NUREG-1437
Supplement 27

Generic Environmental Impact Statement for License Renewal of Nuclear Plants

Supplement 27

Regarding
Palisades Nuclear Plant

Final Report

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

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Division of License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Abstract

The U.S. Nuclear Regulatory Commission (NRC) considered the environmental impacts of renewing nuclear power plant operating licenses (OLs) for a 20-year period in its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, and codified the results in Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51). In the GEIS (and its Addendum 1), the NRC staff identifies 92 environmental issues and reaches generic conclusions related to environmental impacts for 69 of these issues that apply to all plants or to plants with specific design or site characteristics. Additional plant-specific review is required for the remaining 23 issues. These plant-specific reviews are to be included in a supplement to the GEIS.

This Supplemental Environmental Impact Statement (SEIS) has been prepared in response to an application submitted to the NRC by the Nuclear Management Company, LLC (NMC), to renew the OL for Palisades Nuclear Plant (Palisades) for an additional 20 years under 10 CFR Part 54. This SEIS includes the NRC staff's analysis that considers and weighs the environmental impacts of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts. It also includes the NRC staff's recommendation regarding the proposed action.

Regarding the 69 issues for which the GEIS reached generic conclusions, neither NMC nor the NRC staff has identified information that is both new and significant for any issue that applies to Palisades. In addition, the NRC staff determined that information provided during the scoping process did not call into question the conclusions in the GEIS. Therefore, the NRC staff concludes that the impacts of renewing the Palisades OL would not be greater than the impacts identified for these issues in the GEIS. For each of these issues, the NRC staff's conclusion in the GEIS is that the impact is of SMALL[(a)] significance (except for collective offsite radiological impacts from the fuel cycle and high-level waste and spent fuel, which were not assigned a single significance level).

Regarding the remaining 23 issues, those that apply to Palisades are addressed in this SEIS. For each applicable issue, the NRC staff concludes that the significance of the potential environmental impacts of renewal of the OL would be SMALL. The NRC staff determined that information provided during the public comment period did not identify any new issue with a significant environmental impact.

The NRC staff's recommendation is that the Commission determine that the adverse environmental impacts of license renewal for Palisades are not so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable. This

(a) Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

recommendation is based on (1) the analysis and findings in the GEIS; (2) the Environmental Report submitted by NMC; (3) consultation with Federal, State, and local agencies; (4) the NRC staff's own independent review; and (5) the NRC staff's consideration of public comments.

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Executive Summary

By letter dated March 22, 2005, Nuclear Management Company, LLC (NMC), submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license (OL) for Palisades Nuclear Plant (Palisades) for an additional 20-year period. If the OL is renewed, State regulatory agencies and NMC 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 OL is not renewed, then the plant must be shut down at or before the expiration date of the current OL, which is March 24, 2011.

The NRC has implemented Section 102 of the National Environmental Policy Act (NEPA), Title 42, Section 4321 of the *United States Code* (42 USC 4321) in Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51). In 10 CFR 51.20(b)(2), the Commission requires preparation of an Environmental Impact Statement (EIS) or a supplement to an EIS for renewal of a reactor OL. In addition, 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 Plant*s (GEIS), NUREG-1437, Volumes 1 and 2.[(a)]

Upon acceptance of the NMC application, the NRC staff began the environmental review process described in 10 CFR Part 51 by publishing a Notice of Intent to prepare an EIS and conduct scoping. The NRC staff visited the Palisades site in July 2005 and held two public scoping meetings on July 28, 2005, in South Haven, Michigan. During the preparation of this Supplemental Environmental Impact Statement (SEIS) for Palisades, the NRC staff reviewed the NMC Environmental Report (ER) and compared it with the GEIS, consulted with other agencies, conducted an independent review of the issues following the guidance set forth in NUREG-1555, Supplement 1, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*, and considered the public comments received during the scoping process. 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 draft SEIS was published in February 2006. The NRC staff held two public meetings at Lake Michigan College, South Haven, Michigan, on April 5, 2006, to describe the preliminary results of the NRC environmental review, to answer questions, and to provide members of the public with information to assist them in formulating comments on this SEIS. When the 75-day comment period ended, the NRC staff considered and dispositioned all of the comments received. These comments are addressed in Appendix A, Part II, of this SEIS.

This SEIS includes the NRC staff's analysis that considers and weighs the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action,

(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.

and mitigation measures for reducing or avoiding adverse effects. It also includes the NRC staff's recommendation regarding the proposed action.

The Commission 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) decision makers.

The evaluation criterion for the NRC staff's environmental review, as defined in 10 CFR 51.950(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 decision makers 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) ["Temporary storage of spent fuel after cessation of reactor operation–generic determination of no significant environmental impact"] and in accordance with § 51.23(b).

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 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 analysis in the GEIS reached the following conclusions:

(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 not likely to be sufficiently beneficial to warrant implementation.

These 69 issues were identified in the GEIS as Category 1 issues. In the absence of new and significant information, the NRC staff relied on conclusions as amplified by supporting information in the GEIS for issues designated as 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 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 NRC staff's consideration of all 92 environmental issues identified in the GEIS. The NRC 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 OL for Palisades) and alternative methods of power generation. Based on projections made by the U.S. Department of Energy's Energy Information Administration, gas- and coal-fired generation appear to be the most likely power-generation alternatives if the power from the plant is replaced. These alternatives are evaluated assuming that the replacement power generation plant is located at either the Palisades site or some other unspecified alternate location.

NMC and the NRC 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 NRC 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, the NRC staff did not identify, during the scoping process or during its review, any new issue applicable to Palisades that had a significant environmental impact. Therefore, the NRC staff relies upon the conclusions of the GEIS for all of the Category 1 issues that are applicable to Palisades.

NMC's license renewal application presents an analysis of the Category 2 issues. The NRC 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. Nine Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at Palisades. 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 Palisades for the license renewal period. In addition, any replacement of components or additional inspection activities are within the bounds of normal plant operation and are not expected to affect the environment outside of the bounds of the plant operations evaluated in the U.S. Atomic Energy Commission's 1972 *Final Environmental Statement Related to the Operation of Palisades Nuclear Generating Plant, Consumers Power Company*.

Eight 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. Four of the Category 2 issues and environmental justice apply to both refurbishment and to operation during the renewal term and are only discussed in this SEIS in relation to operation during the renewal term. For all eight of the Category 2 issues and environmental justice, the NRC staff concludes that the potential environmental effects would be of SMALL significance in the context of the standards set forth in the GEIS. In addition, the

NRC 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 NRC staff concurs with NMC's identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of all or a subset of the identified, potentially cost-beneficial SAMA. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that further evaluation of these SAMAs by NMC is warranted. However, none of the potentially cost-beneficial SAMAs directly relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

Cumulative impacts of past, present, and reasonably foreseeable future actions were considered, regardless of any other action undertaken by agencies or persons. For purposes of this analysis, the overall conclusion of the NRC staff is that these impacts would not result in significant cumulative impacts on potentially affected resources.

If the Palisades OL is not renewed and the plant ceases operation on or before the expiration of its current OL, then the adverse impacts of likely alternatives will not be smaller than those associated with continued operation of Palisades. The impacts may, in fact, be greater in some areas.

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

Abbreviations/Acronyms

°	degree
µCi	microcurie(s)
µg	microgram(s)
ac	acre(s)
AC	alternating current
ACC	averted cleanup and decontamination costs
ACHP	Advisory Council on Historic Preservation
ADAMS	Agencywide Documents Access and Management System
AEC	U.S. Atomic Energy Commission
AEP	American Electric Power
AFW	auxiliary feedwater
ALARA	as low as reasonably achievable
AOC	averted offsite property damage costs
AOE	averted occupational exposure
AOSC	averted onsite costs
APE	area of potential effect
APE	averted public exposure
AQCR	Air Quality Control Region
BEIR	Biological Effects of Ionizing Radiation
Btu	British thermal unit(s)
CDF	core damage frequency
CEOG	Combustion Engineering Owners Group
CEQ	Council on Environmental Quality
CET	containment event tree
CFR	Code of Federal Regulations
Ci	curie(s)
cm^3	cubic centimeter(s)
CO	carbon monoxide
COE	cost of enhancement
CWS	Circulating Water System
CZMA	Coastal Zone Management Act
DAW	dry active waste
DBA	design-basis accident
DC	direct current
DDDIP	direct drive diesel-driven injection pump
DFO	Department of Fisheries and Oceans Canada

DFS	dry fuel storage
DMR	Discharge Monitoring Report
DOC	U.S. Department of Commerce
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
DSM	Demand Side Management
EDG	emergency diesel generator
EIA	Energy Information Administration
EIS	Environmental Impact Statement
ELF-EMF	extremely low frequency-electromagnetic field
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ER	Environmental Report
F	Fahrenheit
FAA	Federal Aviation Administration
FES	Final Environmental Statement
FSAR	Final Safety Analysis Report
ft	foot (feet)
ft^3	cubic foot (feet)
FWS	U.S. Fish and Wildlife Service
gal	gallon(s)
GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437
GL	Generic Letter
GLSC	Great Lakes Science Center
GLSGN	Great Lakes Sea Grant Network
gpd	gallon(s) per day
gpm	gallon(s) per minute
GWd	gigawatt day(s)
HEPA	high-efficiency particulate air
HLW	high-level waste
HPI	high-pressure injection
hr	hour(s)
HPSI	high-pressure safety injection
HVAC	heating, ventilation, and air-conditioning

Hz	hertz
I-196	Interstate-196
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IDNR	Indiana Department of Natural Resources
IEEE	Institute of Electrical and Electronic Engineers
in.	inch(es)
INEEL	Idaho National Engineering and Environmental Laboratory
IPE	Individual Plant Examination
IPEEE	Individual Plant Examination of External Events
ISFSI	independent spent fuel storage installation
kV	kilovolt(s)
kWe	kilowatt(s) electrical
kWh	kilowatt hour(s)
L	liter(s)
lb	pound(s)
LOCA	loss of coolant accident
LOOP	loss of offsite power
m	meter(s)
m^2	square meter(s)
mA	milliampere(s)
MAAP	Modular Accident Analysis Program
MACCS2	Melcor Accident Consequence Code System 2
MDCH	Michigan Department of Community Health
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MEDC	Michigan Economic Development Corporation
MEI	maximally exposed individual
METC	Michigan Electric Transmission Company, LLC
mg	milligram(s)
MGy	milliGray(s)
mi	mile(s)
mi^2	square mile(s)
mi^3	cubic mile(s)
min	minute(s)
MMACR	modified maximum averted cost risk
MNFI	Michigan Natural Features Inventory

mph	mile(s) per hour
MRCC	Midwestern Regional Climate Center
mrem	millirem(s)
MSIV	main steam insolation valve
MSL	mean sea level
MTU	metric ton(s)-uranium
MW	megawatt(s)
MW(e)	megawatt(s) electric
MW(t)	megawatt(s) thermal
MWh	megawatt hour(s)
NAS	National Academy of Sciences
NCES	National Center for Educational Statistics
NCI	National Cancer Institute
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act
NREL	National Renewable Energy Laboratory
NESC	National Electric Safety Code
ng/J	nanogram(s) per Joule
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NMC	Nuclear Management Company, LLC
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxide(s)
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
OL	operating license
PCB	polychlorinated biphenyl
PCS	Primary Coolant System
PG&E	PG&E Corporation
PM_{10}	particulate matter with an aerodynamic diameter of 10 μm or less
PNL	Pacific Northwest National Laboratory
PSA	Probabilistic Safety Assessment
PSD	prevention of significant deterioration
psi	pounds per square inch
RAI	request for additional information

RCP	reactor coolant pump
REMP	radiological environmental monitoring program
ROI	region of interest
RPC	replacement power cost
RRW	risk reduction worth
s	second(s)
SAMA	severe accident mitigation alternative
SAR	Safety Analysis Report
SBO	station blackout
SCR	selective catalytic reduction
SECA	Solid State Energy Conservation Alliance
SEIS	Supplemental Environmental Impact Statement
SER	Safety Evaluation Report
SGTR	steam generator tube rupture
SHPO	State Historic Preservation Office(r)
SIRWT	safety injection and refueling water tank
SO_2	sulfur dioxide
SO_x	sulfur oxide(s)
spp.	species
STS	STS Consultants, Inc.
SWPPP	Storm Water Pollution Prevention Plan
SWS	Service Water System
TEDE	total effective dose equivalent
TLAA	time-limited aging analysis
TRO	total residual oxidant
TSS	total suspended solids
TWh	terawatt-hour(s)
U.S.	United States
USC	United States Code
USDA	U.S. Department of Agriculture
USI	unresolved safety issue
UWSGI	University of Wisconsin Sea Grant Institute
W	watt(s)
yd	yard(s)

1.0 Introduction

Under the U.S. Nuclear Regulatory Commission's (NRC's) environmental protection regulations in Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51), which implement the National Environmental Policy Act of 1969 (NEPA), renewal of a nuclear power plant operating license (OL) requires the preparation of an Environmental Impact Statement (EIS). In preparing the EIS, the NRC staff is required first to issue the statement in draft form for public comment, and then issue a final statement after considering public comments on the draft. To support the preparation of the EIS, the NRC staff has prepared a *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[(a)] The GEIS is intended to (1) provide an understanding of the types and severity of environmental impacts that may occur as a result of license renewal of nuclear power plants under 10 CFR Part 54; (2) identify and assess the impacts that are expected to be generic to license renewal; and (3) support 10 CFR Part 51 to define the number and scope of issues that must be addressed by the applicants in plant-by-plant renewal proceedings. Use of the GEIS guides the preparation of complete plant-specific information in support of the OL renewal process.

Nuclear Management Company, LLC (NMC), operates Palisades Nuclear Plant (Palisades) in southwestern Michigan under OL DPR-20, which was issued by the NRC. This OL will expire in March 2011. On March 22, 2005, NMC submitted an application to the NRC to renew the Palisades OL for an additional 20 years under 10 CFR Part 54. NMC is a licensee for the purposes of its current OL and an applicant for the renewal of the OL. Pursuant to 10 CFR 54.23 and 51.53(c), NMC submitted an Environmental Report (ER) (NMC 2005a) in which NMC analyzed the environmental impacts associated with the proposed license renewal action, considered alternatives to the proposed action, and evaluated mitigation measures for reducing adverse environmental impacts.

This report is the plant-specific supplement to the GEIS (the supplemental EIS (SEIS)) for the NMC license renewal application. This SEIS is a supplement to the GEIS because it relies, in part, on the findings of the GEIS. The NRC staff will also prepare a separate Safety Evaluation Report in accordance with 10 CFR Part 54.

(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.

1.1 Report Contents

The following sections of this introduction (1) describe the background for the preparation of this SEIS, including the development of the GEIS and the process used by the NRC staff to assess the environmental impacts associated with license renewal; (2) describe the proposed Federal action to renew the Palisades OL; (3) discuss the purpose and need for the proposed action; and (4) present the status of NMC's compliance with environmental quality standards and requirements that have been imposed by Federal, State, regional, and local agencies that are responsible for environmental protection.

The ensuing chapters of this SEIS closely parallel the contents and organization of the GEIS. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. Chapters 3 and 4, respectively, discuss the potential environmental impacts of plant refurbishment and plant operation during the renewal term. Chapter 5 contains an evaluation of potential environmental impacts of plant accidents and includes consideration of severe accident mitigation alternatives. Chapter 6 discusses the uranium fuel cycle and solid waste management. Chapter 7 discusses decommissioning, and Chapter 8 discusses alternatives to license renewal. Finally, Chapter 9 summarizes the findings of the preceding chapters and draws conclusions about the adverse impacts that cannot be avoided; the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and the irreversible or irretrievable commitment of resources. Chapter 9 also presents the NRC staff's recommendation with respect to the proposed license renewal action.

Additional information is included in appendixes. Appendix A contains public comments related to the environmental review for license renewal and NRC staff responses to those comments. Appendixes B through G, respectively, list the following:

- The preparers of the supplement,
- The chronology of NRC staff's environmental review correspondence related to this SEIS,
- The organizations contacted during the development of this SEIS,
- NMC's compliance status in Table E-1 (this appendix also contains copies of consultation correspondence prepared and sent during the evaluation process),
- GEIS environmental issues that are not applicable to Palisades, and
- Severe accident mitigation alternatives (SAMAs).

1.2 Background

Use of the GEIS, which examines the possible environmental impacts that could occur as a result of renewing individual nuclear power plant OLs under 10 CFR Part 54, and the established license renewal evaluation process support the thorough evaluation of the impacts of renewal of OLs.

1.2.1 Generic Environmental Impact Statement

The NRC initiated a generic assessment of the environmental impacts associated with the license renewal term to improve the efficiency of the license renewal process by documenting the assessment results and codifying the results in the Commission's regulations. This assessment is provided in the GEIS, which serves as the principal reference for all nuclear power plant license renewal EISs.

The GEIS documents the results of the systematic approach that was taken to evaluate the environmental consequences of renewing the licenses of individual nuclear power plants and operating them for an additional 20 years. For each potential environmental issue, the GEIS (1) describes the activity that affects the environment, (2) identifies the population or resource that is affected, (3) assesses the nature and magnitude of the impact on the affected population or resource, (4) characterizes the significance of the impact for both beneficial and adverse impacts, (5) determines whether the results of the analysis apply to all plants, and (6) considers whether additional mitigation measures would be warranted for impacts that would have the same significance level for all plants.

The NRC's standard of significance for impacts was established using the Council on Environmental Quality (CEQ) terminology for "significantly" (40 CFR 1508.27, which requires consideration of both "context" and "intensity"). Using the CEQ terminology, the NRC established three significance levels – SMALL, MODERATE, and LARGE. The 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, as follows:

> SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
>
> 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 GEIS assigns a significance level to each environmental issue, assuming that ongoing mitigation measures would continue.

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 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 in this SEIS unless new and significant information is identified.

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

In the GEIS, the NRC staff assessed 92 environmental issues and determined that 69 qualified as Category 1 issues, 21 qualified as Category 2 issues, and 2 issues were not categorized. The two uncategorized issues are environmental justice and chronic effects of electromagnetic fields. Environmental justice was not evaluated on a generic basis and must 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.

Of the 92 issues, 11 are related only to refurbishment, 6 are related only to decommissioning, 67 apply only to operation during the renewal term, and 8 apply to both refurbishment and operation during the renewal term. A summary of the findings for all 92 issues in the GEIS is codified in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

1.2.2 License Renewal Evaluation Process

An applicant seeking to renew its OL is required to submit an ER as part of its application. The license renewal evaluation process involves careful review of the applicant's ER and assurance that all new and potentially significant information not already addressed in or available during the GEIS evaluation is identified, reviewed, and assessed to verify the environmental impacts of the proposed license renewal.

In accordance with 10 CFR 51.53(c)(2) and (3), the ER submitted by the applicant must

- Provide an analysis of the Category 2 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, in accordance with 10 CFR 51.53(c)(3)(ii), and

- Discuss actions to mitigate any adverse impacts associated with the proposed action and environmental impacts of alternatives to the proposed action.

In accordance with 10 CFR 51.53(c)(2), the ER does not need to

- Consider the economic benefits and costs of the proposed action and alternatives to the proposed action except insofar as such benefits and costs are either (1) essential for making a determination regarding the inclusion of an alternative in the range of alternatives considered, or (2) relevant to mitigation;

- Consider the need for power and other issues not related to the environmental effects of the proposed action and the alternatives;

- Discuss any aspect of the storage of spent fuel within the scope of the generic determination in 10 CFR 51.23(a) in accordance with 10 CFR 51.23(b); and

- Contain an analysis of any Category 1 issue unless there is significant new information on a specific issue–this is pursuant to 10 CFR 51.23(c)(3)(iii) and (iv).

New and significant information is (1) information that identifies a significant environmental issue not covered in the GEIS and codified in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, or (2) information that was not considered in the analyses summarized in the GEIS and that leads to an impact finding that is different from the finding presented in the GEIS and codified in 10 CFR Part 51.

In preparing to submit its application to renew the Palisades OL, NMC developed a process to ensure that information not addressed in or available during the GEIS evaluation regarding the environmental impacts of license renewal for Palisades would be properly reviewed before

submitting the ER, and to ensure that such new and potentially significant information related to renewal of the license for Palisades would be identified, reviewed, and assessed during the period of NRC review. NMC reviewed the Category 1 issues that appear in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, to verify that the conclusions of the GEIS remained valid with respect to Palisades. This review was performed by personnel from NMC and its support organization who were familiar with NEPA issues and the scientific disciplines involved in the preparation of a license renewal ER.

The NRC staff also has a process for identifying new and significant information. That process is described in detail in *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal,* NUREG-1555, Supplement 1 (NRC 2000). The search for new information includes (1) review of an applicant's ER and the process for discovering and evaluating the significance of new information; (2) review of records of public comments; (3) review of environmental quality standards and regulations; (4) coordination with Federal, State, and local environmental protection and resource agencies; and (5) review of the technical literature. New information discovered by the staff is evaluated for significance using the criteria set forth in the GEIS. For Category 1 issues, where new and significant information is identified, reconsideration of the conclusions for those issues is limited to the assessment of the relevant new and significant information; the scope of the assessment does not include other facets of the issue that are not affected by the new information.

Chapters 3 through 7 discuss the environmental issues considered in the GEIS that are applicable to Palisades. At the beginning of the discussion of each set of issues, a table identifies the issues to be addressed and lists the sections in the GEIS where the issues are discussed. Category 1 and Category 2 issues are listed in separate tables. For Category 1 issues for which there is no new and significant information, the table is followed by a set of short paragraphs that state the GEIS conclusion codified in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, followed by the NRC staff's analysis and conclusion. For Category 2 issues, in addition to the list of GEIS sections where the issue is discussed, the tables list the subparagraph of 10 CFR 51.53(c)(3)(ii) that describes the analysis required and the SEIS sections where the analysis is presented. The SEIS sections that discuss the Category 2 issues are presented immediately following the table.

The NRC prepares an independent analysis of the environmental impacts of license renewal and compares these impacts with the environmental impacts of alternatives. The evaluation of the NMC license renewal application began with publication of a Notice of Acceptance for docketing and opportunity for a hearing in the *Federal Register* (Volume 70, page 33533 (70 FR 33533)) (NRC 2005a) on June 8, 2005. On June 27, 2005, the NRC staff published a Notice of Intent to prepare an EIS and conduct scoping (70 FR 36967) (NRC 2005b). Two public scoping meetings were held on July 28, 2005, in South Haven, Michigan. Comments received during the scoping period were summarized in the *Environmental Impact Statement Scoping Process: Summary Report – Palisades Nuclear Plant, Van Buren County, Michigan*

(NRC 2005c). Comments that are applicable to this environmental review are presented in Part I of Appendix A.

The NRC staff followed the review guidance contained in NUREG-1555, Supplement 1 (NRC 2000). The NRC staff and contractors retained to assist the NRC visited the Palisades site on July 26 and 27, 2005, to gather information and to become familiar with the site and its environs. The NRC staff also reviewed the comments received during scoping and consulted with Federal, State, regional, and local agencies. A list of the organizations consulted is provided in Appendix D. Other documents related to Palisades were reviewed and are referenced in this SEIS.

This SEIS presents the NRC staff's analysis that considers and weighs the environmental impacts of the proposed renewal of the OL for Palisades, the environmental impacts of alternatives to license renewal, and mitigation measures available for avoiding adverse environmental impacts. Chapter 9, "Summary and Conclusions," provides the NRC staff's recommendation to the Commission on whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable.

On February 23, 2006, the NRC published a Notice of Availability of the draft SEIS (71 FR 9383) (NRC 2006). A 75-day comment period began on the date of publication of the U.S. Environmental Protection Agency Notice of Filing of the draft SEIS to allow members of the public to comment on the preliminary results of the NRC staff's review. During this comment period, two public meetings, an afternoon session and an evening session, were held on April 5, 2006 at South Haven, Michigan. During these meetings, the NRC staff described the preliminary results of the NRC environmental review and answered questions related to it to provide members of the public with information to assist them in formulating their comments. The comment period for the Palisades draft SEIS ended on May 18, 2006. Comments made during the 75-day comment period, including those made at the two public meetings, are presented in Part II of Appendix A of this SEIS. The NRC's responses to those comments are also provided.

1.3 The Proposed Federal Action

The proposed Federal action is renewal of the OL for Palisades. Palisades is located in Covert Township, Van Buren County, Michigan, on the southeastern shoreline of Lake Michigan. The site is located 4.5 mi south of the South Haven city limits. Kalamazoo and Portage, Michigan, and Elkhart and South Bend, Indiana, are located inland 30 to 50 mi from Palisades. Smaller cities in the region include South Haven, Benton Harbor, and St. Joseph, Michigan. The site location is approximately 75 mi northeast of downtown Chicago, Illinois.

The plant has a single pressurized light-water reactor. Combustion Engineering, Inc., designed the Nuclear Steam Supply System, which includes the primary system (e.g., reactor vessel, steam generators, pressurizer, and pumps), reactor auxiliary system components, nuclear and certain process instrumentation, and the Reactor Protective System. Bechtel Corporation and its affiliate, Bechtel Company, designed and supplied the balance of the plant equipment, systems, and structures (NMC 2003).

