051090335)	A-29	1.3, A.2.10
PB-CC-7	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	1.5, A.2.10
PB-CC-8	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	1.4, A.2.10
PB-CC-9	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	1.3, A.2.10
PB-CC-10	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	2.1.1, A.2.10
PB-CC-11	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	2.2.1, A.2.10
PB-CC-12	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	2.2.5, A.2.10
PB-CC-13	Mr. Dennis L. Koehl	Letter (ML051090335)	A-21	2.2.4, A.2.2
PB-CC-14	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	2.2.7, A.2.10
PB-CC-15	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	2.2.7, A.2.10
PB-CC-16	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	2.2.7, A.2.10
PB-CC-17	Mr. Dennis L. Koehl	Letter (ML051090335)	A-30	2.2.8.3, A.2.10
PB-CC-18	Mr. Dennis L. Koehl	Letter (ML051090335)	A-31	2.1.2, A.2.10
PB-CC-19	Mr. Dennis L. Koehl	Letter (ML051090335)	A-31	2.2.8.4, A.2.10
PB-CC-20	Mr. Dennis L. Koehl	Letter (ML051090335)	A-31	2.2.10, A.2.10
PB-CC-21	Mr. Dennis L. Koehl	Letter (ML051090335)	A-31	Figure 2-3, A.2.10
PB-CC-22	Mr. Dennis L. Koehl	Letter (ML051090335)	A-31	Figure 2-3, A.2.10
PB-CC-23	Mr. Dennis L. Koehl	Letter (ML051090335)	A-31	2.1.5, A.2.10
PB-CC-24	Mr. Dennis L. Koehl	Letter (ML051090335)	A-31	2.1.5, A.2.10
PB-CC-25	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	2.1.6, A.2.10
PB-CC-26	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	2.2.3, A.2.10
PB-CC-27	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	2.2.4, A.2.10

Table A-2. (contd)

Comment ID	Commenter	Source	Comment Location	Section(s) Where Addressed
PB-CC-28	Mr. Dennis L. Koehl	Letter (ML051090335)	A-22	2.2.5, A.2.4
PB-CC-29	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	2.2.8.1, A.2.10
PB-CC-30	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	4.1.1, 4.1.2, A.2.10
PB-CC-31	Mr. Dennis L. Koehl	Letter (ML051090335)	A-22	4.1.2, A.2.4
PB-CC-32	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	4.1.1, 4.1.2, A.2.10
PB-CC-33	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	4.4.5, A.2.10
PB-CC-34	Mr. Dennis L. Koehl	Letter (ML051090335)	A-32	8.2.5.9, A.2.10
PB-CC-35	Mr. Dennis L. Koehl	Letter (ML051090335)	A-33	9.0, A.2.10
PB-CC-36	Mr. Dennis L. Koehl	Letter (ML051090335)	A-29	Executive Summary, 1.2.2, 9.0, A.2.10
PB-CC-37	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	5.2.1, A.2.6
PB-CC-38	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	5.2.6, A.2.6
PB-CC-39	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.5, A.2.6
PB-CC-40	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.6.2, A.2.6
PB-CC-41	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.6.2, A.2.6
PB-CC-42	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.7, A.2.6
PB-CC-43	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	5.2.2, A.2.6
PB-CC-44	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	5.2.4, A.2.6
PB-CC-45	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	Table G-4, A.2.6
PB-CC-46	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.6.2, A.2.6
PB-CC-47	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.7, A.2.6
PB-CC-48	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.7, A.2.6
PB-CC-49	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	Table 5-3, A.2.6
PB-CC-50	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	Table G-1, A.2.6
PB-CC-51	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	Table 5-4, A.2.6
PB-CC-52	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	Table G-2, A.2.6
PB-CC-53	Mr. Dennis L. Koehl	Letter (ML051090335)	A-26	G.2.2, A.2.6
PB-CC-54	Mr. Dennis L. Koehl	Letter (ML051090335)	A-27	G.5, A.2.6
PB-CC-55	Mr. Dennis L. Koehl	Letter (ML051090335)	A-27	G.7, A.2.6
PB-CD-1	Mr. Kenneth A. Westlake, U.S. Environmental Protection Agency (EPA)	Letter (ML051160259)	A-20	A.2.1

Table A-2. (contd)

Comment ID	Commenter	Source	Comment Location	Section(s) Where Addressed
PB-CD-2	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-21	2.1.3, A.2.3
PB-CD-3	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-33	2.2.7, A.2.10
PB-CD-4	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-33	A.2.10
PB-CD-5	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-33	A.2.10
PB-CD-6	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-33	4.8.3, A.2.10
PB-CD-7	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-27	A.2.6
PB-CD-8	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-27	A.2.7
PB-CD-9	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-28	A.2.8
PB-CD-10	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-34	A.2.10
PB-CD-11	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-21	A.2.2
PB-CD-12	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-25	A.2.5
PB-CD-13	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-29	A.2.9
PB-CD-14	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-25	A.2.5
PB-CD-15	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-23	A.2.4
PB-CD-16	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-35	A.2.11
PB-CD-17	Mr. Kenneth A. Westlake, EPA	Letter (ML051160259)	A-21	2.2.2, 2.2.3, 4.5, A.2.3
PB-CE-1	Mr. Michael T. Chezik, Department of Interior (DOI)	Letter (ML051050351)	A-24	A.2.4
PB-CE-2	Mr. Michael T. Chezik, DOI	Letter (ML051050351)	A-24	4.6.2, A.2.4
PB-CE-3	Mr. Michael T. Chezik, DOI	Letter (ML051050351)	A-23	A.2.4
PB-CE-4	Mr. Michael T. Chezik, DOI	Letter (ML051050351)	A-24	4.1.2, A.2.4