The maximum authorized power level of the reactor is 2565 megawatts thermal (MW(t)) (NMC 2003). The current net summer capacity of Palisades is 786 megawatts electric (MW(e)), which is equivalent to the power needs of approximately 775,000 residences (NMC 2005a). Palisades uses a circulating water cooling system to conduct waste heat from the main condenser to two mechanical draft cooling towers where heat is removed by evaporation. The current OL for Palisades expires on March 24, 2011. By letter dated March 22, 2005, NMC submitted an application to the NRC (NMC 2005b) to renew this OL for an additional 20 years of operation (i.e., until March 24, 2031).

1.4 The Purpose and Need for the Proposed Action

Although a licensee must have a renewed license to operate a reactor beyond the term of the existing OL, the possession of that license is just one of a number of conditions that must be met for the licensee to continue plant operation during the term of the renewed license. Once an OL is renewed, State regulatory agencies and the owners of the plant 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.

Thus, for license renewal reviews, the NRC has adopted the following definition of purpose and need (GEIS Section 1.3):

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

This definition of purpose and need reflects the Commission's recognition that, unless there are findings in the safety review required by the Atomic Energy Act of 1954 or findings in the NEPA environmental analysis that would lead the NRC to reject a license renewal application, the NRC does not have a role in the energy-planning decisions of State regulators and utility officials as to whether a particular nuclear power plant should continue to operate. From the perspective of the licensee and the State regulatory authority, the purpose of renewing an OL is to maintain the availability of the nuclear plant to meet system energy requirements beyond the current term of the plant's license.

1.5 Compliance and Consultations

NMC is required to hold certain Federal, State, and local environmental permits, as well as meet relevant Federal and State statutory requirements. In its ER (NMC 2005a), NMC provided a list of the authorizations from Federal, State, and local authorities for current operations as well as environmental approvals and consultations associated with license renewal for Palisades. Authorizations and consultations relevant to the proposed OL renewal action are included in Appendix E.

The NRC staff has reviewed the list and consulted with the appropriate Federal, State, and local agencies to identify any compliance or permit issues or significant environmental issues of concern to the reviewing agencies. These agencies did not identify any new and significant environmental issues. The ER (NMC 2005a) states that NMC is in compliance with applicable environmental standards and requirements for Palisades. The NRC staff has not identified any environmental issues that are both new and significant.

1.6 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."

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

Atomic Energy Act of 1954 (AEA). 42 USC 2011, et seq.

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

Nuclear Management Company, LLC (NMC). 2003. *Final Safety Analysis Report (FSAR) – Palisades Nuclear Plant*. Rev. 24, Covert, Michigan (October 2003).

Nuclear Management Company, LLC (NMC). 2005a. *Applicant's Environmental Report – Operating License Renewal Stage, Palisades Nuclear Power Plant*. Docket No. 50-255, Covert, Michigan (March 2005).

Nuclear Management Company (NMC). 2005b. *Palisades Nuclear Plant. Application for Renewed Operating License*. Covert, Michigan (March 22, 2005).

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

U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Main Report, Supplement 1: Operating License Renewal*. NUREG-1555, Supplement 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2005a. "Notice of Acceptance for Docketing of the Application and Notice of Opportunity for Hearing Regarding Renewal of Facility Operating License No. DPR-20 for an Additional 20-Year Period." *Federal Register*, Vol. 70, No. 109, pp. 33533–33535, Washington, D.C. (June 8, 2005).

U.S. Nuclear Regulatory Commission (NRC). 2005b. "Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." *Federal Register*, Vol. 70, No. 122, pp. 36967–36968, Washington, D.C. (June 27, 2005).

U.S. Nuclear Regulatory Commission (NRC). 2005c. *Environmental Impact Statement Scoping Process: Summary Report – Palisades Nuclear Plant, Van Buren County, Michigan*. Washington, D.C. (December 14, 2005).

U.S. Nuclear Regulatory Commission (NRC). 2006. "Nuclear Management Company, LLC; Palisades Nuclear Plant; Notice of Availability of the Draft Supplement 27 to the Generic Environmental Impact Statement, and Public Meeting for the License Renewal of Palisades Nuclear Plant." *Federal Register*, Vol. 71, No. 36, pp. 9383–9384, Washington, D.C. (February 23, 2006).

2.0 Description of Nuclear Power Plant and Site and Plant Interaction with the Environment

Palisades Nuclear Plant (Palisades) is owned by Consumers Energy Company (Consumers Energy), a subsidiary of CMS Energy Corporation. Nuclear Management Company, LLC (NMC), operates Palisades on behalf of Consumers Energy. With respect to the Palisades operating license (OL), Consumers Energy is the owner licensee, and NMC is the licensed operator of the facility (NMC 2005a). Palisades is located in Covert Township, Van Buren County, Michigan, on the southeastern shoreline of Lake Michigan. The plant consists of a pressurized light-water reactor that produces steam that turns turbines to generate electricity.

The Palisades facilities and infrastructure include the power block area, two independent spent fuel storage installations for dry storage, mechanical draft cooling towers, main parking lot, main access road, switchyard (Palisades Substation), and power transmission facilities and corridors, which extend eastward from the power block to the eastern site boundary at the Blue Star Memorial Highway. Other development on the site consists of waste storage and support facilities, including a radioactive waste storage building, an interim steam generator storage building for storage of old steam generators that were replaced in the early 1990s, a warehouse, an outage/training facility, and spent fuel services building. The plant and its environment are described in Section 2.1, and the plant's interaction with the environment is presented in Section 2.2.

2.1 Plant and Site Description and Proposed Plant Operation During the Renewal Term

Palisades is located on approximately 432 ac of land, and is bordered by Lake Michigan on the west and the Blue Star Memorial Highway and adjacent Interstate-196 (I-196) on the east in Covert Township, Van Buren County, Michigan. The nearest town is South Haven, Michigan, which is approximately 4.5 mi north of the plant, and has a population of about 5000 people. The major towns within a 50-mi radius of the plant are Kalamazoo and Portage, Michigan, and Elkhart, Mishawaka, and South Bend, Indiana. Figures 2-1 and 2-2 show the site location and features within 50 mi and 6 mi, respectively (NMC 2005a).

Based on 2000 U.S. Census Bureau data, approximately 1.3 million people live within 50 mi of the site (NMC 2005a). The population density of 293 persons/mi^2 is considered a high population area based on the criteria described in the Generic Environmental Impact Statement

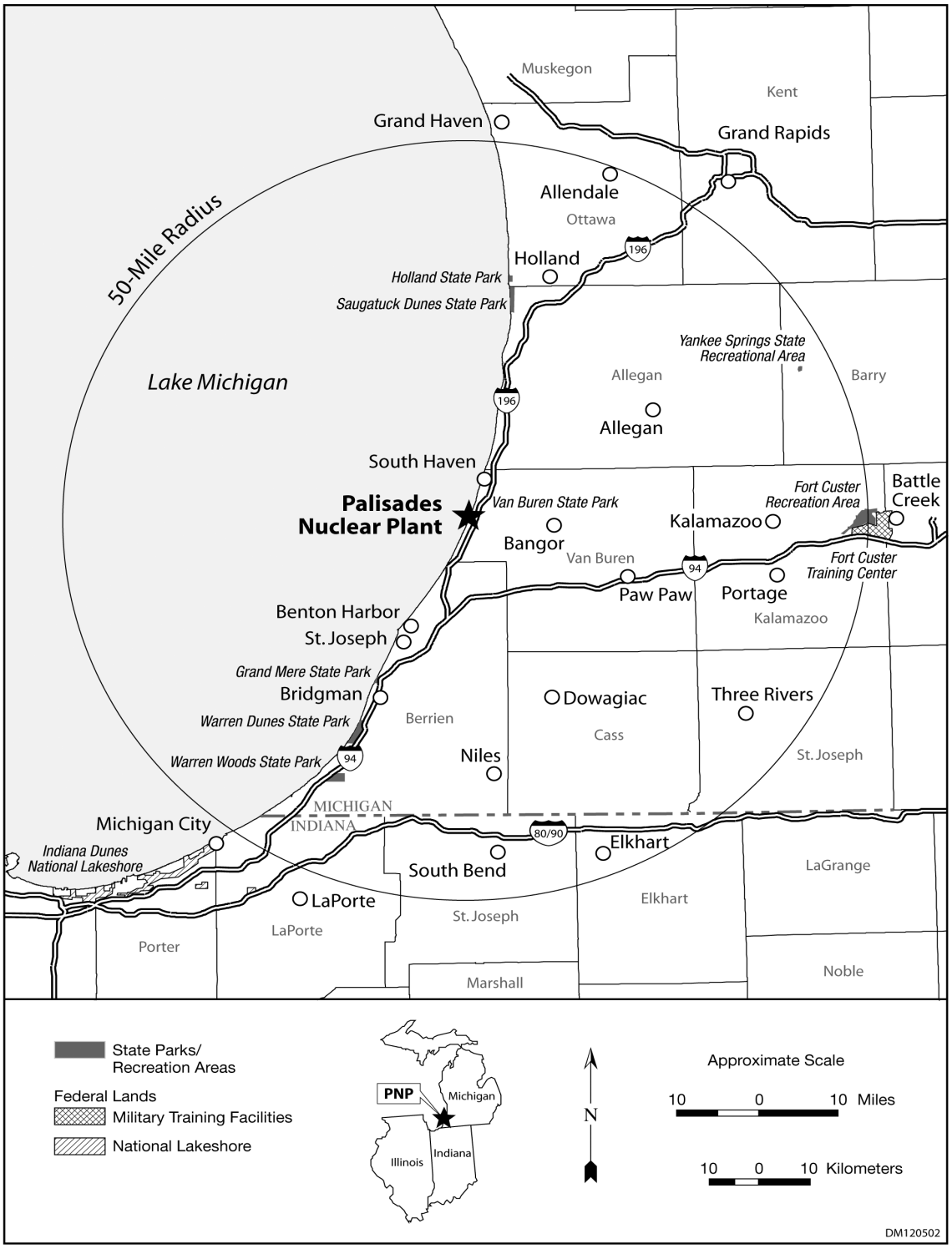

Figure 2-1. Location of Palisades, 50-mi Region

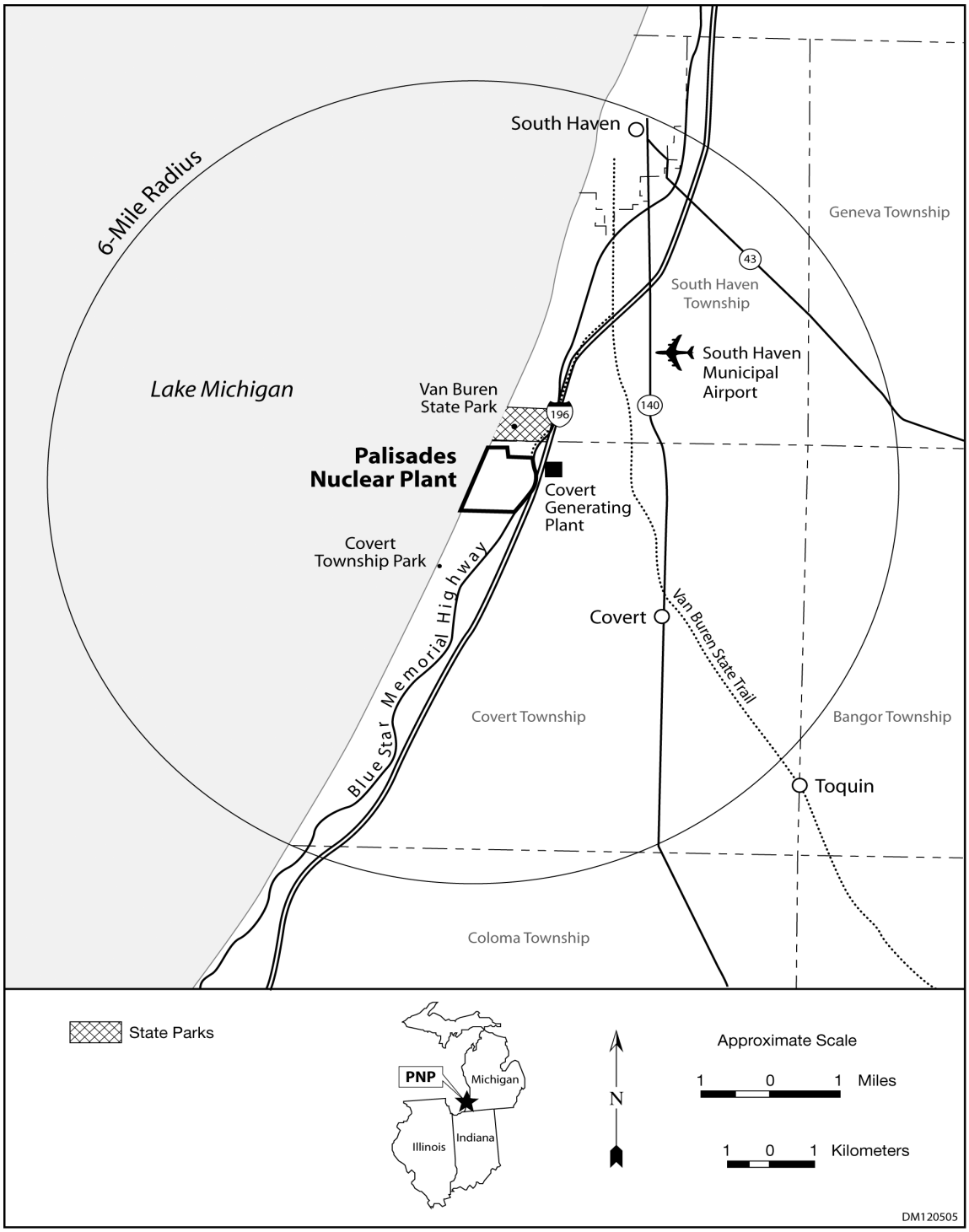

Figure 2-2. Location of Palisades, 6-mi Region

for License Renewal of Nuclear Plants (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[(a)]

NMC employs a permanent workforce of approximately 530 employees and 110 contractors. The reactor is refueled on an 18-month refueling cycle. During refueling outages, site employment increases by approximately 380 workers assigned for temporary (30 to 40 days) duty (NMC 2005a). Upon the initiation of the renewed OL, the permanent workforce is expected to increase by approximately 60 employees to perform the license renewal surveillance, online monitoring, inspections, testing, trending, and record keeping activities (NMC 2005a).

2.1.1 External Appearance and Setting

Palisades property includes approximately 1 mi of lake frontage and extends about 1 mi eastward from Lake Michigan. The local terrain consists of a gentle upward sloping beach at an elevation of about 580 ft above mean sea level (MSL) that rises sharply into sand dunes at an elevation of approximately 780 ft MSL and then drops off abruptly to about 610 ft MSL at the eastern site boundary. The area surrounding the plant property is largely rural, characterized by agriculture and heavily wooded, rugged sand dunes along the lakeshore (NMC 2005a). As indicated in Figure 2-2, there are few urban areas and little industrial development within the 6-mi radius of the plant. The only major industrial facility in the immediate vicinity of the site is the Covert Generating Station, on the east side of I-196. The Covert Generating Station, owned and operated independently of Palisades, consists of three natural-gas-fired combined-cycle electric generating units. It generates 1100 MW of electricity when all three units are operating. The electricity from the plant is connected to the grid at the Palisades Substation.

The developed area on the Palisades site, which includes power production and support facilities, roads, parking lots, and the transmission line rights-of way up to the site boundary, is approximately 80 ac. No residences exist on the site. The main access to the site is the Blue Star Memorial Highway.

Numerous public recreational areas and summer vacation properties exist within 50 mi of the Palisades site. The area is particularly popular with tourists during the summer months. There are no Federal facilities, but State-owned facilities include eight parks, two recreational areas, seven game areas, one fish and wildlife area, and seven wilderness and natural areas (NMC 2005a). There are also a large number (more than 200) of municipal and privately owned parks and recreational areas. The site is bordered by Van Buren State Park on the north and a privately owned residential and lakefront recreational community, Palisades Park and Country Club, on the south. The 400-ac Van Buren State Park has a 1-mi shoreline on Lake Michigan and contains campgrounds and picnic and beach facilities. Two of the State Parks in the region

(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.

are linear walking and riding trails. The Van Buren Trail State Park is a dirt and gravel multiuse trail between South Haven and Hartford, Michigan. The Kal-Haven Trail State Park is a 34-mi crushed limestone path between South Haven and Kalamazoo, Michigan. Both trails are located on abandoned railroad paths (NMC 2005a). Many of the State-owned and private recreational areas within 50 mi of the site offer facilities for camping, picnicking, boating, hunting, fishing, swimming, hiking, horseback riding, and winter sports (NMC 2005a).

The 432-ac Palisades site is owned by Consumers Energy. Consumers Energy has granted easements to the Michigan Electric Transmission Company, LLC (METC), which owns the transmission lines leaving the Palisades Substation on the site. The immediate plant area is fenced, with a locked gate under the control of plant personnel. Access to the site is controlled both from the land and the lake.

2.1.2 Reactor Systems

The Nuclear Steam Supply System for Palisades is a pressurized water reactor consisting of a reactor Primary Coolant System (PCS) and associated auxiliary systems (NMC 2003b). The PCS design features two closed loops in which reactor coolant is circulated, each of which includes two primary coolant pumps and a steam generator. The reactor coolant, demineralized water to which chemicals are added to control corrosion and moderate the nuclear reaction, circulates under high pressure through the reactor vessel and the tube side of the two steam generators in these closed loops. Heat from the reactor is transferred to conditioned, demineralized water in the shell side of the steam generators to produce high-pressure steam that is routed through the steam turbine, condensed back to water in the main condenser, and pumped back to the steam generators, thus comprising an isolated secondary cooling loop (i.e., the secondary system) (NMC 2003b). The steam turbine is a tandem-compound unit and is connected directly to the generator. The maximum calculated capacity of the turbine generator is 865 megawatts-electric (MW(e)) gross. Heat transfer from the main condenser is accomplished by a third cooling loop, the Circulating Water System (CWS).

The nuclear fuel is low-enriched uranium dioxide with enrichments below 5 percent by weight (NMC 2005a). The fuel is contained in long fuel rods that are assembled into fuel bundles consisting of 225 rods in 15 × 15 arrays. The collection of fuel bundles with associated instrument tubes, control rods, and structural elements make up the reactor core. The nuclear energy contained in the fuel is converted to thermal energy through fissioning of the uranium atoms in the fuel, and the thermal energy is transferred to the circulating water in the primary cooling system as described above.

The reactor, steam generators, and related systems are enclosed in a Containment Building that is designed to prevent leakage of radioactivity to the environment in the improbable event of a rupture of the reactor coolant piping. The Containment Building is a reinforced concrete

cylinder with a slab base and an arching dome. A 0.25-in. welded steel liner is attached to the inside face of the concrete shell to ensure a high degree of leak-tightness. In addition, the 3.5-ft-thick concrete walls serve as a radiation shield for both normal and accident conditions.

The Containment Building is ventilated to maintain pressure and temperatures within acceptable limits. The containment ventilation system also can purge the containment prior to entry. Exhaust from the ventilation system is monitored for radioactivity before being released to the plant vent, which is located just above the top of the containment outside wall. High-efficiency particulate air (HEPA) filters are used when needed to filter the air before releasing it.

In addition to the Containment Building, the major structures within the power block on the Palisades site include the Turbine Building, which houses the turbines, the electrical generator, condenser, feedwater heaters, and feedwater and condensate pumps; the Auxiliary Building and the attached Radioactive Waste Building, which contain the spent fuel pool, radioactive waste management equipment, heating and ventilation system components, the emergency diesel generators, switchgear, laboratories, offices, and the control room; the Condensate and Makeup Demineralizer Building, which houses the equipment and facilities used to treat the makeup water for the CWS; the Cooling Tower Pump House; and the Intake Structure, which houses the service water and fire protection pumps.

As shown in Figure 2-3, the other prominent structures outside of the power block area on the Palisades side include two independent spent fuel storage installations for dry storage, cooling towers, the Palisades Substation (the switchyard), power transmission lines extending from the Palisades Substation to the eastern site boundary, a warehouse building, a meteorological tower, and various storage areas, roads, and parking lots.

2.1.3 Cooling and Auxiliary Water Systems

Palisades relies on two sources of water: raw water from Lake Michigan and potable water from the South Haven Municipal Water Authority (Consumers Energy 2003a; NMC 2003b). The water from Lake Michigan is used primarily for waste heat removal in the plant's Service Water System (SWS) and CWS. The withdrawal rate is approximately 98,000 gpm during normal full power operation. Of this flow, evaporative loss due to evaporation from the two CWS cooling towers may range as high as 12,000 gpm during the summer, while the remaining 86,000 gpm is returned to Lake Michigan (Consumers Energy 2003a; NMC 2003b).

The water for the SWS and CWS is withdrawn from Lake Michigan via pipeline from a submerged intake crib structure located 3300 ft offshore in water about 35 ft deep (Consumers Energy and NMC 2001). The crib structure is a box measuring 57 ft wide, 57 ft long, and 13 ft high. Two-thirds of its top surface consist of steel plates, and one-third is comprised of bar

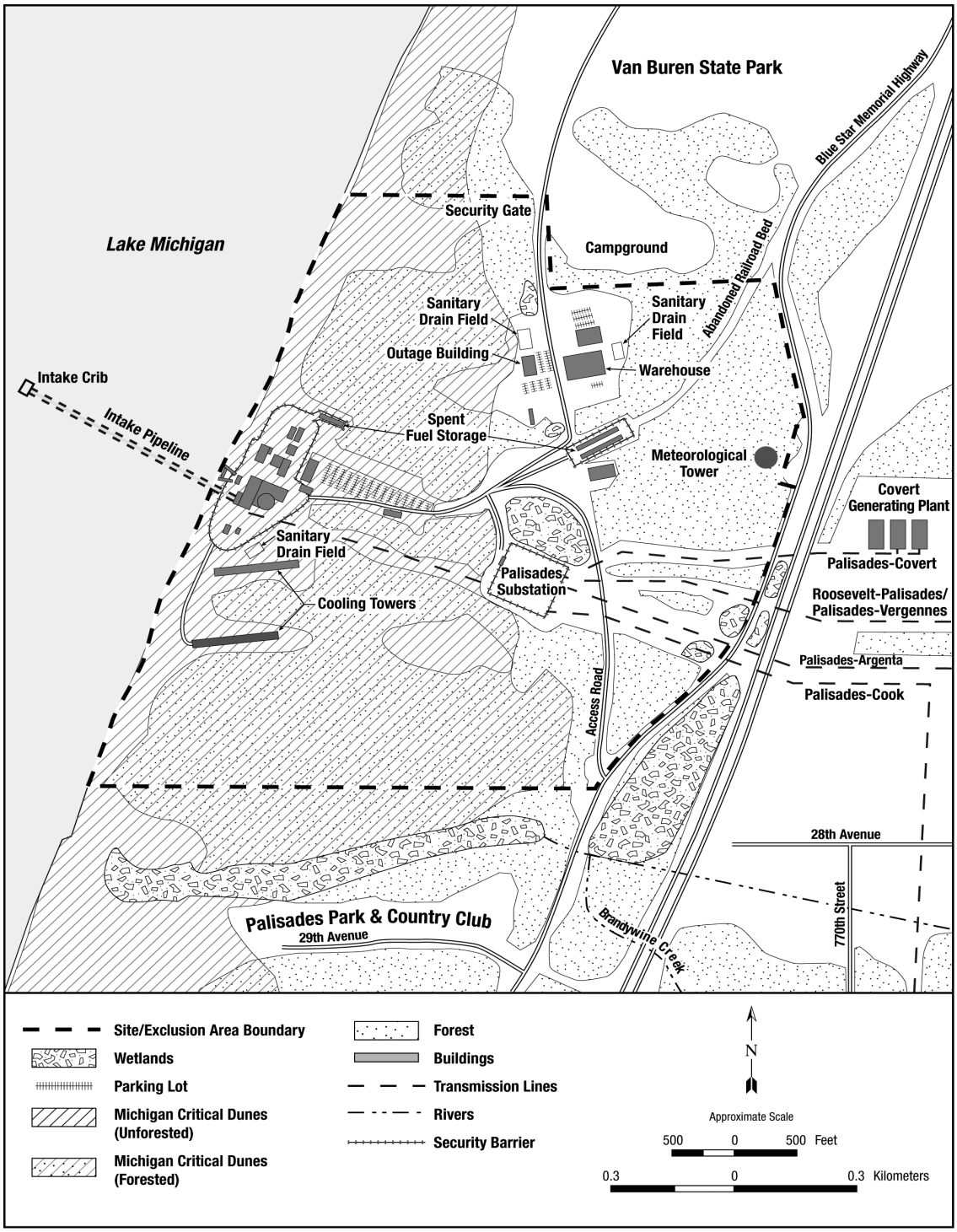

Figure 2-3. Palisades Site Layout

racks. Water enters the crib through the bar racks and on each of the crib's four sides, which are constructed of 2-in. vertical steel bars spaced at 10-in. intervals (Consumers Energy and NMC 2001).

Originally, the crib was designed for a once-through cooling-water flow rate of approximately 400,000 gpm. However, subsequent conversion to a closed-cycle cooling system reduced intake flow to approximately 98,000 gpm, resulting in low approach velocities of approximately 0.1 foot per second at the face of the structure (Consumers Energy and NMC 2001). Water flows from the intake crib through an 11-ft-diameter pipe to the onshore intake structure where it passes through trash racks constructed of steeply sloped bars to prevent entry of coarse debris. Debris accumulated on the trash racks is removed by a mechanical rake or scoop (AEC 1972). The water then flows through vertical 0.375-in. mesh traveling screens for removal of finer debris (Consumers Energy and NMC 2001). The traveling screens are cleaned by rotating and backwashing the screens as needed (in automatic or manual operation) and sluicing the debris to a collection basket (AEC 1972; Consumers Energy and NMC 2001). The accumulated debris is disposed of in accordance with the Palisades National Pollutant Discharge Elimination System (NPDES) permit (MDEQ 2004).

Three 8000-gpm service water pumps, one of which is normally on standby, are located in the onshore intake structure and provide water to the SWS (NMC 2003b). The purpose of the service water is to remove waste heat from the nuclear plant and steam plant auxiliary systems. After flowing through coolers, heat exchangers, and other plant components, this service water is discharged to the makeup basin, which is open to the suction basins for the CWS cooling-tower pumps (NMC 2003b). A small fraction of water in the SWS is used as feedwater for production of demineralized water for use in the primary and secondary cooling loops.

The CWS removes waste heat from the main condenser by recirculating water from the hot side of the condenser through the facility's two mechanical draft cooling towers (NMC 2003b). In these towers, cooling takes place through evaporation. Water circulation in this system is accomplished by two 164,000-gpm pumps located in the cooling-tower pump building. Evaporation in the cooling towers ranges from 4500 gpm in winter to 6000 gpm in summer for each of the two towers.

Evaporation and other losses (e.g., cooling-tower blowdown) from the CWS are replaced by makeup water withdrawn from the onshore intake structure by two 40,000-gpm dilution water pumps. Makeup water surplus is directed to the makeup basin where it combines with the SWS cooling water. Excess cooling water in the makeup basin flows over weirs to the mixing basin for discharge to the lake.

The cool lake water provided by the dilution water pumps increases the generation efficiency of the plant and reduces the temperature of the water discharged to the lake (NMC 2003b). Cooling water mixes with low-volume waste sources, which meet the criteria described in

Section 2.2.3, from plant operations in the mixing basin and flows through openings in the outer wall of the mixing basin to Lake Michigan via Outfall 001, which is the shoreline discharge structure (NMC 2003b). The outfall is a pile structure that widens from 37 ft at the mixing basin outlet wall to 100 ft at its terminus, 108 ft from the outlet wall (AEC 1972). The discharge (monitoring point 001A) is monitored for both radiological and nonradiological parameters in accordance with the NPDES permit (MDEQ 2004). Associated limits include a maximum allowable discharge flow of 135.2 million gpd, a daily maximum heat addition limit of 2.1×10^9 Btu/hr, and limits for release of total residual oxidants (TROs) used for biofouling control (MDEQ 2004).

2.1.4 Radioactive Waste Management Systems and Effluent Control Systems

Radioactive wastes resulting from plant operations are classified as liquid, gaseous, and solid wastes. Palisades uses liquid, gaseous, and solid radioactive waste management systems to collect and process these wastes before they are released to the environment or shipped to offsite commercial waste processing or disposal facilities. The waste disposal system meets the design objectives and release limits as set forth in Title 10 of the *Code of Federal Regulations*, Part 20 (10 CFR Part 20) and Part 50 (10 CFR Part 50), Appendix I ("Numerical Guide for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As is Reasonably Achievable' for Radiological Material in Light-Water-Cooled Nuclear Power Reactor Effluents"), and controls the processing, disposal, and release of radioactive liquid, gaseous, and solid wastes. Section 3.8.1.1 "Regulatory Requirements" of the GEIS (NRC 1996) provides a summary of the regulatory requirements and specific numerical dose limits. Unless otherwise noted, the description of the radioactive waste management systems and effluent control systems for liquid, gaseous, and solid wastes presented here (Sections 2.1.4.1, 2.1.4.2, and 2.1.4.3, respectively) is based on information provided in the *Palisades Final Safety Analysis Report* (FSAR; NMC 2003b) and as confirmed during the U.S. Nuclear Regulatory Commission (NRC) staff site visit on July 26 and July 27, 2005.

The waste disposal system collects and processes all potentially radioactive reactor plant wastes for removal from the plant site within limitations established by applicable governmental regulations. In addition, the system is capable of liquid waste segregation and reuse. All planned releases of liquid and gaseous effluents may be either batch or continuous. Before a batch may be released, the tank is sampled and the sample analyzed in the laboratory. A gas release is made only if the release can be made without exceeding Federal standards, and lack of reserve holdup capacity requires such a release. Radiation monitors are provided to maintain surveillance over the release operation, and a permanent record of activity released is provided by radiochemical analysis of known quantities of waste (NMC 2003b).

Radioactive fission products build up within the fuel as a consequence of the fission process. These fission products are contained in the sealed fuel rods; however, as a result of fuel

cladding failure and corrosion, small quantities escape from the fuel rods and contaminate the reactor coolant. Neutron activation of the primary coolant system is also responsible for coolant contamination. Nonfuel solid wastes result from treating and separating radionuclides from gases and liquids and from removing contaminated material from various reactor areas. Solid wastes also consist of reactor components, equipment, and tools removed from service as well as contaminated protective clothing, paper, rags, and other trash generated from plant operations during design modification and during routine maintenance activities. The solid waste disposal system is designed to package solid wastes for removal to offsite treatment or disposal facilities. Some solid waste is temporarily stored onsite.

Fuel assemblies that have exhausted a certain percentage of their fuel and that are removed from the reactor core for disposal are called spent fuel. Palisades currently operates on an 18-month refueling cycle. Spent fuel is temporarily stored onsite in a spent fuel pool and in two dry-storage areas.

The Offsite Dose Calculation Manual (ODCM) for Palisades (NMC 2004a), which is included in the *Palisades Annual Radioactive Effluent Release and Waste Disposal Report*s (e.g., NMC 2005b), describes the methods and parameters used for calculating radioactivity concentrations in the environment and the estimated potential offsite doses associated with liquid and gaseous effluents from the plant. The ODCM also specifies controls for release of liquid and gaseous effluents from Palisades to ensure compliance with NRC regulations.

2.1.4.1 Liquid Waste Processing Systems and Effluent Controls

A small fraction of the water circulating in the primary coolant system is routinely withdrawn by the chemical and volume control system within the plant, processed, and then reinjected into the primary coolant system to control the composition and volume of the primary coolant. The processing equipment removes any radionuclides that either escape from the fuel rods or are produced in the coolant due to activation with neutrons to prevent their buildup in the primary coolant.

Any leaks from piping, valves, pump seals, and storage tanks throughout the plant are routinely collected via catch basins, building drains, or sumps. At times equipment changes, repairs, or cleanup operations also generate liquids that contain small concentrations of radioactive elements. All such liquids, including those generated by the chemical and volume control system, are handled by the Liquid Radioactive Waste System. They are collected, monitored, and processed by a combination of mechanisms, including holdup (permitting radioactive decay), filtration, demineralization, and ion-exchange treatment (removal of insoluble particulates and soluble contaminants), degassing (removal of dissolved gases), and evaporation (volume reduction). After processing, most of the liquids are recycled back into the primary coolant system or other liquid systems within the plant and reused. The wet residues or certain concentrates are solidified and sent offsite for disposal (see Section 2.1.4.3). Liquid

streams that are not needed in the plant and meet the release criteria established in 10 CFR Part 50, Appendix I, are discharged to Lake Michigan after dilution with CWS discharge. This flow is via low-velocity surface discharge at the shoreline. The releases to the lake are in batches and are strictly monitored to make sure that the release criteria are met. Any liquids that do not meet the criteria are reprocessed until they meet the criteria, or they are sent offsite for disposal after appropriate solidification and packaging.

Some of the radionuclides in the recycled primary coolant are noble gases dissolved in the water. These radionuclides are degassed during the processing of the bleed-off stream by the chemical and volume control system and sent to the gaseous radioactive waste processing system for further processing (see Section 2.1.4.2).

Prior to 1989, another source of liquid waste was the laundry facility that was used to clean contaminated clothing. Although the equipment used for laundry is still in place, the facility is no longer being used. Laundry is sent offsite to be cleaned by a contractor, and clean laundry is returned to the site.

During the 5-year period from 2000 through 2004, an average of four liquid batch releases occurred annually from Palisades. During this 5-year period, there were no unplanned or uncontrolled liquid releases to the environment. Liquid effluents were reported in the *Palisades Annual Radioactive Effluent Release and Waste Disposal Reports* for the years 2000 through 2004 (NMC 2001a, 2002, 2003a, 2004b, 2005b). Over this period, liquid effluents containing fission and activation products[(a)] and tritium were released into Lake Michigan. An annual average of 1.18×10^{-3} Ci of fission and activation products and 202 Ci of tritium were discharged with an average diluted concentration of 8.78×10^{-15} Ci/L for fission and activation products and 1.58×10^{-9} Ci/L for tritium (NMC 2001a, 2002, 2003a, 2004b, 2005b). The maximum amount released in any one year during the 5-year period was 2.12×10^{-3} Ci for fission and activation products and 342 Ci for tritium. The releases and the average diluted concentrations were well below NRC regulatory limits. In 2005 (the most recent year for which data were available), the radioactive materials released to Lake Michigan in liquid effluents were 0.01 Ci of fission and activation products and 305 Ci of tritium (NMC 2006a). Nine liquid batch releases occurred in 2005; none of them were unplanned or uncontrolled. The average diluted concentration of fission and activation products in liquid effluents released in 2005 was 7.27×10^{-14} Ci/L; the average diluted concentration of tritium was 2.13×10^{-9} Ci/L. NMC does not anticipate any significant increases in liquid waste released annually during the renewal period. See Section 2.2.7 for a discussion of the theoretical doses to the maximally exposed individual (MEI) as a result of these releases.

(a) The fission and activation products do not include tritium activity (which is given separately), activity of dissolved and entrained gases (which is generally below levels of detection), and gross alpha radioactivity (which is negligibly small).

Since the March 22, 2005, application for the license renewal of Palisades, NMC has modified its liquid radioactive waste processing system. The system that NMC installed in December 2005 relies on cleaning of the contaminated liquid streams through a process known as ion exchange. In this method, specially formulated resins are used to capture the contaminants from the liquid streams; streams can be recycled through the resin bed to further reduce contaminant levels if samples are above regulatory standards. Once saturated, the resins are removed from the system and are treated as solid waste. New resins are placed in the system and the cycle is repeated.

The equipment NMC has installed is commonly used in other nuclear power plants in the United States, including the Donald C. Cook Nuclear Plant in Michigan and Nine Mile Point in New York. On the basis of experience in those plants and analyses conducted by NMC staff, it is expected that the amount of radioactive material released in liquid effluent may increase slightly. However, Palisades will continue to comply with all regulatory standards and will maintain the existing ODCM release limits and set points.

2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls

During plant operations, gaseous wastes originate from degassing reactor coolant discharged to the chemical and volume control system, displacement of cover gases as liquids accumulate in various tanks, miscellaneous equipment vents and relief valves, and sampling operations and automatic gas analysis for hydrogen and oxygen in cover gases.

The Gaseous Radioactive Waste System in Palisades is designed to maintain gaseous effluents within limits specified in 10 CFR Part 20, 40 CFR Part 190, and to the ALARA (as low as reasonably achievable) requirement of 10 CFR Part 50, Appendix I. Section 3.8.1.1 of the GEIS (NRC 1996) provides a summary of these regulatory requirements and specific numerical dose limits. The Gaseous Radioactive Waste System is divided into two sections: (1) the gas collection header, which collects low-activity gases from liquids that have been previously degassed and/or vented in other waste handling steps, and (2) the waste gas processing system, which collects gases from potentially high-activity sources. Gases collected by the gas collection header are passed through a HEPA filter to the suction side of the main vent exhaust fans, diluted by ventilation exhaust air, and discharged through a ventilation stack to the atmosphere.

The waste gas processing system collects all potentially high-activity gaseous waste. The waste gas surge tank collects and absorbs surges from the demineralizer vents, quench tank vent, primary system drain tank vent, volume control tank vent, vacuum degassifier vent, equipment drain tank, and evaporator vents. The same tank also collects vent gas from relief valves on various waste collection tanks. The waste gas surge tank discharges to one of three compressors that compress the gas for storage and decay in one or more of six waste decay

tanks. If the activities are less than or equal to 1×10^{-5} μCi/cm^3 (xenon-133), the waste gas surge tank can be discharged through a HEPA filter directly to the ventilation stack.

Gases collected in decay tanks are held in the tanks until the radioactivity is low enough for them to be discharged to the atmosphere. Gaseous effluents entering the plant's ventilation stack are continuously monitored and flow-controlled so that the previously established limits are not exceeded. The discharge is then immediately diluted by mixing airflow from one of the two continuously operating ventilation fans that transport 75,000 ft^3/min of air up the stack. If at any time a high radiation condition is detected, the flow of radioactive gases through the stack is stopped and the control room operators are alerted of the condition.

Gaseous effluents for the years 2000 through 2004 were reported in the *Palisades Annual Radioactive Effluent Release and Waste Disposal Reports* (NMC 2001a, 2002, 2003a, 2004b, 2005b). During this 5-year period, there were no unplanned or uncontrolled gaseous releases to the environment; Palisades did, however, release measurable concentrations of fission and activation gases, radioiodine, particulate radioactivity, and tritium in gaseous effluents to the atmosphere. The average annual effluent releases over this 5-year period were 28.9 Ci of fission and activation gases, 1.93×10^{-3} Ci of iodine-131, 2.65×10^{-4} Ci of particulates, and 37.7 Ci of tritium. The maximum amount released in any one year during this 5-year period was 65 Ci for fission and activation gases, 3.49×10^{-3} Ci for iodine-131, 9.62×10^{-4} for particulates, and 99.2 Ci for tritium. In 2005 (the most recent year for which data were available), there were also no unplanned or uncontrolled gaseous releases to the environment. The radioactive materials released to the atmosphere in gaseous effluents were 43.8 Ci of fission and activation gases, 1.30×10^{-3} of iodine-131, 3.11×10^{-5} of particulates, and 108 Ci of tritium (NMC 2006a). NMC does not anticipate any significant increases in the radioactive gaseous releases during the renewal period. As discussed in Section 2.2.7, the estimated doses to the MEI as a result of these releases is a small fraction of applicable dose limits.

2.1.4.3 Solid Waste Processing

Solid wastes from Palisades include filter sludge, spent resin, radioactive tools and equipment, and miscellaneous trash from plant operations and laboratory, maintenance, and cleanup operations. The solid wastes are collected, processed, and temporarily stored onsite before being shipped offsite for disposal or further processing and disposal by an authorized third party. Radiation levels of shipped containers are maintained within the standards set forth by the NRC and the U.S. Department of Transportation (DOT) (NMC 2003b).

The Solid Radioactive Waste System consists of those systems and components that are used to process and package wet and dry solid waste so that the waste is suitable for transport and disposal. The system is not used for spent fuel storage and shipment. The spent fuel from the plant is currently stored in the spent fuel storage pool and two dry storage areas onsite.

High-activity reactor wastes other than the spent fuel are stored in the fuel storage pool to allow radioactive decay, then packaged and transferred in approved shipping containers for offsite burial. Maintenance waste, such as contaminated clothing and tools, is packed in suitable DOT-approved containers and may be stored prior to shipment. Process waste, such as filter sludges and spent resins, is collected in tanks, processed, and stored prior to shipment.

Dry active waste (DAW), generated as a result of operation and maintenance activities, is collected throughout the radiologically controlled areas of the facility. Typical DAW includes air filters, cleaning rags, protective tape, paper and plastic coverings, discarded contaminated clothing, tools, equipment parts, and solid laboratory wastes. Most DAW has relatively low radioactive content and may be handled manually. The DAW is normally stored in various work areas and then moved to the process area.

Liquid radwaste concentrates (evaporator bottoms) are volume reduced to a dry powder, mixed with a binding agent, and discharged directly into a burial container. Wet solid radioactive waste results from the processing of spent demineralizer resins (both bead and powdered) and spent filter material from the equipment drain, floor drain subsystems, and water cleanup systems. The wet waste is solidified, dried, or dewatered for acceptability for a disposal site. If storage is required for any of these types of waste, the containers of waste may be temporarily stored onsite.

Transportation and disposal of solid radioactive wastes are performed in accordance with the applicable requirements of 10 CFR Part 71 and 10 CFR Part 61, respectively. No releases to the environment occur from solid radioactive wastes generated at Palisades. During the period 2000 through 2004, Palisades made an average of 16 shipments of solid radioactive waste each year, with an average volume for spent resins, filter sludges, evaporator bottoms, contaminated equipment, and other sources of 1561 ft^3, and an average activity of 1740 Ci (NMC 2001a, 2002, 2003a, 2004b, 2005b; 2005e). The maximum volume of waste shipped offsite in any one year during this 5-year period was 2285 ft^3 in 2001. In terms of activity, the maximum amount shipped in any one year was 8554 Ci in 2000. In 2005 (the most recent year for which data were available), approximately 3630 ft^3 of solid waste containing 347 Ci of radioactivity was shipped offsite (NMC 2006a). The modification to the liquid waste processing system at Palisades completed in December 2005 (see Section 2.1.4.1) is not expected to significantly change the generation of solid waste and offsite shipments of such waste from the plant.

2.1.5 Nonradioactive Waste Systems

The principal nonradioactive effluents from Palisades consist of chemical and biocide wastes, lubrication oil waste, resin regeneration waste, Freon™ filters, and sanitary waste. Palisades stopped using chlorinated solvents and oils several years ago. The chemistry laboratory may generate small quantities of expired chemicals. Other wastes could include laboratory packs

and mercury switches. Spent batteries and discarded fluorescent lights are recycled. Sanitary waste is sent to three onsite septic tanks. The tanks are sampled twice a year and emptied quarterly. Thus far, no radioactive contamination has been detected in the tanks. Depending on the usage and the number of workers onsite during outages, they may be emptied more frequently. The sewage removed from the tanks is taken to a local sewage treatment plant and treated there, along with regular city sewage.

2.1.6 Plant Operation and Maintenance

Routine maintenance performed on plant systems and components is necessary for the safe and reliable operation of a nuclear power plant. Maintenance activities conducted at Palisades include inspection, testing, and surveillance to maintain the current licensing basis of the plant and to ensure compliance with environmental and safety requirements. Certain activities can be performed while the reactor is operating. Others require that the plant be shut down. Long-term outages are scheduled for refueling and for certain types of repairs or maintenance, such as the replacement of a major component. Palisades is refueled on an 18-month schedule.

As part of the License Renewal Application (Application), NMC conducted an aging management review to manage the impacts of aging on systems, structures, and components in accordance with 10 CFR Part 54. Appendix A of the Application provides the information to be submitted in a FSAR Supplement as required by 10 CFR 54.21(d) for Palisades. The Application contains the technical information required by 10 CFR Part 54. Section 4 of the Application documents the evaluations of time-limited aging analyses (TLAAs) for the period of extended operation. Appendix B of the Application provides descriptions of the programs and activities that will manage the impacts of aging for the period of extended operation. These summary descriptions of aging management program activities and TLAAs will be incorporated into the FSAR for Palisades following the issuance of the renewed OL. NMC expects to conduct the activities related to the management of aging impacts during plant operation or normal refueling and other outages, but does not plan any outages specifically for the purpose of refurbishment.

2.1.7 Power Transmission System

Transmission corridors considered in scope for license renewal are those constructed specifically to connect the facility to the transmission system (10 CFR 51.53(c)(3)(ii)(H)). The Final Environmental Statement (FES) for Palisades (AEC 1972) described two transmission lines that connected Palisades with the transmission system. Both lines were constructed in 1969 and have steel lattice support structures anchored to concrete footings (AEC 1972). The initial 0.6-mi long Palisades-Cook 345-kV transmission line (referred to as the Palisades-West Olive line in the FES (AEC 1972)) connects to the American Electric Power (AEP) system, while the 40-mi-long Palisades-Argenta 345-kV transmission line connects to the METC system and

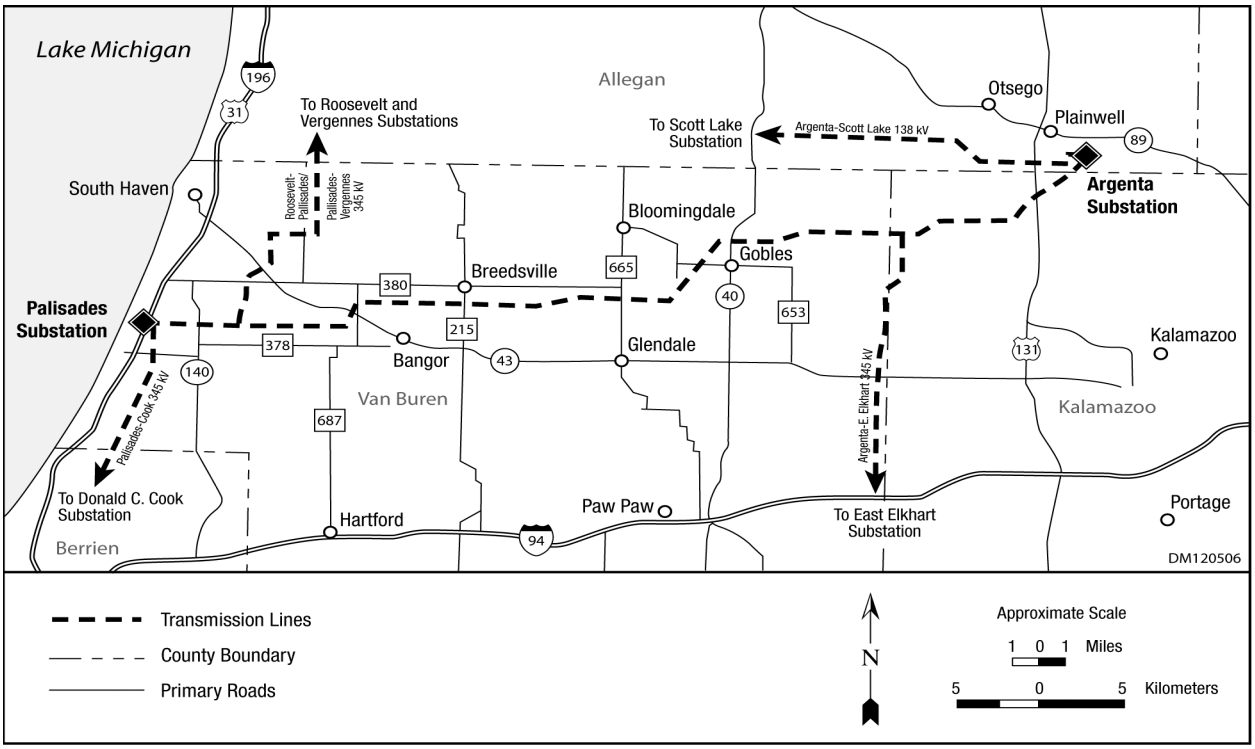

Figure 2-4. Transmission Lines

the Michigan Power Pool (NMC 2005a). The Palisades-Argenta line extends eastward to the Argenta Substation near Plainwell, north of Kalamazoo (Figure 2-4). Both transmission lines have been owned by the METC since 2002, while Consumers Energy owns the land on which the transmission lines are located (NMC 2005a).

The Palisades Substation, which operates at 345-kV, is the interconnection between Palisades and the power grid system. The applicant's ER (NMC 2005a) describes changes in the way that Palisades is connected to the transmission system that have been made since the FES was published. Currently seven 345-kV circuits on four double-circuit, steel lattice support structure transmission lines extend from the Palisades Substation (Figure 2-3): Palisades-Cook #1 and #2 (Circuits 310B and 310A); Palisades-Argenta #1 and #2 (Circuits 309A and 309B); Palisades-Vergennes and Roosevelt-Palisades (Circuits 306A and 306B); and Palisades-Covert Plant (Circuit 306J) (NMC 2005a). However, only the 0.6-mi-long Palisades-Cook line and the 40-mi-long Palisades-Argenta line are considered in scope for license renewal.

Both transmission lines associated with Palisades were constructed in accordance with the National Electrical Safety Code (NESC) (IEEE 2002) and industry guidance in effect at that time. The transmission facilities are maintained to ensure continued compliance with current standards.

The 0.6-mi-long Palisades-Cook transmission line occurs on land similar to that of the Palisades site. Its construction involved the clearing of a 150-ft-wide right-of-way totaling 10.9 ac over sand dunes (AEC 1972). The Palisades-Argenta transmission line right-of-way is 1320 ft wide for the first 4.5 mi, 350 ft wide for the next 34 mi, and 471 ft wide for the final 1.5 mi, totaling 2250 ac. This line occurs mostly on flat to gently rolling terrain crossing land used primarily for agriculture, with scattered orchards and residential and commercial properties (AEC 1972).

In general, the corridors are in remote, sparsely populated areas. Where the Palisades-Argenta line crosses agricultural lands, the land typically continues to be used for agricultural purposes. Both transmission lines cross Blue Star Memorial Highway and I-196, which occur just east of Palisades. The Palisades-Argenta line also crosses a number of other State and U.S. highways. The transmission lines are near the Van Buren State Park, and the Palisades-Argenta transmission line crosses the Kal-Haven and Van Buren State Trails (NMC 2005a). The Palisades-Argenta line crosses the Kalamazoo River and several other streams (see Section 2.2.5), while the 0.6-mi-long Palisades-Cook line does not cross any streams or rivers.

The METC recognizes that transmission line rights-of-way provide ancillary compatible uses, including agriculture, wildlife habitat, recreation, and aesthetics. The METC practices a vegetation-management program that utilizes physical, chemical, and biological treatments to promote stable, diverse, low-growing plant communities in a way that promotes wildlife habitat and/or maintains current usage of the rights-of-way and reduces environmental impacts.

Semiannual visual helicopter patrols and biennial infrared inspections of the transmission lines are conducted to check for anomalies in the conductors, insulators, and support structures, as well as for encroachments into the rights-of-way (e.g., trees, buildings, or other obstructions) (NMC 2005a). Walking inspections are also conducted about every 2 years to assess the condition of trees and other vegetation. Contractors conduct vegetation maintenance about every 4 years in accordance with METC-approved maintenance plans. Right-of-way maintenance involves both selective cutting and herbicide application. Herbicide use during right-of-way maintenance is restricted to treatment of tree species, with a basal application applied to individual stems or root crowns. Such applications are normally made at 5- to 6-year intervals (METC 2001). Only those herbicides approved by the U.S. Environmental Protection Agency (EPA) are used. They are applied by a licensed contractor in accordance with label instructions (NMC 2005a). Danger trees are generally removed whenever identified, except at critical areas where they are trimmed (METC 2001).

Border and wire zone vegetation management is employed for right-of-way maintenance. The wire zone (the area beneath the conductors) is managed to promote a mix of herbaceous plants, whereas the border area is managed to promote low-growing shrubs and other compatible vegetation. Low-growing trees and shrubs that do not interfere with the function of

the transmission lines are left undisturbed. Trees that have the potential to interfere with the transmission lines, including danger trees that are outside of the 150-ft-wide right-of-way, are removed (NMC 2005a). Special consideration is given to areas where threatened and endangered species could occur and maintenance activities are planned. Practices to mitigate adverse impacts on these species are reviewed and approved by the METC before maintenance activities are conducted (NMC 2005a).

2.2 Plant Interaction with the Environment

Sections 2.2.1 through 2.2.8 provide general descriptions of the environment near Palisades as background information. They also provide detailed descriptions where needed to support the analysis of potential environmental impacts of refurbishment and operation during the renewal term, as discussed in Chapters 3 and 4. Section 2.2.9 describes the historic and archaeological resources in the area, and Section 2.2.10 describes other Federal project activities that might impact license renewal.

2.2.1 Land Use

The Palisades site is located in Covert Township, Van Buren County, Michigan, on the southeastern shoreline of Lake Michigan, about 4.5 mi from South Haven, Michigan. The Palisades site is approximately 432 ac and extends approximately 1 mi inland between Lake Michigan and the Blue Star Memorial Highway and adjacent I-196. The nearest population center is the township of Covert, which is approximately 2.5 mi southeast of the Palisades site. Van Buren State Park is located immediately to the north of the Palisades site, and Van Buren Trail State Park is located northeast of the site.

The Palisades site lies on the southwest flank of the Michigan Basin within the Central Lowland physiographic province (NMC 2003b). Covert Ridge, a glacial moraine, bounds the area to the east of the site. The ridge serves as a drainage divide; the water table gradient is nearly flat with a slow westward flow toward the lake. The western part of the site is covered by large, coalescing sand dunes more than 200 ft high, while the eastern portion is characterized by scattered lower dunes with broad intervening basins, some of which contain shallow ponds. The dunes are relatively stable topographic features with occasional blowout caused by wind action. The majority of the land area is heavily wooded, with occasional wetlands.

The plant facilities are located about 2500 ft from both the northern and southern boundaries of the site. A number of buildings and other permanent structures occupy approximately 80 ac of the Palisades site. These include the power generation and administration area (20 ac), transmission corridors and switchyard (30 ac), warehouse area (7 ac), cooling towers (4 ac), and other supporting buildings and waste storage (7 ac) (DeCamp 2005).

A fence, with a locked gate under the control of plant security personnel, surrounds the protected plant area, and the site boundary is posted (NMC 2005a). As a result of events on September 11, 2001, NMC implemented actions to limit and/or monitor the entire beach area along the lakefront portion of the site. These actions include vehicle barriers and no trespassing signs at the north and south site boundaries. The U.S. Coast Guard has established a security zone extending along the lakeshore frontage of the site 1000 yds out into Lake Michigan, effectively prohibiting access without prior authorization (NMC 2005a).

In addition, Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA) (Section 1456(c)(3)(A) of Title 16 to the *United States Code*, (16 USC 1456(c)(3)(A))) requires that applicants for Federal licenses certify that the proposed coastal zone activity is consistent with the enforceable policies of the State's coastal management program (NRC 2004). A copy of the certification is also to be provided to the State. The State is to notify the Federal agency whether the State concurs with or objects to the applicant's certification. This notification is to occur within 6 months of the State's receipt of the certification. Palisades is within Michigan's coastal zone for purposes of the Act. Following submission of the NMC certification of consistency, the Michigan Department of Environmental Quality (MDEQ) determined that renewal of the OL for Palisades would be consistent with the Michigan Coastal Management Program (NMC 2005a; Attachment D).

2.2.2 Water Use

Palisades lies on the southeastern shore of Lake Michigan, the only Great Lake that lies entirely within the boundaries of the United States. Lake Michigan is the second largest of the Great Lakes by volume at 1.3×10^{15} gal and third largest by area at 22,300 mi^2. It drains an area of 45,600 mi^2 (Fuller, Shear, and Witting 1995). Major tributaries of Lake Michigan include the Fox-Wolf, Grand, St. Joseph, Menominee, and Kalamazoo Rivers. Lake Michigan is joined to Lake Huron at the Straits of Mackinac; thus, the two basins are hydrologically connected.

The northern part of the Lake Michigan watershed is forested and sparsely populated, except for the Fox River Valley, which drains into Green Bay. The southern part of Lake Michigan is among the most urbanized areas in the Great Lakes region, containing both the Milwaukee and Chicago metropolitan areas.

Lake Michigan provides safe drinking water for 10 million people, wildlife habitat, food production and processing, active sport and sustenance fisheries, and other valuable commercial and recreational activities (EPA 2000). However, threats to the ecosystem of the lake and its basin persist.

As described in Section 2.1.3, water usage at Palisades includes Lake Michigan water by the SWS and the CWS. In addition, the facility receives municipal water from the South Haven

Municipal Water Authority. Average water use by the Palisades Domestic Water Distribution System is approximately 18,000 gpd (Consumers Energy 2003a). This system provides Palisades with water for potable, sanitary, emergency shower, eyewash station, and other uses. Average daily plant usage represents 1.1 percent of the South Haven Municipal Water Authority's average daily demand and 0.45 percent of its permitted capacity (NMC 2005a). NMC does not expect any significant change in water usage during the license renewal term. The South Haven Water Authority has an excess capacity of 0.77 million gpd.

A water intake was constructed in 2002 offshore from Van Buren State Park, approximately 1 mi north of the Palisades facility. The purpose of this intake is to provide water to the Covert Generating Station, a 1170-MW, combined-cycle, natural-gas-fired power plant that shares a transmission line with Palisades (Mulcahy 2002). The Covert plant is located about 1 mi east of Palisades (Figure 2-2). Water usage from the Covert plant has been approximately 8 million gpd (Prein & Newhof 2004). The intake is designed as infiltration beds, comprised of slotted pipe on the lake bottom, and surrounded by gravel and sand that allow infiltration while keeping lake sand out of the pipes (Prein & Newhof 2004). Each infiltration bed has a capacity of 10 million gpd (Prein & Newhof 2004), and the system may be expanded.[(a)]

From the inception of the water intake structure as a source of water for the gas plant's cooling needs, planners realized its potential as a possible future supply point for municipal water (PG&E 2001; City of South Haven 2005; Mulcahy 2002).

South Haven's water needs are anticipated to outgrow its capacity (City of South Haven 2005). South Haven's water system has been operating at 80 to 90 percent of its capacity, and additional development is anticipated, according to a water filtration plant representative.[(a)] The district engineer for the MDEQ estimates that in 3 to 5 years, a water treatment plant will be completed, relying on the intake for use in an expanded municipal water system.[(b)] The water treatment plant would be built on land provided by the Covert Generating Station (City of South Haven 2005).[(b)] As with the existing South Haven water supply system, sampling and monitoring of an additional intake and treatment plant would be regulated by the State of Michigan.

Most of the domestic water is disposed of as sanitary wastewater, which is collected by the Palisades septic system. This system collects the raw sanitary wastewater in holding tanks where solids settle out of the wastewater. Effluent from the tanks flows to three sanitary drain

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(a) Personal communication from R. Packard, South Haven Michigan Water Filtration Plant, to J. Quinn, Argonne National Laboratory, Argonne, Illinois. Subject: "Municipal Water System." (September 16, 2005).

(b) Personal communication from W. Chooi, District Engineer, Michigan Department of Environmental Quality, to J. Quinn, Argonne National Laboratory, Argonne, Illinois. Subject: "Lake Michigan Water Intake at Covert." (September 16, 2005).

fields, one located between the north cooling tower and the power block, one located east of Warehouse No. 2, and one located north of the Outage Building (Figure 2-3). Wastewater is treated and disposed of by infiltration at the drain fields; solids are periodically removed from the holding tanks and disposed of at a licensed wastewater treatment facility by a commercial vendor (Consumers Energy 1998).

Palisades has three operating groundwater wells to supply water for grounds maintenance and other miscellaneous uses. Their combined pumping capacity is 24 gpm.

2.2.3 Water Quality

The water quality of Lake Michigan has been degraded by industrial, municipal, agricultural, navigational, and recreational water users for more than 150 years. Water quality is diminished near urban areas, mostly due to sewer overflows, direct storm water runoff, and industrial discharges. Sources of pollutants throughout the basin include atmospheric deposition, release from contaminated groundwater and sediments, point source discharges, and nonpoint source runoff.

The health of aquatic organisms is continually affected by the presence of toxic pollutants (e.g., mercury and polychlorinated biphenyls (PCBs)). Fish consumption advisories and beach closings adversely affect the beneficial uses of the lake. Non-native species continue to disrupt native plant and animal communities. Purple loosestrife (*Lythrum salicaria*) is still largely uncontrolled despite numerous eradication attempts (EPA 2000). Algal species abundance and type can vary greatly within the lake and can be altered by excessive predation by uncontrolled exotic species and competition with nonindigenous algae (EPA 2000). Increased salinity and other environmental changes may also support adaptation of non-native species.

The United States and Canada, in consultation with State and Provincial governments, are working to “restore and maintain the chemical, physical, and biological integrity of the water of the Great Lakes Basin Ecosystem” under the provisions of the Great Lakes Water Quality Agreement, signed in 1972 and amended in 1987 (EPA 2000).

As part of this effort, the Lake Michigan Technical Committee developed a Lake Michigan Lakewide Management Plan (EPA 2000) that describes the current state of lake habitats (e.g., open waters, wetlands, and tributary streams), identifies areas of concern, and recommends future steps that should be taken to protect and restore Lake Michigan ecosystems. These recommendations range from controls on ballast water to remediation of contaminated sediment sites, to implementation of Total Maximum Daily Load strategies for tributary streams. The Lake Michigan Lakewide Management Plan lists a number of areas in which improvements have been made (e.g., reduction of point-source pollutants entering the basin and protection and restoration of wetlands) but notes other areas still needing

improvement (e.g., deposition of toxic air pollutants in the watershed and non-point-source pollutants).

Consumers Energy Company's Palisades Nuclear Plant is authorized to discharge water to Lake Michigan under an NPDES permit administered by the MDEQ. As described in the current NPDES permit (MDEQ 2004), Palisades has one outfall, Outfall 001, and three monitoring points: 001A, 001D, and 001F.

At monitoring point 001A, the discharge is a combination of noncontact cooling water, cooling-tower blowdown, and the miscellaneous treated low-volume wastewaters from monitoring points 001D and 001F, which may include steam generator blowdown, demineralization backwash, regeneration waste, reverse osmosis filter backwash, turbine sump drainage, floor drainage, laboratory waste, and radwaste wastewater. Water from the three monitoring points discharges to Lake Michigan through five pipes at Outfall 001. The NPDES permit for Palisades (MDEQ 2004) describes the limits for discharges at monitoring point 001A. The daily limit for TRO is 38 µg/L for continuous discharge (greater than 160 min/day) and 200 µg/L for intermittent discharge (less than or equal to 160 min/day). During bromine use, the discharge must be less than or equal to 120 min/day, and the TRO daily limit is 50 µg/L. The heat addition limit is 2.1×10^9 Btu/hr. The pH should range between 6.5 and 9.0. Flow and TRO discharge time are to be recorded daily, and outfall observations are to be made five times per week.

Monitoring point 001D is radwaste wastewater, up to 0.1 million gpd. The flow and total suspended solids (TSS) are monitored at this point, with a grab sample for TSS analysis for each batch of wastewater. TSS limits are 30 mg/L monthly and 100 mg/L daily. As discussed in Section 2.1.4.1, this radwaste wastewater must meet criteria prior to discharge at monitoring point 001D. Monitoring point 001F is turbine sump water, also up to 0.1 million gpd. The flow and oil and grease content are monitored, with two grab samples per month for oil and grease analysis. Oil and grease limits are 15 mg/L monthly and 20 mg/L daily. Discharges from monitoring points 001D and 001F are monitored prior to discharge to the mixing basin, where the discharge comingles with other wastewater.

Palisades applies treatments to control microbiological organisms and the zebra mussel (*Dreissena polymorpha*) in the SWS and CWS. NMC uses approved biocides in these systems to control biofouling problems in accordance with use and discharge requirements, including provisions of the NPDES permit and special MDEQ approvals required for discharge of water treatment additives (MDEQ 2004). NMC currently is permitted by MDEQ to use chlorination, bromination, and application of a quaternary amine formulation for biofouling control (MDEQ 2004; Consumers Energy 2003a). Compliance with NPDES permit limits for discharge of these biocides and associated residuals is confirmed by monitoring.

Discharge Monitoring Reports (DMRs) include daily data on TRO discharge time, oxidants, flow, pH, visual inspection, and dechlorination agent, all at monitoring point 001A. Oxidants are noted as "not used" on many monthly reports. Betz Clam-Trol treatments are no longer required to be reported in DMRs for Palisades, but monitoring during Clam-Trol treatments is performed in accordance with the NPDES permit. Temperature data collection at monitoring point 001A is conducted in accordance with the NPDES permit. The actual temperature data are not logged on the DMRs, but rather the Btu/hr data are presented, as a function of temperature and flow data. The permitted maximum for heat addition is 2.1×10^9 Btu/hr (MDEQ 2004).

Several violations of NPDES permitting requirements have been issued by the MDEQ in the last 5 years. One was a minor oily sheen and discharge to Lake Michigan on April 6, 2001. The sheen was within 2 to 5 ft of the lakeshore and was remediated with an oil boom. Another was a septic lift station pump failure on February 12, 2002, during which about 300 gal of liquid sewage (no solids) overflowed into storm drains, which drained onto beach sands (Consumers Energy 2002). According to a notification submitted to the MDEQ, the incident did not cause adverse impact to the environment or the public (Consumers Energy 2002).

EPA Region 5 manages a Web site of quarterly listings of facilities in noncompliance (EPA 2005a). In the second quarter of 2001, violations such as "report overdue" and "compliance schedule overdue" are posted for the Palisades plant, and "incomplete/deficient report" is listed for each compliance parameter. In subsequent quarters, "continuing noncompliance" notices are listed for the compliance parameters. The initial violations stem from a delinquent annual review of the Storm Water Pollution Prevention Plan (SWPPP) (NMC 2001b). The MDEQ (2005c) has documented that the noncompliance notices in the online database are erroneous, and the facility is in compliance.

Seven field surveys conducted from August 2000 to June 2003 provide information on the thermal characteristics of the cooling water discharged to Lake Michigan and the resulting thermal plume in the lake. The surveys include temperature measurements while the plant was operating at near-maximum power levels at a discharge flow rate of 92,500 gpm. Results of the surveys indicate that the thermal plume is much smaller than it was when Palisades had its initial once-through cooling system and that the plume is generally at the surface. The area of the plume (the 3°F isotherm) ranged seasonally from 40 to 286 ac at the lake surface and from 0 to 19 ac at a depth of 3 ft. The 3°F isotherm was seldom noted to extend at or below a depth of 5 ft. The temperature of the plant cooling-water discharge during the surveys ranged from 77 to 98°F, corresponding to approximately 25 to 34°F above the ambient lake temperature in all seasons except winter. During the winter survey, conducted March 19, 2001, the ambient lake temperature was 34°F, the discharge temperature was approximately 78°F, or 44°F above ambient, and the plume area at the surface was approximately 76 ac. According to the NPDES permit, Palisades must make gradual changes to thermal inputs to the lake to avoid fish mortality due to cold shock during the winter months (MDEQ 2004).

The applicant monitors the septic sludge twice per year. A 1-L dip sample is taken at each sampling event, and it is analyzed through a gamma scan. Septic waste is hauled to the Benton Harbor-St. Joseph Wastewater Plant. Septic field effluent is not monitored.

The Palisades SWPPP notes that the septic system has the potential to overflow and reach storm water outflow SW-4 by way of a catch basin (Consumers Energy 2003b). To prevent this, an alarm system, structural curb, and backup pump have been installed. The SWPPP also notes that storm water outflow SW-6, which discharges to monitoring point 001A, includes floor drains in the Turbine Building. Therefore, the building has sediment bags or socks to collect debris and sediment, and an oil boom is installed across the mixing basin.

2.2.4 Air Quality

The Palisades site is located in the Moist Continental Climate zone, characterized by the dominance of tropical air masses in summer and polar air masses in winter and by the presence of deciduous forest that covers the Great Lakes region of the United States and Canada. Seasonal changes between summer and winter are very large, with an average seasonal temperature change of 46°F. Daily temperatures also change often. Abundant precipitation falls throughout the year but increases in the spring and summer seasons due to invading tropical air masses. Cold winters are caused by polar and arctic air masses moving south. Local precipitation occurs throughout the year, with a typical increase in rainfall in summer. Meteorological records for southwestern Michigan (i.e., the South Haven area) are generally representative of the Palisades site. The data from this area indicate that the lowest precipitation amounts for the year generally last for about a month or two, typically in February. Mean or normal monthly temperatures for southwestern Michigan range from 13.4 to 35.3°F in January to 65.5 to 77.6°F in July and August (MRCC 2005). The mean annual precipitation for the region is 35.8 in. Normal monthly precipitation ranges from 1.7 to 2.5 in. in the dry season (January to March) to 3.6 to 4.1 in. in the wet season (July to September) (NOAA 2002).

Onsite meteorological conditions at Palisades are monitored at three levels: 10, 30, and 100 m from the main meteorological tower. The tower winds (speed and direction) and temperature are measured at two levels, 10 and 30 m, including horizontal wind direction variations. Atmospheric stability is calculated from temperature differences taken from readings between the 30- and 10-m levels. Hourly data from readings recorded from both levels and annual summaries, including wind roses, can be found in the Palisades meteorological monitoring semiannual report (Consumers Energy 2005a). Winds during the winter season tend to be stronger, with mean winds at the 100-m level exceeding 9 mph, and are predominately out of the southwest. During the summer, winds are more often from the southwest and are from the north-northwest more than 20 percent of the time; in the fall, they are from the southeast to south-southeast about 19 percent of the time (Consumers Energy 2005a).

Over the past 55 years, severe thunderstorms with winds exceeding 58 mph or with resulting property damage occurred on average about once per year (NOAA 2005). During the period from the middle of March to the middle of November, the daily occurrence of thunderstorms and high winds is less than once every 2 months, with a total of 103 thunderstorm and wind damage reports filed for Van Buren County from January 1, 1950, to May 31, 2005. Through the last half of the last century to the present, 1950 to 2005, a total of 16 tornadoes touched down in Van Buren County (NOAA 2005). The majority of these (13 strikes) produced slight or moderate property damage, less than $25,000 and less than $250,000, respectively. These storm events were categorized in the low-to-moderate intensity range of the Fujita Tornado Scale, that is, F-0, F-1, and F-2 category tornados.[(a)] Three F-3 tornado strikes, two that occurred on March 3, 1956, and one on May 13, 1980, caused a total of 21 injures and produced major property damage totaling approximately $2.5 million for each storm (NOAA 2005). On the basis of statistics for the 30 years from 1954 through 1983 (NRC 2005a), the probability of a tornado striking a point in a 1 degree latitude-longitude square at the site is expected to be about 7 to 8 $\times 10^{-4}$ per year.

Wind resources are expressed in terms of wind power classes, ranging from Class 1 to Class 7 (PNL 1986). Each class represents a range of mean wind power density or approximate mean wind speed at specified heights above the ground. The wind energy resource for most of the Lake Michigan shoreline region in the State of Michigan, including Van Buren County, has good wind power potential. The annual average wind power for this part of the State is rated Class 3 (PNL 1986). Areas designated Class 3 or greater are suitable for most wind energy applications, whereas Class 2 areas are marginal, and Class 1 areas are generally not wind power suitable.

Air quality in a given area is a function of the air pollutant emissions (type of pollutant; rate, frequency, and duration; and exit conditions and location of release), atmospheric conditions (climate and meteorology), the area itself (size of airshed and topography of the area), and the pollutants transported from outside the area. Air quality within a 31-mi radius of Palisades is generally considered good, with the exception of areas within 16 mi of designated ozone nonattainment areas (EPA 2005b). Localized sources of emissions include man-made sources of commercial, residential, and transportation-related emissions. Natural sources of windblown dust contribute to temporary increases in air pollution.

The MDEQ is responsible for air quality in six Air Quality Control Regions (AQCRs) within the State of Michigan. Palisades is located in Van Buren County, Michigan, and is within AQCR 82

(a) Tornado wind speeds for the F-0 to F-4 categories are in the following ranges: F-0: 40 to 72 mph; F-1: 73 to 110 mph; F-2: 113 to 157 mph; F-3: 158 to 206 mph; and F-4: 207 to 260 mph (Fujita 1987).

located in the southwestern corner of the State. AQCR 82 includes two other counties, Berrien and Cass, just south of Van Buren. This region, with the exception of the 8-hour ozone standard, is designated as being in attainment or unclassifiable for all criteria pollutants (40 CFR 81.333). The AQCR 82 is designated as the Kalamazoo-Battle Creek 8-hour nonattainment area for ozone (Clean Air Act Amendments of 1990, Title 1, Part D, Subpart 1). No Prevention of Significant Deterioration Class I areas are located within 62 mi of Palisades.

Two emergency diesel generators serve the Palisades plant. The two small generators are identical and are rated at a nominal capacity of approximately 2500 kilowatts electric (kW(e)). The diesels are used for emergency backup power and provide a standby source of electric power for equipment required for mitigation of the consequences of an accident, for safe shutdown, and for maintenance of the station in a safe condition under postulated event and accident scenarios (NMC 2005d). The diesel generators are tested once a month for 1-, 2-, 3-, and 4-hour test burn durations. Maintenance tests for each generator (e.g., to replace pumps and test for leaks) last 24 hours and are run as needed. Twenty-four hour endurance runs are performed on a staggered test schedule, once every 18 months.

Under the air pollution rules and regulations of the MDEQ, Part 2, R 336.1212, insignificant activities exemptions, emergency diesel generators meeting certain operating criteria are exempt from State operating permit requirements. The rules define emergency power generating units as stationary internal combustion engines that operate as a mechanical or electrical power source only when the usual supply of power is unavailable. These sources are provided a permit exemption if their annual emissions are less than significance levels as defined in R 336.1119. This would apply to operations during emergency situations, routine maintenance, and routine exercising (e.g., test firing the engine for 1 hour a week to ensure reliability). Since all of the emergency diesel generators at Palisades operate for a small number of test hours per year, emissions from these sources are not regulated under Michigan's Permit Operating Program. In addition to the emergency diesel generators, Palisades has three No. 2 diesel oil-fired boilers that are used for evaporator heating, plant space heating, and feedwater purification. Two units are rated at 6.8 MW/hr and the third at 7.4 MW/hr. All three units are permitted to operate under Michigan's Air Pollution Control Rule 336.1210(1) (MDEQ 2003).

There are no mandatory Federal Class 1 areas within 100 mi of the Palisades site in which visibility is an important value, as designated in 40 CFR Part 81.

2.2.5 Aquatic Resources

Palisades is located on the southeastern shoreline of Lake Michigan, which is the source and receiving body for the plant's cooling system. The 40-mi-long Palisades-Argenta 345-kV transmission line associated with Palisades crosses several streams, including the South Branch of the Black River, Extension Drain, Veley Drain (a Clear Lake tributary), Pine Creek

(a tributary to the Kalamazoo River), and the Kalamazoo River (NMC 2005a). No streams are crossed by the 0.6-mi-long Palisades-Cook transmission line. Transmission line right-of-way maintenance activities in the vicinity of stream and river crossings include procedures to minimize erosion and shoreline disturbance while encouraging vegetative cover. In addition, aerial application of herbicides is restricted from riparian areas (NRC 1978).

Water depths in the southeastern portion of Lake Michigan are up to 10 ft within 500 ft of the shore and up to 50 ft at 1 mi offshore. Lake substrates range from coarse and very coarse sand in the surf zone, medium sand at the 5-ft-depth zone, and fine sand in deeper waters (NMC 2005a). Open-lake temperatures range from 35°F in January and February to about 75°F in mid August. Temperatures near the Palisades intake range from a monthly minimum of about 34°F in January to a monthly maximum of about 70°F in August, with a daily minimum and maximum of about 33°F and 80°F, respectively (NMC 2005a). In the Palisades area, the lake is thermally stratified in summer but is generally isothermic in early winter and early spring. Inshore waters may be substantially warmer than offshore waters in early winter, while being colder in early spring. These conditions limit mixing of inshore and offshore waters during these periods. Intermittent ice cover extends 1 to 2 mi offshore during winter (NMC 2005a; AEC 1972).

Lake Michigan is used for a variety of purposes, including navigation, recreation, tourism, and conservation. The major changes and modifications that have had the greatest impact on aquatic resources of Lake Michigan include (1) industrial, urban, and residential developments on the lakefront; (2) water quality impairment from industrial, municipal, agricultural, navigational, and recreational water uses; (3) overfishing; and (4) invasion of exotic species (EPA 2004). Overall, the status of Lake Michigan habitats, including open water, wetlands, coastal shore, and tributaries, is considered “mixed” to “deteriorating” (EPA 2004). Dams, agricultural and urban development activities, drainage and filling of wetlands, and invasive species have adversely affected the aquatic resources of the tributary streams to Lake Michigan (e.g., the Kalamazoo River) (Wesley 2005).

Contamination is emerging as an important concern in fish in Lake Michigan and its tributary streams (EPA 2004). Some fish cannot be sold commercially because of high levels of PCBs, mercury, or other substances (Fuller, Shear, and Witting 1995). The State of Michigan has published advisories governing the consumption of fish from these water bodies. Within the southeastern portion of Lake Michigan, there are advisories for brown trout (*Salmo trutta*), lake trout (*Salvelinus namaycush*), rainbow trout (*Oncorhynchus mykiss*), chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), rainbow smelt (*Osmerus mordax*), lake sturgeon (*Acipenser fulvescens*), walleye (*Sander vitreus*), lake whitefish (*Coregonus clupeaformis*), and yellow perch (*Perca flavescens*). PCB advisories have also been issued for common carp, northern pike (*Esox*

lucius), and white sucker (*Catostomus commersoni*) in the Black River, and for all fish species for some portions of the Kalamazoo River (MDCH 2003).

Despite the modifications and multiple competing uses of Lake Michigan, the overall fish community is fairly diverse. Almost 100 species of fish occur in Lake Michigan (UWSGI 2001a). Lake Michigan supports commercial, recreational, and tribal fishing. Commercial and tribal production totals more than 14.6 million lb of fish annually (EPA 2004). Lake whitefish is the primary commercial species, while both lake whitefish and lake trout comprise the tribal fisheries (Stein et al. 2003). Some commercial fishing also targets bloater (*Coregonus hoyi*) and rainbow smelt (Madenjian et al. 2004). Sport fishing within the southeastern portion of Lake Michigan is for lake trout, rainbow trout or steelhead (the migratory form of rainbow trout), brown trout, coho salmon, chinook salmon, northern pike, smallmouth bass (*Micropterus dolomieu*), various sunfish (e.g., bluegill (*Lepomis macrochirus*), pumpkinseed (*L. gibbosus*), and rock bass (*Ambloplites rupestris*)), yellow perch, and walleye (MDNR 2005d; IDNR 2005). Important forage species in Lake Michigan include alewife (*Alosa pseudoharengus*), bloater, rainbow smelt, and deepwater sculpin (*Myoxocephalus thompsoni*) (Madenjian et al. 2002, 2005).

Top-level predators in Lake Michigan are dominated by the introduced trout and salmon, while the native burbot (*Lota lota*) and lake trout (the original top predators in the lake) (Madenjian et al. 2004) are recovering. The lake trout is recovering mostly through stocking rather than natural reproduction. About 2.4 million yearling lake trout are stocked annually into Lake Michigan (Bronte and Schuette 2002). Reasons that self-sustaining populations of lake trout have yet to be reestablished in Lake Michigan may include loss of suitable spawning habitat, environmental contamination, predation on larval lake trout by alewife, thiamine deficiency from a diet of alewife, and a loss of genetically distinct strains (EPA 2004). About 70 percent of the Great Lakes trout and salmon fishery is dependent upon fish stocking (MDNR 2004).

Forty fish species were collected during preoperational and early years of operation at Palisades. The dominant species included alewife (the major component of the catch), rainbow smelt, yellow perch (the most numerous game species), spottail shiner (*Notropis hudsonius*, the most abundant minnow species), slimy sculpin (*Cottus cognatus*, which inhabits the rip-rap around the intake crib), trout-perch (*Percopsis omiscomaycus*), longnose dace (*Rhinichthys cataractae*), longnose sucker (*Catostomus catostomus*), and white sucker (NMC 2005a; NRC 1978; AEC 1972). Coho and chinook salmon, steelhead, and lake and brown trout were also collected during preoperational studies (NMC 2005a).

At least 160 species have been introduced into the Great Lakes since the early 1800s through the canal system interconnection with the Atlantic Ocean (e.g., sea lamprey (*Petromyzon marinus*), alewife, and white perch (*Morone americana*)), ship ballast (e.g., Asiatic clam (*Corbicula fluminea*), zebra mussel (*Dreissena polymorpha*), spiny water flea (*Bythotrephes cederstroemi*), and round goby (*Neogobius melanostomus*)), or as intentionally introduced

species (e.g., common carp, rainbow smelt, and various salmonids) (EPA 2004; Peeters 1998). The non-native salmonids that were introduced to the Great Lakes between 1870 and 1960 include Atlantic species (Atlantic salmon (*Salmo salar*) and brown trout); Pacific species (chinook salmon, coho salmon, rainbow trout, kokanee (*Oncorhynchus nerka*), chum salmon (*O. keta*), cutthroat trout (*O. clarkii*), masu salmon (*O. masou*), and pink salmon (*O. gorbuscha*)); and Arctic species (Arctic charr (*Salvelinus alpinus*)) (Crawford 2001).

Since the mid-1970s, salmonid stocking in Lake Michigan has included the brook trout, brown trout, lake trout, rainbow trout/steelhead, chinook salmon, coho salmon, and splake (hybrid between lake trout and brook trout). Nearly 14.5 million trout and salmon are stocked annually in Lake Michigan. Atlantic salmon have not been stocked in the lake since 1989 (Bronte and Schuette 2002). Currently, the only major objective for salmonid stocking is the development and maintenance of recreational fisheries (Crawford 2001). The stocking of salmonids may have resulted in the introduction of some non-native fish diseases and parasites to the Great Lakes and caused genetic alteration of native salmonids through hybridization and introgression and/or through declines in the abundance of native salmonids. Also, stocked salmonids may present a direct threat to native and non-native forage fish and invertebrates, while placing competitive pressure upon native fish species for food and habitat resources (Crawford 2001).

The native fish species of Lake Michigan have been affected by introduced aquatic species, most notably the sea lamprey and alewife. Both species have adversely affected native fish species, including commercially and/or recreationally important species such as the cisco (*Coregonus artedi*), lake whitefish, burbot, and lake trout (Madenjian et al. 2002). Combined with overfishing, the introduction of the sea lamprey led to the extirpation of the longjaw cisco (*C. alpanae*), deepwater cisco (C. *johannae*), and blackfin cisco (*C. nigripinnis*) from Lake Michigan (Fuller and Nico 2000). Sea lamprey abundance remains higher than desired in Lake Michigan. This limits rehabilitation efforts for lake trout, despite the stocking program previously mentioned (Stein et al. 2003). Other impediments to sustainable reproduction of lake trout in Lake Michigan relate to the following: (1) the lakewide population is too low, (2) spawning aggregations are too diffuse and in inappropriate locations, and (3) there is poor survival of early life stages (Bronte et al. 2003).

The alewife was first reported from Lake Michigan in 1949, and by 1967 it made up about 85 percent of the fish biomass of the lake (Peeters 1998). Its increase was aided by the decrease in its main predators (lake trout and burbot) caused by the sea lamprey. The population explosion of alewives led to the decline of native planktivorous fishes such as the emerald shiner (*Notropis atherinoides*), lake whitefish, cisco, and a number of coregonine species (Peeters 1998; Fuller and Nico 2000). The alewife is the most important prey species for salmonids in Lake Michigan. The alewife's estimated lakewide biomass decreased from 42,876 metric tons in 2003 to 13,721 metric tons in 2004 (Madenjian et al. 2005). Currently, there is no commercial fishery for alewives in Lake Michigan (Madenjian et al. 2004).

Alewives are easily stressed, and during peak population levels, stress can result in large die-offs in the spring. They are affected by both osmotic stress associated with life in freshwater and exposure to fluctuating water temperatures when they move to inshore waters (e.g., exposure to colder waters during an upwelling event can cause the fish to die; UWSGI 2002). Susceptibility to cold is related to inadequate fat reserves (Eshenroder et al. 1995). In spring, alewives are also in a weakened condition because of a lack of forage in the winter and by stress related to spawning (UWSGI 2001b). Adult alewives feed little, if at all, during their spawning migration (DFO 2004). Large numbers of spawning alewives can occur in nearshore waters as a result of strong year classes produced in the prior 3 or more years. Fish that become weak or die during rapid temperature change can be blown into windrows close to shore or can wash onto beaches (UWSGI 2002). Adult mortality following spawning may be as high as 40 to 60 percent (DFO 2004). Therefore, potentially large numbers of both moribund and dead alewives can be found in inshore waters during the spawning season. The alewife spawning season generally occurs from late May to early August, peaking in June and July, in the southeastern portion of the lake (Jude 1995).

The white perch preys on eggs of walleye and other species (including its own), zooplankton, macroinvertebrates, and minnows. It may compete with yellow perch, emerald shiner, and spottail shiner for food resources (Fuller 2003).

The round goby first appeared in southern Lake Michigan in 1994 (Fuller and Benson 2003). It feeds on the eggs and young of other bottom-dwelling fish species, zebra mussels, snails, soft-shelled crayfish, aquatic insects, and zooplankton. The round goby inhabits a wide variety of habitats but prefers rock, cobble, or rip-rap (Manz 1998). This is the type of habitat found around the Palisades intake. The round goby has a long spawning season (it may spawn up to six times during the breeding season) and aggressively defends its spawning area. It displaces native sculpins and darters and impacts recreationally important centrarchids (sunfish and bass) and lake trout (GLSC 2003; Marsden and Chotkowski 1995; Manz 1998; Ray and Corkum 1997). However, to date, no lakewide changes in the abundance of any Lake Michigan species have been ascribed to the round goby invasion (Madenjian et al. 2002).

The ruffe (*Gymnocephalus cernuus*), native to Europe and Asia, was introduced to the Great Lakes in ship ballast. This species also has the potential to disrupt fish community structure within the lake through competition or modification of plankton and macroinvertebrate populations (Jude 1995).

The plankton community of Lake Michigan may be changing as a result of the presence of contaminants and nutrients in the water and sediment as well as the presence of exotic species such as the zebra mussel and spiny water flea (EPA 2004). Phytoplankton abundance and production in nearshore areas have decreased since 1970, probably due to a reduction in phosphorus loading (Madenjian et al. 2002). Phytoplankton in southeastern Lake Michigan is dominated by diatoms, while green algae and blue-green algae were not found to be abundant

near Palisades (AEC 1972; NRC 1978). Periphyton (attached algae) and rooted aquatic plant growth is limited in the Palisades area because of shifting sandy-gravel substrates (NRC 1978; NMC 2005a). The water intake structure and other underwater components provide artificial habitats for periphyton.

The zooplankton community in Lake Michigan near Palisades is abundant and fairly diverse. Copepods and cladocerans dominated the zooplankton community near Palisades (NRC 1978). Predation by the spiny water flea has caused a significant decline in three offshore *Daphnia* spp. that are a prey source for young-of-year fish (Lehman 1991). The spiny water flea population grows rapidly, partly due to its parthenogenic asexual reproduction. Its rapid population growth allows it to monopolize the zooplankton food supply, which can be detrimental to fishes such as the bloater (GLSGN 1991).

The benthic macroinvertebrate community near Palisades was dominated by *Diporeia* spp. (formerly known as *Pontoporeia* spp., an amphipod), chironomids (midges), aquatic worms, and fingernail clams (NRC 1978; NMC 2005a). Nearshore benthic macroinvertebrate communities have been altered dramatically since the 1960s because of a reduction in phosphorus and other nutrient loads and the establishment of the zebra mussel (Madenjian et al. 2002).

The zebra mussel was first discovered in Lake Michigan in 1988. Its impacts fall into three main categories: (1) biofouling, (2) filter feeding, and (3) nutrient dynamics (Garton 2002). The zebra mussel has impacted aquatic communities by consuming zooplankton and phytoplankton (fundamentally altering the foodchain) and by displacing native mussels (Garton 2002; Madenjian et al. 2002). Zebra mussels have eliminated native mussels from some areas of the Great Lakes and can exclude gastropods (snails) and net-spinning caddisflies from hard substrates through competition for food and space (Stewart et al. 1998a). However, they consistently cause increases in the total macroinvertebrate biomass and densities of hydrozoans, flatworms, and amphipods on hard benthic substrates because their shells enhance surface area, substrate heterogeneity, and accumulation of benthic organic matter (Horvath et al. 1999; Stewart et al. 1998a).

It is suspected that the lakewide population decline of *Diporeia* spp. is linked to the introduction of the zebra mussel, which has severely limited the food available to *Diporeia* spp. (EPA 2004). Declines of *Diporeia* spp. might be the cause of decline in the abundance of lake whitefish and slimy sculpin (Madenjian et al. 2004; Stein et al. 2003) and decline in alewife condition (Madenjian et al. 2002). Reduced biomass of phytoplankton, zooplankton, and *Diporeia* spp. caused by zebra mussels may adversely affect rainbow smelt and young salmonids, which in turn would affect predators of these fishes. However, freshwater drum (*Aplodinotus grunniens*), rock bass, yellow perch, and other benthivorous fish species consume large numbers of gammarid amphipods, crayfish, zebra mussels, and other benthic macroinvertebrates that have increased in abundance (Stewart et al. 1998a,b).

The zebra mussel is cold-tolerant and is considered a potential serious biofouling problem at power plants. Zebra mussels can accumulate on the inside of intake tunnels; intake cribs; and screenhouse walls, floors, and trash racks. Large piles of zebra mussels that slough off from other areas can accumulate on screenhouse floors in areas of low flow and against out-of-service traveling screens. Approved biocides are used, in accordance with NPDES permit requirements (MDEQ 2004), to control zebra mussels (Consumers Energy 2003a; NMC 2005a).

The amphipod *Echinogammarus ischnus* and the quagga mussel (*Dreissena bugensis*), a species similar to the zebra mussel, have recently been reported in Lake Michigan. Both species will likely contribute to further food-web modifications in the lake. The quagga mussel may further decrease the abundance of *Diporeia* spp. in offshore areas, while *E. ischnu*s may become an important food item for many fish species (Nalepa et al. 2001).

No Federally listed threatened, endangered, proposed, or candidate aquatic species occur in Lake Michigan in the vicinity of Palisades. In addition, no Federally listed aquatic species are listed for Allegan, Kalamazoo, and Van Buren Counties within which the Palisades-Argenta transmission line occurs (FWS 2005a; MNFI 2005a,b). Also, no designated critical habitat for aquatic species occurs in the site vicinity. State-listed aquatic species that have the potential to occur in the vicinity of Palisades and its associated transmission lines are presented in Table 2-1.

2.2.6 Terrestrial Resources

The Palisades site is located in the glacial plain of Lake Michigan, where sand dunes up to 200 ft high occur in a band along the lakeshore, and generally flat to gently rolling glacial features occur eastward (NMC 2005a). Forests dominated by American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and eastern hemlock (*Tsuga canadensis*) made up much of the original vegetation of the region (MNFI 2005c); however, timber harvest, sand mining, and drainage of wetlands have greatly altered the landscape (NMC 2005c). Most of the land in the region is now devoted to agriculture, including blueberry farming on poorly drained sites and orchards and vineyards on better drained soils (NMC 2005a).

The entire Palisades site is protected under the CZMA and Michigan's Coastal Zone Management Program (MDEQ 2005a). About 80,000 ac of Lake Michigan sand dunes in Michigan, including those within the Palisades site, are classified and protected as Critical Dune Areas under authority of Michigan's Natural Resources and Environmental Protection Act, Part 353 (MDEQ 2005b). Development activities in designated critical dune areas, including those on the site, require an environmental impact assessment and permit from MDEQ (MDEQ 2005b).

Table 2-1. State-Listed Aquatic Species Potentially Occurring in the Vicinity of Palisades and Associated Transmission Lines

Scientific Name	Common Name	Michigan Status[(a)]	County[(a)]	Habitat
Plants				
Lemna valdiviana	pale duckweed	X	K, V	Ponds, marshes
Insects				
Stenelmis douglasensis	Douglas stenelmis riffle beetle	SC	K	On wood in lakes, streams, and rivers
Mussels and Snails				
Alasmidonta viridis	slippershell mussel	SC	A	Small to medium lakes; small tributaries to large rivers
Cyclonaias tuberculata	purple wartyback	SC	A	Moderate gradient of medium to large rivers
Funtigens nickliniana	watercress snail	SC	K	Ponds, small lakes, small streams
Fish				
Acipenser fulvescens	lake sturgeon	T	A	Large rivers and shallow water of large lakes
Lepisosteus oculatus	spotted gar	SC	A, K	Nearshore areas of medium to large lakes; medium to large rivers
Coregonus artedi	lake herring	T	A, K	Nearshore areas of medium to large lakes; large rivers
Hiodon tergisus	mooneye	T	A	Nearshore areas of medium to large lakes; large rivers
Erimyzon oblongus	creek chubsucker	E	A, K	Low-gradient creeks
Notropis anogenus	pugnose shiner	SC	K, V	Small to medium lakes; small tributaries to medium rivers
Notropis texanus	weed shiner	X	A, K	Sand-bottomed creeks; sloughs and large rivers

(a) A = Allegan County, E = endangered, K = Kalamazoo County, SC = special concern, T = threatened, V = Van Buren County, X = probably extirpated.

Sources: Brown 1976; Carman 2002a,b; Consumers Energy and NMC 2001; Cummings and Mayer 1992; Eagle et al. 2005; FWS 2003; MNFI 2005a,b; Page and Burr 1991; NatureServe 2005; Scott and Crossman 1973; Smith 1979.

Plant and the Environment

Developed or maintained areas occupy about 80 ac of the 432-ac Palisades site. Most (about 68 percent) of the undeveloped portions of the Palisades site are dominated by forest. The most extensive forest community type is a red oak (*Quercus rubra*), sassafras (*Sassafras albidium*), sugar maple, and American beech association. This forest is typical of many rear-dune areas along the Lake Michigan shoreline and appears to have a well-balanced, all-age structure (NMC 2005a). A portion of this community near the southern site boundary is recognized as important habitat by the Michigan Natural Features Inventory (MNFI) (Higman and Goff 1991; Goff 1992). Most of the remaining forest on the site is a second-growth community dominated by red oak, white ash (*Fraxinus americana*), sassafras, and sugar maple.

Early successional plant communities on the Palisades site include old-field and upland scrub-shrub, which occupy portions of transmission line rights-of-way, abandoned railroad bed, disturbed sites around buildings, forest openings, borders of forested areas, and dune blowouts (NMC 2005a). These communities occupy about 10 percent of the site.

Portions of steep dunes and flats at the base of dunes that are on or adjacent to developed areas have been stabilized with plantings of beach grass (*Ammophila breviligulata*) and dune grass (*Calamovilfa longifolia*) or are stabilized by natural colonization of these species (NMC 2005a). These areas occupy about 10 percent of the site. Sand dune blowouts (4 percent of the site) occur where wind action has disturbed established vegetation and resulted in dune destabilization. About 3 percent of the site is open sand (beach and other unvegetated flat areas).

Wetland communities occupy a total of about 9 ac (2 percent of the site area) but are generally small and widely scattered (NMC 2005a). The largest wetland on site is located just north of the Palisades Substation and is a seasonally inundated wetland dominated by black gum (*Nyssa sylvatica*), willow (*Salix* spp.), and reedgrass (*Calamogrostis* spp.). Similar small wetlands occur in the transmission right-of-way on the eastern border of the site, and a small forested wetland dominated by black gum is located north of the Outage Building sanitary waste drainfield.

Approximately 5 ac of vegetation (1 percent of the site) on dune ridges adjacent to and southeast of the cooling towers have been affected by condensate plumes and drift (NMC 2005a). Drift from operation of the two mechanical draft cooling towers has resulted in the replacement of the original mature trees with an early succession dense scrub-shrub community. Some standing dead trees remain from the original forest. Rochow (1978a) described the sequence of vegetation change in drift-impacted areas at Palisades. Three to four months after cooling tower start-up, white pines began to show signs of chemically induced injury in areas up to 295 ft from the towers. Deciduous trees began showing visible signs of injury during the second summer of operation. High deposition rates of sulfate were considered responsible for this damage (Rochow 1978a,b). Severe icing of vegetation in the winter of 1976

to 1977 resulted in extensive damage of trees, and by the third summer of operations, the forest canopy had been nearly eliminated in the most severely impacted areas.

Site surveys have documented a variety of terrestrial vertebrates on the site, including 4 amphibian, 3 reptile, 113 bird, and 14 mammal species. Amphibians include northern leopard frog (*Rana pipiens*), spring peeper (*Pseudacris crucifer*), American toad (*Bufo americanus*), and red-backed salamander (*Plethodon cinereus*). Reptiles on the site include the eastern box turtle (*Terrapene carolina*), eastern hognose snake (*Heterodon platyrhinos*), and blue racer (*Coluber constrictor*). Birds on the site include killdeer (*Charadrius vociferus*), ring-billed gull (*Larus delawarensis*), northern flicker (*Colaptes auratus*), blue jay (*Cyanocitta cristata*), black-capped chickadee (*Poecile atricapillus*), gray catbird (*Dumetella carolinensis*), American robin (*Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), American goldfinch (*Carduelis tristis*), and eastern towhee (*Pipilo erythrophthalmus*). Mammals on the site include white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), white-footed mouse (*Peromyscus leucopus*), eastern chipmunk (*Tamias striatus*), and thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*).

The landscape crossed by the Palisades-Cook transmission line and the western portion of the Palisades-Argenta line is similar to that of the Palisades site; however, the eastern portion of the Palisades-Argenta transmission line in Van Buren County crosses an area with moderate to steep slopes and scattered kettle depressions that are poorly drained (NMC 2005a). Most of the original vegetation of this portion of the project area was forest dominated by American beech, sugar maple, and white oak (*Quercus alba*). However, swamp hardwoods, tamarack (*Larix laricina*), wetland shrubs, and bogs occurred in kettle depressions, and wet prairie and emergent marsh were found in other poorly drained sites (MNFI 2005c; NMC 2005a). Most of the area is now used for agriculture. In Kalamazoo County, the Palisades-Argenta line traverses a glacial outwash plain with flat to gently sloping terrain. Prior to settlement, tallgrass prairies, oak savannas, wet prairies, marshes, and extensive wet meadows were present (MNFI 2005c; NMC 2005a). Most uplands and large areas of wetland in this region have been converted to agriculture. Although prairie fens remain common in the region, tallgrass prairie, wet prairie, and oak savanna are now quite rare (NMC 2005a).

Approximately 38 percent of the land within transmission line rights-of-way associated with Palisades is classified as active agricultural land (NMC 2005a). Approximately 28 percent and 25 percent of the rights-of-way are forest (mostly hardwoods) and rangeland (mostly shrubland), respectively, and about 7 percent of the area traversed consists of urban and developed areas such as roadways.

The percent of area within Palisades rights-of-way occupied by wetland communities was estimated by the applicant as 2 percent (primarily scrub-shrub) by using State land-use data but as 18 percent by using the U.S. Fish and Wildlife Service (FWS) National Wetland Inventory

(NMC 2005a). Nearly all of these wetlands are seasonally or temporarily flooded palustrine emergent and, to a lesser extent, seasonally flooded palustrine scrub-shrub habitat. Wetlands within the corridors are generally associated with unnamed streams in the Brandywine Creek, South Branch Black River, Paw Paw River, and Kalamazoo River watersheds.

Areas of natural vegetation traversed by the lines are maintained to ensure compatibility with the line by using a vegetation-management protocol that involves periodic selective removal of woody vegetation to promote and maintain herbaceous plant communities beneath the conductors and low-growing shrubs and other compatible vegetation in the border zones. Vegetation maintenance beyond the border zone is limited to selective removal of trees that could come into contact with the line (NMC 2005a). Right-of-way maintenance activities are on an approximate 4- to 6-year schedule; although mowing is occasionally used for vegetation maintenance, selective application of registered herbicides is the preferred method of vegetation control. Compatible land uses (e.g., cropland, pastureland) are allowed to continue on the right-of-way. No access road exists along the right-of-way, and access is gained on foot and with the use of all-terrain vehicles.

Federally listed and State-listed, proposed, or candidate terrestrial species found in Allegan, Kalamazoo, and Van Buren Counties and, therefore, possibly present on the Palisades site or the transmission line rights-of-way associated with Palisades are included in Table 2-2. No designated critical habitat occurs on the Palisades site or vicinity, or on the associated transmission line rights-of-way.

The NRC contacted the FWS and requested information on Federally listed and proposed threatened and endangered species, candidate species, and critical habitat on and near the Palisades site (NRC 2005b). In its response, the FWS stated that four Federally listed species and one Federal candidate for listing could occur in the project area (FWS 2005c). These include the Pitcher's thistle (*Cirsium pitcheri*; threatened), Karner blue butterfly (*Lycaeides melissa samuelis*; endangered), Mitchell's satyr butterfly (*Neonympha mitchelli mitchelli*; endangered), Indiana bat (*Myotis sodalis*; endangered), and eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*; candidate).

Pitcher's thistle is the only Federally listed species known to exist on the Palisades site (NMC 2005a). It occurs on the site in open habitats on the dunes, including dune blowouts. The species is a perennial, herbaceous plant that is endemic to the nonforested dunes of the western Great Lakes and requires active dune processes to maintain early successional habitat (FWS 2005c). In Michigan, Pitcher's thistle is most common in the dunes of the northern and northeastern shores of Lake Michigan and exists in scattered populations along the perimeter of southeastern Lake Michigan (MNFI 2005c).

Table 2-2. Federally Listed and State-Listed Terrestrial Species Potentially Occurring on or in the Vicinity of Palisades and Associated Transmission Lines

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Plants				
Agalinis gattingeri	Gattinger's gerardia	–	E	Sandy, rocky, or clayey slopes; open woods; barrens; Kalamazoo County
Aristida tuberculosa	beach three-awned grass	–	T	Sandy barrens; Van Buren County
Aristolochia serpentaria	Virginia snakeroot	–	T	Southern floodplain forests, rich dry-mesic forests; Van Buren County
Aster sericeus	western silvery aster	–	T	Prairies, dry banks, fields; Kalamazoo County
Astragalus canadensis	Canadian milk-vetch	–	T	Oak barrens, moist openings, wet ground, sandy lake shores; Kalamazoo County
Baptisia leucophaea	cream wild indigo	–	E	Openings of dry to dry-mesic forest; Kalamazoo County
Bartonia paniculata	panicled screw-stem	–	T	Coastal plain marsh; Allegan and Van Buren Counties
Berula erecta	cut-leaved water-parsnip	–	T	Cold spring-fed drainages; recorded within 1 mi of Palisades-Argenta line (1940s); Allegan, Kalamazoo, and Van Buren Counties
Besseya bullii	kitten-tails	–	T	Oak savanna remnants on steep hillsides; Kalamazoo and Van Buren Counties
Calamagrostis stricta	narrow-leaved reedgrass	–	T	Streams, marshes, fens, mudflats; Kalamazoo County
Carex albolutescens	greenish-white sedge	–	T	Intermittent wetlands, lake margins, wet prairies; Allegan and Kalamazoo Counties
Carex lupuliformis	false hop sedge	–	T	Deciduous and mixed swamps in southern Michigan; Kalamazoo County

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Carex platyphylla	broad-leaved sedge	–	T	Mesic forests formed on dunes; Van Buren County
Carex oligocarpa	eastern few-fruited sedge	–	T	Rich deciduous woods; Kalamazoo County
Carex seorsa	sedge	–	T	Swamps and buttonbush depressions; recorded (1985) within 1 mi of Palisades site; Kalamazoo and Van Buren Counties
Carex straminea	straw sedge	–	E	Low ground, marshes, and swamps; Kalamazoo County
Castanea dentata	American chestnut	–	E	Upland forest; Kalamazoo County
Cirsium pitcheri	Pitcher's thistle	T	T	Great Lakes shorelines and sand dunes; found in dune blowouts and other open dune habitats on the site; more than 100 individual plants found onsite in July 2005 in the northwestern portion of the site near Van Buren State Park (NMC 2006c); Allegan and Van Buren Counties
Coreopsis palmata	prairie coreopsis	–	T	Mesic prairies along railroad rights-of-way; Kalamazoo and Van Buren Counties
Corydalis flavula	yellow fumewort	–	T	Oak savannas and floodplain forests; Kalamazoo County
Cypripedium candidum	white lady-slipper	–	T	Alkaline wetlands; Kalamazoo and Van Buren Counties
Diarrhena americana	beak grass	–	T	Floodplain forests; Kalamazoo County
Draba reptans	creeping whitlow-grass	–	T	Oak savanna and prairie; Kalamazoo County

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Dryopteris celsa	log fern	–	T	Acidic, humus-rich soils in hardwood swamps and floodplain forests; Kalamazoo and Van Buren Counties
Echinodorus tenellus	dwarf burhead	–	E	Intermittent, seasonally inundated wetlands within oak barrens; Allegan County
Eleocharis compressa	flattened spike-rush	–	T	Limestone pavement and grassland; Kalamazoo County
Eleocharis microcarpa	small-fruited spike-rush	–	E	Intermittent, seasonal wetlands; Allegan County
Eleocharis tricostata	three-ribbed spike-rush	–	T	Wetlands with a fluctuating water table; Allegan County
Eryngium yuccifolium	rattlesnake-master	–	T	Sedge and grass-dominated portions of prairie fens; Kalamazoo and Van Buren Counties
Eupatorium sessilifolium	upland boneset	–	T	Slopes of oak savannas; Kalamazoo County
Euphorbia commutata	tinted spurge	–	T	Sandy areas of riparian hillsides and open woods; Allegan County
Filipendula rubra	queen-of-the-prairie	–	T	Prairie fen; Kalamazoo County
Fuirena squarrosa	umbrella-grass	–	T	Coastal plain marshes, sandy lake edges, dune swales, seepages, and sandy marshes; Kalamazoo and Van Buren Counties
Galearis spectabilis	showy orchis	–	T	Rich deciduous woods, often near temporary spring ponds; Kalamazoo and Van Buren Counties
Gentiana flavida	white gentian	–	E	Dry or moist prairies and oak woodlands; Kalamazoo County

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Gentiana puberulenta	downy gentian	–	E	Edges of coastal plain marshes in oak barrens; Allegan County
Gentianella quinquefolia	stiff gentian	–	T	Wet meadows; Kalamazoo County
Geum triflorum	prairie-smoke	–	T	Lower slopes of dry sand prairie; Allegan County
Gillenia trifoliata	Bowman's root	–	T	Oak barrens; Kalamazoo County
Helianthus mollis	downy sunflower	–	T	Prairie remnants and oak barrens; Kalamazoo County
Hydrastis canadensis	goldenseal	–	T	Southern hardwood forests and moist ravines and portions of riparian forests; Allegan, Kalamazoo, and Van Buren Counties
Isoetes engelmannii	Appalachian quillwort	–	E	Intermittent wetlands; Allegan County
Isotria verticillata	whorled pogonia	–	T	Successional oak and red maple forest; Kalamazoo and Van Buren Counties
Juncus brachycarpus	short-fruited rush	–	T	Coastal plain marshes, sandy lake edges, dune swales, seepages, and sandy marshes; Allegan County
Juncus scirpoides	scirpus-like rush	–	T	Coastal plain marshes, sandy lake edges, dune swales, seepages, and sandy marshes; recorded within 1 mi of Palisades-Argenta line (1983); Allegan, Kalamazoo, and Van Buren Counties
Juncus vaseyi	Vasey's rush	–	T	Wet prairies, moist sandy barrens, and open marshy flats or swales; Allegan County

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Lechea pulchella	Leggett's pinweed	–	T	Seasonally inundated intermittent wetlands; Allegan and Kalamazoo Counties
Linum virginianum	Virginia flax	–	T	Open oak forests, upland woods, and lakeside and riparian forests; Kalamazoo and Van Buren Counties
Ludwigia sphaerocarpa	globe-fruited seedbox	–	T	Muddy shores of lakes, marshes, and streams; Allegan and Van Buren Counties
Lygodium palmatum	climbing fern	–	E	Moist thickets and woods; Kalamazoo County
Morus rubra	red mulberry	–	T	Southern floodplain forest; Kalamazoo County
Muhlenbergia richardsonis	mat muhly	–	T	Limestone pavement communities; Kalamazoo County
Nelumbo lutea	American lotus	–	T	Marshes and large rivers; Kalamazoo County
Panax quinquefolius	ginseng	–	T	Rich shaded forests; Allegan, Kalamazoo, and Van Buren Counties
Panicum leibergii	Leiberg's panic-grass	–	T	Dry prairies and open areas in savannas; Kalamazoo and Van Buren Counties
Panicum longifolium	long-leaved panic-grass	–	T	Seasonally flooded wetlands in shallow depressions; Allegan County
Panicum verrucosum	warty panic-grass	–	T	Coastal plain marshes, sandy lake edges, dune swales, seepages, and sandy marshes; Van Buren County
Platanthera ciliaris	orange or yellow fringed orchid	–	T	Acid swamps; Allegan, Kalamazoo, and Van Buren Counties

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Poa paludigena	bog bluegrass	–	T	Bogs, swamps, and wet woods; Kalamazoo County
Polygonum careyi	Carey's smartweed	–	T	Coastal plain marshes and intermittent wetlands; Allegan and Van Buren Counties
Populus heterophylla	swamp or black cottonwood	–	E	Swamp forest; Kalamazoo County
Potamogeton bicupulatus	waterthread pondweed	–	T	Coastal plain marshes and intermittent wetlands; Allegan and Van Buren Counties
Psilocarya scirpoides	bald-rush	–	T	Coastal plain marshes, sandy lake edges, dune swales, seepages, and sandy marshes; Allegan, Kalamazoo, and Van Buren Counties
Rhynchospora globularis	globe beak-rush	–	E	Coastal plain marshes, sandy lake edges, dune swales, seepages, and sandy marshes; Allegan County
Sabatia angularis	rose-pink	–	T	Moist sandy shores, depressions in dunes, marshy ground and edges of lakes; Kalamazoo and Van Buren Counties
Schoenoplectus hallii	Hall's bulrush	–	T	Intermittent wetlands within oak barrens; Allegan County
Scleria pauciflora	few-flowered nut-rush	–	E	Sandy edges of intermittent wetlands; Van Buren County
Scleria reticularis	netted nut-rush	–	T	Seasonally flooded wetlands in glacial lakeplain landscapes; Allegan and Van Buren Counties
Silene stellata	starry campion	–	T	Dry, open woodlands on sandy soils; Kalamazoo County
Silphium integrifolium	rosinweed	–	T	Mesic prairie; Kalamazoo and Van Buren Counties

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Silphium laciniatum	compass-plant	–	T	Mesic prairies; Kalamazoo County
Silphium perfoliatum	cup-plant	–	T	Openings in floodplain forests; Kalamazoo County
Sisyrinchium atlanticum	Atlantic blue-eyed-grass	–	T	Moist sandy shores; Allegan County
Solidago missouriensis	Missouri goldenrod	–	T	Dry sand prairie; Kalamazoo County
Spiranthes ovalis	lesser ladies'-tresses	–	T	Open, sandy soil, old roads, and open fields; Kalamazoo County
Stellaria crassifolia	fleshy stitchwort	–	T	Cold springs and seeps along rivers; Kalamazoo County
Trichostema dichotomum	bastard pennyroyal	–	T	Oak savannas; Allegan, Kalamazoo, and Van Buren Counties
Trillium sessile	toadshade	–	T	Floodplains and mesic forests; recorded within 1 mi of Palisades-Argenta line (1981); Kalamazoo and Van Buren Counties
Triphora trianthophora	three-birds orchid	–	T	Rich oak-hickory forests; Allegan, Kalamazoo, and Van Buren Counties
Valerianella chenopodiifolia	goosefoot corn-salad	–	T	Wet sites in forested floodplains; Kalamazoo County
Viola pedatifida	prairie birdfoot violet	–	T	Mesic prairie; Kalamazoo County
Utricularia subulata	zigzag bladderwort	–	T	Damp sand at the margins of interdunal wetlands; Allegan County
Zizania aquatica var. *aquatica*	wild-rice	–	T	Rivers, streams, lakes, and ponds; Kalamazoo County

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Insects				
Erynnis persius persius	Persius duskywing	–	T	Oak savannas and pine barrens (Shepard et al. 2005); Allegan and Kalamazoo Counties
Hesperia ottoe	Ottoe skipper	–	T	Remnant dry sand prairies and open oak barrens with native warm season grasses; Allegan County
Incisalia irus	frosted elfin	–	T	Oak savannas and pine barrens (Shepard et al. 2005); Allegan and Kalamazoo Counties
Lepyronia gibbosa	great plains spittlebug	–	T	Prairies; Van Buren County
Lycaeides melissa samuelis	Karner blue butterfly	E	T	Oak or oak-pine savanna, openings, old fields, and rights-of-way surrounded by close-canopied oak forest; Allegan County
Neonympha mitchellii mitchellii	Mitchell's satyr butterfly	E	E	Calcareous wetlands; Kalamazoo and Van Buren Counties
Nicrophorus americanus	American burying beetle	E	E	Wide variety of habitats with significant humus and topsoil suitable for burying of carrion (FWS 1989); Kalamazoo County, last observation 1961; no recent State sightings (MDNR 2005a).
Speyeria idalia	regal fritillary	–	E	Tall-grass prairie, meadows, marshes, and pastures (Shepard et al. 2005); Kalamazoo County

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Amphibians				
Ambystoma opacum	marbled salamander	–	T	Sandy, upland deciduous forests most of the year; lowland forest in the fall to breed (MDNR 2005b); Allegan and Van Buren Counties
Reptiles				
Clemmys guttata	spotted turtle	–	T	Shallow wetlands; recorded within 1 mi of Palisades-Argenta line (2002); Allegan, Kalamazoo, and Van Buren Counties
Clonophis kirtlandii	Kirtland's snake	–	E	Damp meadows, vacant lots, and open swampy woodlands (MDNR 2005c); Kalamazoo and Van Buren Counties
Sistrurus catenatus catenatus	eastern massasauga rattlesnake	C	–	Wetlands, including bogs, fens, shrub swamps, wet meadows, marshes, moist grasslands, wet prairies, and floodplain forests; recorded within 1 mi of Palisades-Argenta line (1995); Allegan, Kalamazoo, and Van Buren Counties
Birds				
Buteo lineatus	red-shouldered hawk	–	T	Mature, forested floodplains and upland forest; Allegan County
Dendroica discolor	prairie warbler	–	E	Upland scrub-shrub; recorded within 1 mi of Palisades-Argenta line (1997); Allegan and Van Buren Counties

Table 2-2. (contd)

Scientific Name	Common Name	Federal Status[(a)]	Michigan Status[(a)]	Habitat and Location in Project Area[(b)]
Lanius ludovicianus migrans	migrant loggerhead shrike	–	E	Grasslands and open, agricultural areas characterized by short vegetation and scattered trees, shrubs, or hedgerows; Allegan County
Rallus elegans	king rail	–	E	Freshwater marshes; Allegan and Van Buren Counties
Mammals				
Cryptotis parva	least shrew	–	T	Grassy, weedy, or brushy fields; Allegan, Kalamazoo, and Van Buren Counties
Microtus ochrogaster	prairie vole	–	E	Open prairie and savanna; recorded on Palisades site (1978); Kalamazoo and Van Buren Counties
Myotis sodalis	Indiana bat	E	E	Riparian, bottomland, and upland forest habitats; Allegan, Kalamazoo, and Van Buren Counties (FWS 2005b)

(a) C = candidate for listing; E = listed as endangered, T = listed as threatened, – = no listing.
(b) Habitat information from MNFI 2005b,c or NMC 2005a unless otherwise noted. Location on Palisades site or near transmission lines from NMC 2005a. County occurrence from MNFI 2005d unless otherwise noted.

The Pitcher's thistle has been found in dune blowouts and in semistabilized, but dynamic, full-sun dune habitats throughout the Palisades site (NMC 2006c). The species' distribution on the site can change over time in response to changes in habitat suitability and the location of seed sources offsite. From the early 1980s until the late 1990s, the Pitcher's thistle was found onsite in suitable habitat near the cooling towers. No Pitcher's thistle were found near the cooling towers during the NRC staff's site audit in July 2005. A survey on July 28, 2005, found no Pitcher's thistle in suitable habitat south or north of Palisades site; however, a population comprised of 113 individuals (9 mature plants and 104 first-year plants) were found in the beach grass stabilized dune community and flats located on the northern end of the site adjacent to Van Buren State Park (NMC 2006c).

On the basis of county distributions published in FWS (2005b), the Karner blue butterfly occurs in Allegan County and the Mitchell's satyr butterfly occurs in Kalamazoo and Van Buren

Counties. However, Czarnecki (FWS 2005c) stated that the Karner blue butterfly may occur near the Argenta-E. Elkhart transmission line in eastern Van Buren County, and the Mitchell's satyr butterfly may be found near the Palisades-Cook transmission line in Berrien County. It should be noted that neither the Argenta-E. Elkhart transmission line nor the portion of the Palisades-Cook transmission line in Berrien County were part of the original licensing of the plant and, therefore, are not considered in this SEIS. Neither species was observed during field surveys of the Palisades site and transmission line corridors conducted in 1979 (Asplundh 1979) and 1991 (Higman and Goff 1991; Goff 1992).

The Karner blue butterfly is dependent on its only known larval food plant, wild lupine (*Lupinus perennis*), grasses, and a variety of nectar plants (FWS 2005a). These plants and the butterfly's habitat occur in areas of sandy soil in oak and oak-pine savanna habitat, as well as other locations such as highway and transmission line rights-of-way, especially those surrounded by close-canopied oak forest (FWS 2005c; MNFI 2005b). The Mitchell's satyr butterfly is closely affiliated with wetlands that are dominated by sedges, especially *Carex stricta*, with scattered deciduous or coniferous trees such as tamarack and red cedar (*Juniperus virginiana*) (FWS 2005c; MNFI 2005b).

There is a possibility that the Indiana bat occurs within suitable habitat on or near the Palisades site or transmission lines associated with the plant (FWS 2005c). The summer range of this species includes the southern half of Michigan and most of the western coastal counties of the Lower Peninsula. Although the MNFI does not have records of occurrence in the three counties in the project area (MNFI 2005d), the FWS lists the Indiana bat as occurring in all three of the counties associated with the proposed action (FWS 2005b). Suitable habitat for the Indiana bat consists of riparian, bottomland, and upland forest habitats with trees that have crevices or exfoliating bark that can be used as roosting sites.

The eastern massasauga rattlesnake is known from Allegan, Kalamazoo, and Van Buren Counties and could occur on the Palisades site and within the rights-of-way of its associated transmission lines (FWS 2005b,c). Four records of eastern massasauga occur within 1 mi of the Palisades-Argenta transmission line within Van Buren County. Across the species' range, Michigan has the most recent recordings, and the State may represent the massasauga's last stronghold (MNFI 2005b). Recent sightings have been clustered in several portions of the Lower Peninsula, including Allegan and Kalamazoo Counties of the project area (MNFI 2005b). Eastern massasauga habitat includes a variety of wetland habitats, including bogs, fens, shrub swamps, wet meadows, marshes, moist grasslands, wet prairies, and floodplain forests (MNFI 2005b). In southern Michigan, populations are typically associated with open wetlands, particularly prairie fens. In the summer, snakes migrate from wetlands to drier, upland sites that include forest openings, old fields, agricultural lands, and prairies. Preferred sites have the following characteristics: (1) open, sunny areas intermixed with shaded areas, presumably for

thermoregulation; (2) a water table near the surface for hibernation; and (3) variable elevations between adjoining lowland and upland habitats (MNFI 2005b).

2.2.7 Radiological Impacts

NMC has conducted a radiological environmental monitoring program (REMP) around the Palisades site since 1971. Through this program, radiological impacts on workers, the public, and the environment are monitored, documented, and compared with the appropriate standards. The objectives of the REMP are the following:

- Identify and measure radiation and radioactivity in the plant environs for the calculation of potential dose to the population.
- Verify the effectiveness of in-plant measures used for controlling the release of radioactive materials.
- Provide reasonable assurance that the predicted doses, based on effluent data, have not been substantially underestimated and are consistent with applicable standards.
- Comply with regulatory requirements and plant technical specifications and provide records to document compliance.

Each year, radiological releases are summarized in the *Palisades Annual Radioactive Effluent Release and Waste Disposal Report* (e.g., NMC 2005b). The limits for all radiological releases are specified in the ODCM (NMC 2004a), and these limits are designed to meet Federal standards and requirements. The primary radiological standards applicable to Palisades are contained in 10 CFR Part 20, 40 CFR Part 190, and 10 CFR Part 50, Appendix I. Section 3.8.1.1 “Regulatory Requirements” of the GEIS (NRC 1996) also provides a summary and specific numerical dose limits associated with these standards and requirements. The REMP includes monitoring of the waterborne environment (groundwater, surface water, and sediments), ingestion pathways (milk, fish, and vegetation), direct radiation (gamma dose on thermoluminescent dosimeter locations), and atmospheric environment (airborne radioiodine, particulates, gross beta, and gamma). The results of the REMP are summarized in the *Palisades Annual Radiological Environmental Operating Reports* (e.g., NMC 2005c and 2006b). The REMP data indicate that the operation of Palisades has minimal impact on the environment, and most isotopic activity measured in the environmental media around Palisades is at environmental background levels (NMC 2006b).

NMC performs an annual assessment of radiation dose to the general public from radioactive effluents. Dose estimates are calculated on the basis of actual liquid and gaseous effluent release data. Calculations are performed by using the plant effluent release data, onsite meteorological data, and appropriate pathways identified in the ODCM (NMC 2004a).

The EPA's 40 CFR Part 190 is the most limiting generic requirement regarding allowable radiation dose to a member of the public. This regulation limits annual dose to a member of the public to 25 mrem total effective dose equivalent (TEDE) per year from the entire nuclear fuel cycle including power reactors. For the 5-year period 2000 through 2004, the annual TEDE calculated each year for the MEI by NMC was well within the annual limit of 25 mrem for members of the public as specified in the ODCM (TEDE is the sum total of the external dose and the sum of the weighted internal dose) (NMC 2001a, 2002, 2003a, 2004b, 2005b). Over this 5-year period, the maximum annual TEDE for the MEI was estimated to be 7.53×10^{-3} mrem with an annual average TEDE of 3.73×10^{-3} mrem (NMC 2001a, 2002, 2003a, 2004b, 2005b). These doses represent approximately 0.03 percent and 0.015 percent of the 25-mrem limit, respectively. In 2005, the TEDE for the MEI was calculated to be 7.36×10^{-3} mrem (NMC 2006a). The TEDE estimates include exposure from liquid and gaseous effluents and direct radiation. These results confirm that Palisades is operating in compliance with 10 CFR Part 50, Appendix I, 10 CFR Part 20, and 40 CFR Part 190.

A modification to the Liquid Radioactive Waste System was completed in December 2005, as discussed in Section 2.1.4.1. However, the TEDEs are still expected to remain much lower than the applicable standards.

2.2.8 Socioeconomic Factors

The NRC staff reviewed the NMC ER (NMC 2005a) and information obtained from county, city, school district, and local economic development staff. The following sections describe the housing market, community infrastructure, population, and economy in the region surrounding the Palisades site.

2.2.8.1 Housing

The majority of plant employees live in Van Buren County (44 percent) and in Berrien County (33 percent), and most of the remaining employees are located in Ottawa, Allegan, and Kalamazoo Counties (Table 2-3). Given the residential location of Palisades employees, the most significant impacts of plant operations are likely to occur in Van Buren and Berrien Counties. The analysis in this SEIS focuses on the impacts of Palisades operations in these two counties.

NMC refuels Palisades every 18 months. During refueling, approximately an additional 380 workers are employed for a 30- to 40-day period (NMC 2005a). The majority of these workers reside in the same communities as the permanent employees at the plant (NMC 2005b).

Table 2-3. Permanent Employee Residence Information for Palisades by County and City

County and City[a]	Number of Employees	Percent of Total
VAN BUREN COUNTY		
South Haven	156	30
Bangor	14	3
Grand Junction	13	2
Paw Paw	12	2
Hartford	8	2
Others	30	6
Total Van Buren County	233	44
BERRIEN COUNTY		
St. Joseph	73	14
Coloma	24	5
Benton Harbor	23	4
Stevensville	21	4
Watervliet	14	3
Others	17	3
Total Berrien County	172	33
Other counties	119	23
Grand total	524	100[b]

(a) Addresses are for both unincorporated (counties) and incorporated (cities and towns) areas.
(b) Total may not equal 100% because of rounding.
Source: NMC 2004c.

The number of housing units and housing vacancies in Van Buren and Berrien Counties are shown in Table 2-4. In Van Buren County, the total number of housing units grew at an annual rate of 0.7 percent over the period 1990 to 2000, while the number of occupied units grew at an average annual rate of 0.9 percent over the same period. With an annual average population growth rate of almost 1 percent during this period, there was a slight decline in the annual rate of growth in the number of vacant units. In Berrien County, total and occupied housing over the period 1990 to 2000 grew at an average annual rate of approximately 0.5 percent, exceeding the growth rate in population during this period, leading to a 1.5 percent annual growth in vacant housing units.

Table 2-4. Housing Units and Housing Units Vacant (Available) by County During 1990 and 2000

	1990	2000	Percentage Change 1990 to 2000
		VAN BUREN COUNTY	
Housing units	31530	33975	7.8
Occupied units	25402	27982	10.2
Vacant units	6128	5993	-2.2
		BERRIEN COUNTY	
Housing units	69532	73445	5.6
Occupied units	61025	63569	4.2
Vacant units	8507	9876	16.1

Source: U.S. Census Bureau 2000b.

2.2.8.2 Public Services

Water Supply

Water supplies in Van Buren and Berrien Counties come from both surface and groundwater sources, although surface water (especially Lake Michigan) is the main source (NMC 2005a). While Lake Michigan water meets the water quality standards set by the State, water from the lake is under localized threat of degradation from surface runoff, construction, and industrial activity.

Currently, Van Buren County has 28 water suppliers, although these suppliers currently only provide 28 percent of capacity and water supply (NMC 2005a). Residents in Van Buren County not served by municipal systems receive water from individual onsite wells or through wells accessed by small private providers. In Berrien County, 50 suppliers provide 57 percent of water supplies, with the majority of capacity and water supply in the county provided by municipal systems located in St. Joseph, Benton Harbor, Niles, and Lake Charter. Access to water by using individual onsite wells or through private supply systems is less important as a source of water supply in Berrien County. Table 2-5 shows the largest water supply systems in both counties.

According to estimates, excess water capacity in both Van Buren and Berrien Counties is high, and existing water suppliers would be able to satisfy new residential, commercial, and industrial demands (NMC 2005a).

Table 2-5. Major Public Water Supply Systems in Van Buren and Berrien Counties, 2004

Water System	Source	Average Daily Use (million gpd)	Maximum Capacity (million gpd)
VAN BUREN COUNTY			
South Haven	Surface water	1.7	4
Lawton	Groundwater	1.3	3.9
Mattawan	Groundwater	0.8	1.6
BERRIEN COUNTY			
Benton Harbor	Surface water	4.9	12
St. Joseph	Surface water	5.2	16
Niles	Groundwater	1.7	9.5
Lake Charter Township	Surface water	1.6	5
Buchanan	Groundwater	0.5	2.2

Source: NMC 2005a.

South Haven Municipal Water Authority provides potable water to Palisades at an average daily rate of 18,000 gpd (Section 2.2.2). Fire protection services for the plant are provided by the Covert Township Fire Department and the South Haven Fire Department.

Education

Palisades is located in the Covert Public School District, which has a current enrollment of 739 students (Standard and Poor's 2005). Fifty-four teachers are currently employed in the district (MEDC 2005), and current expenditures are $6222 per student (Standard and Poor's 2005). Enrollment has declined slightly in recent years, together with expenditures per student, while the number of teachers in the district has remained stable over the same period (MEDC 2005; Standard and Poor's 2005; greatschools.net 2005).

Including the Covert Public School District, there are 12 public school districts in Van Buren County, with a current total enrollment of 17,696 students (Standard and Poor's 2005). Average expenditure per student in the public school districts in the county is $5013, compared with $8653 for Michigan as a whole in 2002 (Standard and Poor's 2005). There were an additional six private schools in the county in 2004 with a total enrollment of 550 students (NCES 2005).

Berrien County has 15 public school districts, which had a total enrollment of 27,012 students in 2002. Average expenditure per student in the county was $4841. There are also

30 private/parochial schools with a current total enrollment of 4030 students, and two public school academies (Berrien County 2005).

Transportation

Access to Palisades is via Blue Star Memorial Highway, approximately 1 mi east of the plant. Blue Star Memorial Highway runs parallel to I-196 and US 31. Most employees traveling from Benton Harbor and St. Joseph from the south, and South Haven to the north use these roads.

Moderate increases in traffic have occurred on many of the roads in the vicinity of the plant; in particular, I-196, which has seen large increases in commercial traffic. Four segments of I-196 for which traffic counts are available, were assessed in the NMC ER (NMC 2005a). These segments are located both north and south of the plant. Traffic conditions on this stretch of roadway vary between medium density, stable flow, to high-capacity traffic where congestion is likely. Blue Star Memorial Highway also experiences relatively high daily traffic flow (NMC 2005a).

2.2.8.3 Offsite Land Use

Land use in Van Buren County (623 mi^2) is primarily agricultural (47 percent of total land area) and residential (44 percent), with a smaller land area occupied by industrial (2 percent) and commercial (2 percent) land uses (Table 2-6). Berrien County (583 mi^2) is also rural in character, with approximately 84 percent of the land area used for agriculture or classified as unused. About 9 percent of county land is residential and 3 percent is devoted to manufacturing, commercial, and sand and gravel mining activities (NMC 2003b). Fruit production, particularly berries, apples, and cherries, and food processing are an important part of the agricultural economy in both counties. Tourism also provides a significant source of

Table 2-6. Land Use in Van Buren County, 2005[(a)]

Land Use	Percent of Total
Residential	44
Commercial	2
Industrial	2
Agriculture	47
Other	5
Total	5

(a) Interview with K. Getman and M. Thomas, Michigan Economic Development Corporation (July 2005).

employment and income in both counties. The Lake Michigan lakefront, parks, and recreational areas are strong attractions for summer and fall visitors and seasonal residents, even though less than 4 percent of the land is devoted to public and semipublic uses in both counties.

Although Van Buren County's population has grown relatively slowly over the past 30 years, it has experienced moderate residential, industrial, and commercial growth during that period. Residential development has moved away from the urban cores, notably the Kalamazoo area (NMC 2005a), and through the development of lakefront locations for summer and retirement homes, notably in the South Haven area. As a result of these developments, both the Lake Michigan lakefront and prime farmland in the county are confronting growth pressure. In an attempt to manage new development, the county has developed an overall land-use decision-making strategy that encourages the implementation of a "smart growth" methodology by municipalities within the county. To conform with the strategy, each municipality has attempted to create development and planning tools that are compatible with local infrastructure, encourage clustering of new mixed use developments to foster the preservation of open space, farmland, natural beauty, and critical environmental areas.[(a)]

2.2.8.4 Visual Aesthetics and Noise

Palisades is located on the southeastern shoreline of Lake Michigan. The Lake Michigan shoreline in Van Buren County serves as a strong draw to summer tourists and seasonal residents who enjoy the recreational and environmental attractions of the area.

The Palisades site covers 432 ac of beach and high-wooded sand dunes. Plant buildings include a rectangular turbine building (94 ft high); a cylindrical, domed-top reactor containment building (92 ft high); a rectangular auxiliary building (108 ft high); and two cooling towers (65 ft high). All of the plant's structures and the reactor dome are equal to or below the height of the surrounding sand dunes. While the plant is readily visible from Lake Michigan and the shoreline, the distance from the north and south property lines, and the property's dominating sand dunes and trees obscure buildings from view of adjacent properties and I-196. The transmission lines can be seen from both the interstate highway and Blue Star Memorial Highway.

Noise measurements are not available for the Palisades site. However, noise generated by Palisades operations is mitigated at the site boundary because the plant is located approximately 2500 ft from the northern and southern boundaries of the site and is surrounded by sand dunes and vegetation, and most equipment is located within the plant buildings. In

(a) Interview with K. Getman and M. Thomas, Michigan Economic Development Corporation (July 2005).

addition, I-196 encloses the eastern portion of the site and reduces the conspicuousness of any noise generated by Palisades operations.

2.2.8.5 Demography

In 2000, 118,667 people were living within 20-mi of Palisades, for a density of 238 persons/mi^2. This density translates to Category 4 (least sparse), using the GEIS measure of sparseness (NMC 2005a). At the same time, there were 1,287,558 persons living within 50 mi of the plant, for a density of 283 persons/mi^2. The NRC sparseness and proximity matrix assigns a Category 4 rating (high density) for this measure as well. There are currently no mandatory growth controls that would limit housing development in this area (NMC 2005a).

Table 2-7 shows population trends for the two counties where the majority of Palisades employees live. Annual average growth rates in Van Buren County show moderate growth during the 1970s, followed by slight increases during the 1980s and 1990s. The annual average growth rate in Michigan over this period was 0.4 percent.

Growth is forecasted to continue at moderate levels over the period 2000 to 2020. In Berrien County, relatively slow growth in population in the 1970s was followed by declining population in the 1980s and slight increases in the 1990s. Population is forecasted to decline in both decades between 2000 and 2020.

Table 2-7. Population Growth in Van Buren and Berrien Counties, 1970 to 2020

	Van Buren County		Berrien County	
Year	**Population**	**Annual Growth Percent[(a)]**	**Population**	**Annual Growth Percent**
1970	56,173	–[(b)]	163,875	–
1980	66,814	1.7	171,276	0.5
1990	70,060	0.5	161,378	-0.6
2000	76,263	0.9	162,453	0.1
2010	87,100	1.3	160,800	-0.1
2020	95,800	1.0	158,900	-0.1

(a) Annual percent growth rate is calculated over the previous decade.
(b) – indicates no data available.
Sources: NMC 2005a; U.S. Census Bureau 2000a.

Transient Population

The transient population in the vicinity of Palisades consists primarily of tourists visiting South Haven, St. Joseph, Benton Harbor, and various recreational facilities (NMC 2005a). It is estimated that peak visitation levels reach almost 10,000 associated with campgrounds and beaches in the area (NMC 2005a). People visiting summer homes and attendance at local colleges in the area also represent a substantial source of transient population in the area.

Migrant Farm Labor

Seasonal and migrant workers are employed during the summer and fall months in many of the counties in the area surrounding the plant. In 2002, there were 4696 hired farm workers in Berrien County and 7527 in Van Buren County (USDA 2002). Of these workers, 3677 (78%) in Berrien County and 6733 (89%) in Van Buren County were temporary, having worked less than 150 days in the year.

2.2.8.6 Economy

Employment and Income

Total employment in Van Buren County was 23,982 in 2002 (U.S. Census Bureau 2000b; USDA 2002). Agriculture is the most important sector in Van Buren County, with 7537 people employed (31% of the total employed; the county is one of the most important in the state in the production of fruit and vegetables (NMC 2005a)). Service industries are also an important part of the economy of the county, with 28 percent of total employment (6635 people). The largest employer in the county is Consumers Energy, with 484 employees (Table 2-8). Manufacturing also plays an important part in the local economy, with 21 percent of local employment (4934 people); a number of manufacturing firms have a large local labor force, including Double J Moulding and Pullman Industries. Wholesale and retail trade employs 12 percent (2974 people) of the county workforce.

Of the 65,340 employed in Van Buren County in 2002, almost 45 percent of employment (29,214 people) is in the various service sectors (U.S. Census Bureau 2000b). Manufacturing has a relatively small share of county employment (22 percent), with 14,435 people employed.

Wholesale and retail trade has more than 15 percent of the county workforce, with 9836 people.

Personal income in Berrien County was $2.0 billion in 2002 (in 2004 dollars), with a per capita income of $25,514 (2004 dollars) (DOC 2002). In Berrien County, total personal income was $4.7 billion, with a per capita income of $29,081.

Table 2-8. Major Employment Facilities Within 10 mi of Palisades

Firm	Number of Employees
Consumers Energy	484
Double J Moulding	240
Pullman Industries	240
Wal-Mart	230
South Haven Community Hospital	160
De Grandchamp Blueberry Farms	154
Wyckoff Chemical	140
South Haven Public Schools	126
Bangor Industries	110

Source: MEDC 2005.

Unemployment

Unemployment in Van Buren County was moderately high at 7.2 percent in December 2004. The rate for Michigan as a whole for the same month was 7.1 percent. In Berrien County, the rate for December 2004 was lower, at 4.2 percent (DOL 2004).

Taxes

Palisades pays property taxes to Covert School District, Covert Township, Van Buren Intermediate School District, Van Buren County, the District Library, South Haven Community Hospital District, and Lake Michigan College, and it contributes to the Michigan State Education fund. Because Palisades is located in Covert Township, the township collects sufficient tax revenues from the plant to cover local expenditures and forwards the balance to the other jurisdictions. Revenues are used to fund local and county emergency management programs, public safety, local public schools, local government operations, local road maintenance, and the local library system.

The plant is a significant source of tax revenue for local and county government. In 2004, 56 percent (about $1 million in 2004 dollars) of tax revenues raised by Covert Township came from Palisades property taxes, and 29 percent ($2.7 million) of revenues raised by Covert School District came from the plant (Table 2-9). Roughly 4 percent (about $0.8 million in 2004 dollars) of Van Buren County tax revenues in 2004 came from Palisades.

Table 2-9. Contribution of Palisades to County Property Tax Revenues

Year	Total Covert School District Property Tax Revenues (millions $ 2004)	Property Tax Paid to Covert School District for Palisades (millions $ 2004)	Percent of Total Property Taxes
	COVERT SCHOOL DISTRICT		
2002	7.4	2.8	37
2003	8.7	2.7	31
2004	9.2	2.7	29
Year	**Total Covert Township Property Tax Revenues (millions $ 2004)**	**Property Tax Paid to Covert Township for Palisades (millions $ 2004)**	**Percent of Total Property Taxes**
	COVERT TOWNSHIP		
2002	1.6	0.9	58
2003	1.5	0.9	60
2004	1.6	0.9	56
Year	**Total Van Buren County Property Tax Revenues (millions $ 2004)**	**Property Tax Paid to Van Buren County for Palisades (millions $ 2004)**	**Percent of Total Property Taxes**
	VAN BUREN COUNTY		
2002	17.6	0.9	5
2003	18.7	0.9	5
2004	19.7	0.8	4
Year	**Total Van Buren Intermediate School District Property Tax Revenues (millions $ 2004)**	**Property Tax Paid to Van Buren Intermediate School District for Palisades (millions $ 2004)**	**Percent of Total Property Taxes**
	VAN BUREN INTERMEDIATE SCHOOL DISTRICT		
2002	26.3	0.9	3
2003	26.9	0.8	3
2004	28.4	0.8	3

Source: VerBermones 2005.

Utility restructuring legislation has been in place in Michigan since 2000. However, the long-term impact of the restructuring of the electric power industry in the State and its impact on Palisades are not yet known. Any changes in assessed valuation of plant property and equipment that may potentially occur could affect property tax payments to the township, county, and local school districts. However, any impacts on tax revenues as a result of restructuring would not occur as a direct result of license renewal.

2.2.9 Historic and Archaeological Resources

This section discusses the cultural background and the known historic and archaeological resources at the Palisades site and in the surrounding area.

2.2.9.1 Cultural Background

Evidence of human occupation within the region is found in archaeological sites dated according to the following chronological sequence that reflects cultural change through time: Paleo-Indian Period (10000 BC to 8000 BC); Archaic Period (8000 BC to 1000 BC); Woodland Period (1000 BC to AD 1050); and Upper Mississippian Period (1050 to 1600). The Paleo-Indian Period marks the beginning of human occupation within the region. These were highly mobile bands of hunters and gatherers, with a heavy reliance on late Pleistocene animals for food, clothing, and shelter. Archaeological sites tend to be found in upland areas along ancient lakebeds and may consist of a single projectile point or other stone tool of a style characteristic of the period (Mason 1981).

During the Archaic Period, human populations adapted to the postglacial environment by adopting a more sedentary way of life based upon hunting, fishing, and gathering, and a heavy dependence upon waterways for travel, transport, and settlement (Funk 1978; Quimby 1960). Archaeological sites from this period are larger, more numerous, and richer in occupation debris than previous periods, reflecting larger, denser populations and a more abundant and reliable subsistence base. New types of raw material were used for tool production as the techniques of pecking, grinding, and polishing stone gained importance (Mason 1981).

In the Woodland Period, earthenware pottery appears in archaeological sites. Burials are characteristically earthen mounds and contain an abundance of grave offerings. The beginnings of undisputed plant domestication and agriculture also mark this period (Mason 1981). Widespread exchange networks existed and there is evidence of a dramatic increase in the frequency and scale of warfare (Fitting 1978; Mason 1981). The Upper Mississippian Period in southwestern Michigan is characterized by mostly Late Woodland cultural traits with the addition of shell- and grit-tempered cord-marked and plain ceramics (Brose 1978).

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The historic period begins in the late 1600s with the arrival of French explorers, missionaries, and fur traders. Fort Miami (in present-day St. Joseph) and Fort St. Joseph (in present-day Niles) were the first European settlements in the area. Native American groups that inhabited the area during the historic period were predominantly the Potawatomi, Mascouten, Miami, and Ottawa. During the early historic period, their villages were situated on the edge of forested land, adjacent to prairies and convenient to streams and the lakeside; temporary winter camps were established in sheltered areas. By the beginning of the nineteenth century, the Potawatomi had established 11 known villages in southern Michigan. Most were near the shorelines of Lake Michigan and Lake Erie, generally along the streams that flow into their waters (Clifton 1978; Goddard 1978; Callender 1978; Feest and Feest 1978).

After 1783, the official beginning of the American period, Indian lands were rapidly absorbed by expanding American settlements; by 1821, most of these lands were ceded by treaty or purchase (Feest and Feest 1978). In the 1830s, lumbering was an important regional industry and drew many settlers (Brennan 2004). One of the earliest settlements in the Palisades area was Paulville, a logging town established in 1857, and several logging operations were established in the area between 1866 and 1880. While the 1840s and 1850s was a period of agricultural settlement of much of southern lower Michigan (Great Lakes Research 2000), the dune formations present at the Palisades site rendered this area unsuitable for agriculture. As late as 1927, only six structures were located in the Palisades vicinity and they were south of the site along Brandywine Creek (Weir et al.1980).

Five historic properties within Van Buren County are listed on the National Register of Historic Places (NRHP; NPS 2005a); there are no National Historic Landmarks listed for the county (NPS 2005b). Properties listed on the NRHP that are closest to the Palisades site (Liberty Hyde Bailey Birthplace in South Haven and the Navigation Structures at South Haven Harbor) are located approximately 6 mi to the north. In addition, one property in Allegan County (the James Noble Sherwood House in Plainwell) is located approximately 0.5 mi from the Palisades-Argenta transmission line right-of-way (NPS 2005a). The Michigan State Historic Preservation Office's (SHPO's) inventory of historic properties for Van Buren County lists 29 properties. Those nearest the Palisades site are Ward School, Hartman School, and Haven Peaches Informational Designation, all in South Haven, and the First Congregational Church in Covert (State of Michigan 2005).

The Southwest Michigan Underwater Preserve stretches along the Lake Michigan shoreline from just north of Holland to just north of the Indiana border, including the 1-mi stretch of the lakeshore that lies within the Palisades site boundaries. Seventeen sites are documented in and near the preserve that include shipwrecks, geologic features, and historic structures: most lie offshore from South Haven. The closest to the Palisades site is the shipwreck site of the *City of Greenbay*, which sank in 1887. It lies at a depth of 10 ft (Michigan Underwater Preserve Council 2004), approximately 0.5 mi north of the Palisades site.

At least seven previous archaeological surveys came within 1 mi of the Palisades site and transmission line rights-of-way. These surveys resulted in the recordation of 15 archaeological sites within 1 mi of the Palisades site and transmission line rights-of-way. These 15 sites consist of prehistoric lithic scatters and camp sites, one dating to the Archaic Period; isolated prehistoric artifacts, including two Paleo-Indian Period fluted points; one prehistoric village site, Pell Village; two prehistoric sites of undetermined function; and one historic trading post site. One of the prehistoric sites of unknown type, 20-VA-28, is located about 0.3 mi south of the Palisades site and the other, 20-VA-4, is recorded just outside the Palisades site's eastern boundary (Weir et al. 1980).

2.2.9.2 Historic and Archaeological Resources at the Palisades Site

The Palisades site encompasses approximately 432 ac of land, including about 1 mi of Lake Michigan shoreline. The site consists primarily of sand dunes, mostly forested, that extend from the shoreline inland approximately 1 mi. Approximately 80 ac of the site are developed or maintained. The developed or maintained areas include power production and support facilities, roads, and related infrastructure. Most of these facilities are located along the main and north access roads. Also within this area are the power corridor from the main station transformer to the Palisades Substation and transmission rights-of-way from the substation extending offsite. Service and circulating water are withdrawn from Lake Michigan via pipeline from a submerged intake crib structure located 3300 ft offshore (NMC 2005a; Consumers Energy 2005b). In addition to the land disturbance caused by these developments, more than 4 ac of additional land in the northern portion of the Palisades site have been disturbed by former use of the land for sand quarrying operations. Intact archaeological sites could be present within the remaining undeveloped areas as well as in soils below the depth of ground disturbance in most areas of the site. As discussed in Section 2.2.9.1, Native American villages are known to have been situated within physiographic settings similar to portions of the Palisades site: on the shorelines of Lake Michigan and on the edge of forested land, adjacent to prairies and convenient to streams and the lakeside.

A file search conducted on July 27, 2005, at the Michigan SHPO indicates that one cultural resources assessment (Weir et al. 1980) was undertaken at the Palisades site but that no archaeological field surveys have been conducted either at the Palisades site or for original transmission line construction or maintenance. The cultural resource assessment, which was undertaken in 1979, concluded that without accurate knowledge of the cultural resources present at the Palisades site, it must be assumed that power plant construction has the potential to adversely impact significant resources that may exist on the plant site. The report recommends that an intensive survey be undertaken of the undisturbed portions of the site.

In addition to the assessment report on file at the Michigan SHPO, Consumers Energy files contain a second report that documents a brief cultural resource field visit to the Palisades site

by archaeologists in 1982. The purpose of the field visit was to determine the likelihood of the existence of archaeological sites at the locations of three proposed facilities: a drainage pond, a parking lot, and a warehouse (CAI 1982). The report concluded that the likelihood of encountering archaeological sites at the three locations was minimal because of the generally steep terrain and distance from the Lake Michigan shore.

Agency consultation undertaken by the U.S. Atomic Energy Commission (AEC) in 1972 for issuance of an OL for Palisades operation generated comment letters from the U.S. Department of the Interior and from the Michigan State Liaison Officer for Historic Preservation (AEC 1972). The Department of the Interior letter states that it does not appear that the existing plant should directly affect any site eligible for registration as a National Historic Landmark (DOI 1972). The Michigan State Liaison Officer's letter concludes that as far as could be determined at that time, Palisades would not adversely affect known historical or archaeological resources of the State of Michigan (MDNR 1972).

Consumers Energy and NMC corresponded with the Michigan SHPO in early 2005 regarding the current license permit renewal application (Consumers Energy and NMC 2005). The Consumers Energy and NMC letter to the SHPO states that NMC, Consumers, and the Palisades Environmental Review Team conclude the operation of Palisades through the license renewal term will not have an adverse effect on any historic or cultural property in the region and, therefore, a survey of the project area is not necessary. Their conclusion was based upon the small extent of potential land-disturbing activities, the absence of known historic properties in the vicinity of Palisades, and the existence of adequate environmental controls to ensure protection of cultural resources. A response letter from the SHPO dated March 14, 2005, concurred with these conclusions (Michigan SHPO 2005). The NRC staff forwarded a copy of the draft SEIS to the Michigan SHPO for review and comment. In a letter dated June 19, 2006, the Michigan SHPO stated that no historic properties are affected in the project area (Michigan SHPO 2006).

Correspondence between the Michigan SHPO and the NRC, dated June 30, 2005, and June 19, 2006, are provided in Appendix E.

Government-to-government consultation with appropriate Federally recognized Native American Tribes has been initiated. Copies of the consultation letters are provided in Appendix E. To date, no known sites of significance to Native Americans have been identified at Palisades.

2.2.10 Related Federal Project Activities and Consultations

The NRC staff reviewed the possibility that activities of other Federal agencies might impact the renewal of the OL for Palisades. Any such activities could result in cumulative environmental impacts and the possible need for the Federal agency to become a cooperating agency for preparation of the SEIS.

The NRC staff has determined that there are no Federal project activities that would make it desirable for another Federal agency to become a cooperating agency for preparing this SEIS. There are no known Federal facilities or land or Native American land within 50 mi of Palisades. The D.C. Cook Nuclear Plant, owned by the Indiana and Michigan Power Company, is located approximately 28 mi south-southwest of Palisades.

The NRC is required under Section 102(c) of the National Environmental Policy Act of 1969 as amended (NEPA) to consult with and obtain the comments of any Federal agency that has jurisdiction by law or special expertise with respect to any environmental impact involved. The NRC consulted with the FWS; the consultation is described in Sections 2.2.6 and 4.6, and correspondence is included in Appendix E.

2.3 References

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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 61. *Code of Federal Regulations*, Title 10, *Energy*, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste."

10 CFR Part 71. *Code of Federal Regulations*, Title 10, *Energy*, Part 71, "Packaging and Transportation of Radioactive Material."

40 CFR Part 81. *Code of Federal Regulations*, Title 40, *Energy*, Part 81, "Designation of Areas for Air Quality Planning Purposes."

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3.0 Environmental Impacts of Refurbishment

Environmental issues associated with refurbishment activities 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 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 in this Supplemental Environmental Impact Statement (SEIS) 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.

License renewal actions may require refurbishment activities for the extended plant life. These actions may have an impact on the environment that requires evaluation, depending on the type of action and the plant-specific design. Environmental issues associated with refurbishment that were determined to be Category 1 issues are listed in Table 3-1.

Environmental issues related to refurbishment considered in the GEIS for which these conclusions could not be reached for all plants, or for specific classes of plants, are Category 2 issues. These are listed in Table 3-2.

(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.

Table 3-1. Category 1 Issues for Refurbishment Evaluation

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
SURFACE-WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)	
Impacts of refurbishment on surface-water quality	3.4.1
Impacts of refurbishment on surface-water use	3.4.1
AQUATIC ECOLOGY (FOR ALL PLANTS)	
Refurbishment	3.5
GROUNDWATER USE AND QUALITY	
Impacts of refurbishment on groundwater use and quality	3.4.2
LAND USE	
Onsite land use	3.2
HUMAN HEALTH	
Radiation exposures to the public during refurbishment	3.8.1
Occupational radiation exposures during refurbishment	3.8.2
SOCIOECONOMICS	
Public services: public safety, social services, and tourism and recreation	3.7.4; 3.7.4.3; 3.7.4.4; 3.7.4.6
Aesthetic impacts (refurbishment)	3.7.8

Category 1 and Category 2 issues related to refurbishment that are not applicable to the Palisades Nuclear Plant (Palisades) because they are related to plant design features or site characteristics not found at Palisades are listed in Appendix F.

The potential environmental impacts of refurbishment actions would be identified, and the analysis would be summarized within this section, if such actions were planned. Nuclear Management Company, LLC (NMC), indicated that it has performed an evaluation of structures and components pursuant to Section 54.21 of Title 10 of the *Code of Federal Regulations* (10 CFR 54.21) to identify activities that are necessary to continue operation of Palisades during the requested 20-year period of extended operation. These activities include replacement of certain components as well as new inspection activities and are described in the Environmental Report (ER) (NMC 2005).

Table 3-2. Category 2 Issues for Refurbishment Evaluation

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53 (c)(3)(ii) Subparagraph
TERRESTRIAL RESOURCES		
Refurbishment impacts	3.6	E
THREATENED OR ENDANGERED SPECIES (FOR ALL PLANTS)		
Threatened or endangered species	3.9	E
AIR QUALITY		
Air quality during refurbishment (nonattainment and maintenance areas)	3.3	F
SOCIOECONOMICS		
Housing impacts	3.7.2	I
Public services: public utilities	3.7.4.5	I
Public services: education (refurbishment)	3.7.4.1	I
Offsite land use (refurbishment)	3.7.5	I
Public services, transportation	3.7.4.2	J
Historic and archaeological resources	3.7.7	K
ENVIRONMENTAL JUSTICE		
Environmental justice	Not addressed[(a)]	Not addressed[(a)]

(a) Guidance related to environmental justice was not in place at the time the GEIS and the associated revision to 10 CFR Part 51 were prepared. If an applicant plans to undertake refurbishment activities for license renewal, environmental justice must be addressed in the applicant's environmental report and the U.S. Nuclear Regulatory Commission staff's environmental impact statement.

However, NMC stated that the replacement of these components and the additional inspection activities are within the bounds of normal plant component replacement and inspections; therefore, they are not expected to affect the environment outside the bounds of plant operations as evaluated in the Final Environmental Statement for Palisades (AEC 1972). In addition, NMC's evaluation of structures and components as required by 10 CFR 54.21 did not identify any major plant refurbishment activities or modifications necessary to support the continued operation of Palisades beyond the end of the existing operating license. Therefore, refurbishment is not considered in this SEIS.

3.1 References

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

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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, Vol. 1, Addendum 1, Washington, D.C.

4.0 Environmental Impacts of Operation

Environmental issues associated with operation of a nuclear power plant during the renewal term 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 off-site 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 addresses the issues related to operation during the renewal term that are listed in Table B-1 of Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51), Subpart A, Appendix B, and are applicable to the Palisades Nuclear Plant (Palisades). Section 4.1 addresses issues applicable to the Palisades cooling system. Section 4.2 addresses issues related to transmission lines and onsite land use. Section 4.3 addresses the radiological impacts of normal operation, and Section 4.4 addresses issues related to the socioeconomic impacts of normal operation during the renewal term. Section 4.5 addresses issues related to groundwater use and quality, while Section 4.6 discusses the impacts of renewal-term operations on threatened and endangered species. Section 4.7 addresses

(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.

potential new information that was raised during the scoping period, and Section 4.8 discusses cumulative impacts. The results of the evaluation of environmental issues related to operation during the renewal term are summarized in Section 4.9. Finally, Section 4.10 lists the references for Chapter 4. Category 1 and Category 2 issues that are not applicable to Palisades because they are related to plant design features or site characteristics not found at Palisades are listed in Appendix F.

4.1 Cooling System

Category 1 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B that are applicable to the Palisades cooling system operation during the renewal term are listed in Table 4-1. Nuclear Management Company, LLC (NMC), stated in its Environmental Report (ER) (NMC 2005a) that it is not aware of any new and significant information associated with the license renewal and continued operation of Palisades. The U.S. Nuclear Regulatory Commission (NRC) staff has not identified any new and significant information during its independent review of the NMC ER (NMC 2005a), the site visit, the scoping process, the evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS. For all of the issues, the NRC 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.

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

- Altered current patterns at intake and discharge structures. Based on information in the GEIS, the Commission found that

  > Altered current patterns have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of altered current patterns at intake and discharge structures during the renewal term beyond those discussed in the GEIS.

Table 4-1. Category 1 Issues Applicable to the Operation of the Palisades Cooling System During the Renewal Term

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
SURFACE-WATER QUALITY, HYDROLOGY, AND USE	
Altered current patterns at intake and discharge structures	4.2.1.2.1
Altered thermal stratification of lakes	4.2.1.2.2
Temperature effects on sediment transport capacity	4.2.1.2.3
Scouring caused by discharged cooling water	4.2.1.2.3
Eutrophication	4.2.1.2.3
Discharge of chlorine or other biocides	4.2.1.2.4
Discharge of sanitary wastes and minor chemical spills	4.2.1.2.4
Discharge of other metals in wastewater	4.2.1.2.4
AQUATIC ECOLOGY	
Accumulation of contaminants in sediments or biota	4.2.1.2.4
Entrainment of phytoplankton and zooplankton	4.2.2.1.1
Cold shock	4.2.2.1.5
Thermal plume barrier to migrating fish	4.2.2.1.6
Distribution of aquatic organisms	4.2.2.1.6
Premature emergence of aquatic insects	4.2.2.1.7
Gas supersaturation (gas bubble disease)	4.2.2.1.8
Low dissolved oxygen in the discharge	4.2.2.1.9
Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	4.2.2.1.10
Stimulation of nuisance organisms	4.2.2.1.11
AQUATIC ECOLOGY (PLANTS WITH COOLING-TOWER-BASED HEAT DISSIPATION SYSTEMS)	
Entrainment of fish and shellfish in early life stages	4.3.3
Impingement of fish and shellfish	4.3.3
Heat shock	4.3.3
TERRESTRIAL RESOURCES	
Cooling-tower impacts on crops and ornamental vegetation	4.3.4
Cooling-tower impacts on native plants	4.3.5.1
Bird collisions with cooling towers	4.3.5.2
HUMAN HEALTH	
Microbiological organisms (occupational health)	4.3.6
Noise	4.3.7

- Altered thermal stratification of lakes. Based on information in the GEIS, the Commission found that

  > Generally, lake stratification has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, the review of monitoring programs, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of altered thermal stratification of lakes during the renewal term beyond those discussed in the GEIS.

- Temperature effects on sediment transport capacity. Based on information in the GEIS, the Commission found that

  > These effects have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of temperature effects on sediment transport capacity during the renewal term beyond those discussed in the GEIS.

- Scouring caused by discharged cooling water. Based on information in the GEIS, the Commission found that

  > Scouring has not been found to be a problem at most operating nuclear power plants and has caused only localized effects at a few plants. It is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, the review of monitoring programs, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of scouring caused by discharged cooling water during the renewal term beyond those discussed in the GEIS.

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

  > Eutrophication has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, the review of monitoring programs, and its evaluation of other available information (including plant monitoring data and technical reports) and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of eutrophication during the renewal term beyond those discussed in the GEIS.

- Discharge of chlorine or other biocides. Based on information in the GEIS, the Commission found that

  > Effects are not a concern among regulatory and resource agencies, and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information (including the National Pollutant Discharge Elimination System (NPDES) permit for Palisades and discussion with the Michigan Department of Environmental Quality (MDEQ) compliance office) and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of discharge of chlorine or other biocides during the renewal term beyond those discussed in the GEIS.

- Discharge of sanitary wastes and minor chemical spills. Based on information in the GEIS, the Commission found that

  > Effects are readily controlled through the NPDES permit, and periodic modifications, if needed, and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information (including the NPDES permit for Palisades and discussion with the MDEQ compliance office) and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of discharges of sanitary wastes and minor chemical spills during the renewal term beyond those discussed in the GEIS.

- Discharge of other metals in wastewater. Based on information in the GEIS, the Commission found that

  > These discharges have not been found to be a problem at operating nuclear power plants with cooling-tower-based heat dissipation systems and have been satisfactorily mitigated at other plants. They are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information (including the NPDES permit for Palisades and discussion with the MDEQ compliance office) and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of discharges of other metals in wastewater during the renewal term beyond those discussed in the GEIS.

- Accumulation of contaminants in sediments or biota. Based on information in the GEIS, the Commission found that

  > Accumulation of contaminants has been a concern at a few nuclear power plants but has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of another metal. It is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of accumulation of contaminants in sediments or biota during the renewal term beyond those discussed in the GEIS.

- Entrainment of phytoplankton and zooplankton. Based on information in the GEIS, the Commission found that

  > Entrainment of phytoplankton and zooplankton has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, the review of monitoring programs, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of entrainment of phytoplankton and zooplankton during the renewal term beyond those discussed in the GEIS.

- Cold shock. Based on information in the GEIS, the Commission found that

  > Cold shock has been satisfactorily mitigated at operating nuclear plants with once-through cooling systems, has not endangered fish populations or been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds, and is not expected to be a problem during the license renewal term.

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

- Thermal plume barrier to migrating fish. Based on information in the GEIS, the Commission found that

  > Thermal plumes have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of thermal plume barriers on migrating fish during the renewal term beyond those discussed in the GEIS.

- Distribution of aquatic organisms. Based on information in the GEIS, the Commission found that

  > Thermal discharge may have localized effects but is not expected to affect the larger geographical distribution of aquatic organisms.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, the review of monitoring programs, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts on distribution of aquatic organisms during the renewal term beyond those discussed in the GEIS.

- Premature emergence of aquatic insects. Based on information in the GEIS, the Commission found that

  > Premature emergence has been found to be a localized effect at some operating nuclear power plants but has not been a problem and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of premature emergence of aquatic insects during the renewal term beyond those discussed in the GEIS.

- Gas supersaturation (gas bubble disease). Based on information in the GEIS, the Commission found that

  > Gas supersaturation was a concern at a small number of operating nuclear power plants with once-through cooling systems but has been satisfactorily mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

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

- Low dissolved oxygen in the discharge. Based on information in the GEIS, the Commission found that

  > Low dissolved oxygen has been a concern at one nuclear power plant with a once-through cooling system but has been effectively mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, the review of monitoring programs, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of low dissolved oxygen during the renewal term beyond those discussed in the GEIS.

- Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses. Based on information in the GEIS, the Commission found that

  > These types of losses have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of losses from predation, parasitism, and disease among organisms exposed to sublethal stresses during the renewal term beyond those discussed in the GEIS.

- Stimulation of nuisance organisms. Based on information in the GEIS, the Commission found that

  > Stimulation of nuisance organisms has been satisfactorily mitigated at the single nuclear power plant with a once-through cooling system where previously it was a problem. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of stimulation of nuisance organisms during the renewal term beyond those discussed in the GEIS.

- Entrainment of fish and shellfish in early life stages (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found that

  > Entrainment of fish has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of entrainment of fish and shellfish in early life

stages for cooling-tower-based systems during the renewal term beyond those discussed in the GEIS.

- Impingement of fish and shellfish (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found that

  > The impingement has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of impingement of fish and shellfish for cooling-tower-based systems during the renewal term beyond those discussed in the GEIS.

- Heat shock (cooling-tower-based heat dissipation). Based on information in the GEIS, the Commission found that

  > Heat shock has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of heat shock for cooling-tower-based systems during the renewal term beyond those discussed in the GEIS.

- Cooling-tower impacts on crops and ornamental vegetation. Based on information in the GEIS, the Commission found that

  > Impacts from salt drift, icing, fogging, or increased humidity associated with cooling-tower operation have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no cooling-tower impacts on crops and ornamental vegetation during the renewal term beyond those discussed in the GEIS.

- Cooling-tower impacts on native plants. Based on information in the GEIS, the Commission found that

  > Impacts from salt drift, icing, fogging, or increased humidity associated with cooling-tower operation have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no cooling-tower impacts on native vegetation during the renewal term beyond those discussed in the GEIS.

- Bird collisions with cooling towers. Based on information in the GEIS, the Commission found that

  > These collisions have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of bird collisions with cooling towers during the renewal term beyond those discussed in the GEIS.

- Microbiological organisms (occupational health). Based on information in the GEIS, the Commission found that

  > Occupational health impacts are expected to be controlled by continued application of accepted industrial hygiene practices to minimize worker exposures.

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

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

  > Noise has not been found to be a problem at operating plants and is not expected to be a problem at any plant during the license renewal term.

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

No Category 2 issues related to cooling system operation during the renewal term are applicable to Palisades.

4.2 Transmission Lines

The Final Environmental Statement (FES) for Palisades (AEC 1972) describes two transmission lines that connect Palisades with the transmission system. The transmission lines, as well as their ownership and responsibilities for their maintenance, are described in Section 2.1.7 of this Supplemental Environmental Impact Statement (SEIS). The 0.6-mi-long Palisades-Cook 345-kV transmission line connects to the American Electric Power (AEP) system, while the 40-mi-long Palisades-Argenta 345-kV transmission line connects to the Michigan Electric Transmission Company, LLC (METC), system and the Michigan Power Pool (NMC 2005a).

The Palisades-Cook transmission line is situated on land similar to that of the Palisades site. Its construction involved the clearing of a 150-ft-wide right-of-way totaling 10.9 ac over sand dunes (AEC 1972). The Palisades-Argenta transmission line right-of-way is 1320 ft wide for the first 4.5 mi, 350 ft wide for the next 34 mi, and 471 ft wide for the final 1.5 mi, totaling 2250 ac. This line crosses mostly flat to gently rolling terrain used primarily for agriculture (AEC 1972).

Vegetation control along Palisades transmission lines is accomplished through the use of herbicides, mowing, and cutting, or pruning of tall-growing tree species that are considered danger trees. Danger trees are typically outside the cleared right-of-way but could cause a line outage from windfall of healthy or diseased trees. Procedures are in place to ensure that vegetation management along rights-of-way is carried out in a manner to protect local water bodies and aquatic organisms that could be adversely impacted from herbicide application in the immediate vicinity of stream and river crossings. Herbicides that are used comply with Federal and State regulations and are applied by licensed applicators.

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1 that are applicable to Palisades transmission lines are listed in Table 4-2. NMC stated in its ER that it is not aware of any new and significant information associated with the renewal of the Palisades operating

license (OL) (NMC 2005a). The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts related to these issues beyond those discussed in the GEIS (NRC 1999). For all of those issues, the NRC 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 4-2. Category 1 Issues Applicable to the Palisades Transmission Lines During the Renewal Term

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
TERRESTRIAL RESOURCES	
Power line right-of-way management (cutting and herbicide application)	4.5.6.1
Bird collisions with power lines	4.5.6.2
Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)	4.5.6.3
Floodplains and wetlands on power line right-of-way	4.5.7
AIR QUALITY	
Air quality effects of transmission lines	4.5.2
LAND USE	
Onsite land use	4.5.3
Power line right-of-way	4.5.3

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

- Power line right-of-way management (cutting and herbicide application). Based on information in the GEIS, the Commission found that

  > The impacts of right-of-way maintenance on wildlife are expected to be of small significance at all sites.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, consultation with the U.S. Fish and Wildlife Service (FWS) and the Michigan Department of Natural Resources (MDNR), and its evaluation of other available information and public comments on the draft SEIS.

Therefore, the NRC staff concludes that there would be no impacts of power line right-of-way maintenance during the renewal term beyond those discussed in the GEIS.

- Bird collisions with power lines. Based on information in the GEIS, the Commission found that

  > Impacts are expected to be of SMALL significance at all sites.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, consultation with the FWS and MDNR, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of bird collisions with power lines during the renewal term beyond those discussed in the GEIS.

- Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock). Based on information in the GEIS, the Commission found that

  > No significant impacts of electromagnetic fields on terrestrial flora and fauna have been identified. Such effects are not expected to be a problem during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of electromagnetic fields on flora and fauna during the renewal term beyond those discussed in the GEIS.

- Floodplains and wetlands on power line rights-of-way. Based on information in the GEIS, the Commission found that

  > Periodic vegetation control is necessary in forested wetlands underneath power lines and can be achieved with minimal damage to the wetland. No significant impact is expected at any nuclear power plant during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, consultation with the FWS and MDNR, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of power line rights-of-way on floodplains and wetlands during the renewal term beyond those discussed in the GEIS.

- Air quality effects of transmission lines. Based on the information in the GEIS, the Commission found that

  > Production of ozone and oxides of nitrogen is insignificant and does not contribute measurably to ambient levels of these gases.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no air quality impacts of transmission lines during the renewal term beyond those discussed in the GEIS.

- Onsite land use. Based on the information in the GEIS, the Commission found that

  > Projected onsite land use changes required during … the renewal period would be a small fraction of any nuclear power plant site and would involve land that is controlled by the applicant.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no onsite land-use impacts during the renewal term beyond those discussed in the GEIS.

- Power line rights-of-way. Based on information in the GEIS, the Commission found that

  > Ongoing use of power line rights-of-way would continue with no change in restrictions. The effects of these restrictions are of small significance.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of power line rights-of-way on land use during the renewal term beyond those discussed in the GEIS.

There is one Category 2 issue related to transmission lines, and another issue related to transmission lines is being treated as a Category 2 issue. These issues are listed in Table 4-3 and are discussed in Sections 4.2.1 and 4.2.2.

Table 4-3. Category 2 and Uncategorized Issues Applicable to the Palisades Transmission Lines 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
	HUMAN HEALTH		
Electromagnetic fields, acute effects (electric shock)	4.5.4.1	H	4.2.1
Electromagnetic fields, chronic effects	4.5.4.2	NA[(a)]	4.2.2

(a) Not addressed.

4.2.1 Electromagnetic Fields – Acute Effects

Based on the GEIS, the Commission found that electric shock resulting from direct access to energized conductors or from induced charges in metallic structures has not been found to be a problem at most operating plants and generally is not expected to be a problem during the license renewal term. However, site-specific review is required to determine the significance of the electric shock potential along the portions of the transmission lines that are within the scope of this SEIS.

In the GEIS (NRC 1996), the NRC staff found that without a review of the conformance of each nuclear plant transmission line with National Electrical Safety Code (NESC) (IEEE 2002) criteria, it was not possible to determine the significance of the electric shock potential. Evaluation of individual plant transmission lines is necessary because the issue of electric shock safety was not addressed in the licensing process for some plants. For other plants, land use in the vicinity of transmission lines may have changed, or power distribution companies may have chosen to upgrade line voltage. To comply with 10 CFR 51.53(c)(3)(ii)(H), the applicant must provide an assessment of the potential shock hazard if the transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the NESC for preventing electric shock from induced currents.

Both transmission lines associated with Palisades were constructed in accordance with NESC and industry guidance in effect at that time. The transmission facilities are maintained to ensure continued compliance with current standards. Since the lines were constructed, a new criterion has been added to the NESC for power lines with voltages exceeding 98 kV. This

criterion states that the minimum clearance for a line must limit induced currents due to static effects to 5 mA.

NMC (2005a) has reviewed the power lines for compliance with this criterion. Spans where the potential for induced current would be the greatest were identified. The electric field strengths

and potential induced currents for these spans were calculated by using Version 2.5 of the ENVIRO computer code (EPRI 1996). Input to the code included line sag at a 120°F conductor temperature, maximum operating voltage during normal load conditions, and a large tractor-trailer parked under the line in a position to maximize the induced current. The calculated induced currents for both Palisades 345-kV lines at six locations ranged from 1.6 to 4.9 mA, all below the NESC 5-mA criterion (NMC 2005a).

The NRC staff has reviewed the available information, including the applicant's evaluation and computational results. Based on this information, the NRC staff has evaluated the potential impacts for electric shock resulting from operation of Palisades and its associated transmission lines. The NRC staff concludes that the impacts of electric shock during the renewal period would be SMALL, and that no further mitigation measures would be warranted.

4.2.2 Electromagnetic Fields – Chronic Effects

In the GEIS, the chronic effects of 60-Hz electromagnetic fields from power lines were not designated as Category 1 or 2, and will not be until a scientific consensus is reached on the health implications of these fields.

The potential for chronic effects from these fields continues to be studied and is not known at this time. The National Institute of Environmental Health Sciences (NIEHS) directs related research through the U.S. Department of Energy (DOE). The report by NIEHS (1999) contains the following conclusion:

> The NIEHS concludes that ELF-EMF [extremely low frequency-electromagnetic field] exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or noncancer health outcomes provide sufficient evidence of a risk to currently warrant concern.

This statement is not sufficient to cause the NRC staff to change its position with respect to the chronic effects of electromagnetic fields. The NRC staff considers the GEIS finding of "Not Applicable" still appropriate and will continue to follow developments on this issue.

4.3 Radiological Impacts of Normal Operations

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1 that are applicable to Palisades in regard to radiological impacts are listed in Table 4-4. NMC stated in its ER (NMC 2005a) that it is not aware of any new and significant information associated with the renewal of the Palisades OL. The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For these issues, the NRC staff concluded in the GEIS that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-4. Category 1 Issues Applicable to Radiological Impacts of Normal Operations During the Renewal Term

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
HUMAN HEALTH	
Radiation exposures to public (license renewal term)	4.6.2
Occupational radiation exposures (license renewal term)	4.6.3

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

- Radiation exposures to the public (license renewal term). Based on information in the GEIS, the Commission found that

  > Radiation doses to the public will continue at current levels associated with normal operations.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of radiation exposures to the public during the renewal term beyond those discussed in the GEIS.

- Occupational radiation exposures (license renewal term). Based on information in the GEIS, the Commission found that

  > Projected maximum occupational doses during the license renewal term are within the range of doses experienced during normal operations and normal maintenance outages, and would be well below regulatory limits.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts of occupational radiation exposures during the renewal term beyond those discussed in the GEIS.

There are no Category 2 issues related to radiological impacts of routine operations.

4.4 Socioeconomic Impacts of Plant Operations During the License Renewal Period

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1 that are applicable to socioeconomic impacts during the renewal term are listed in Table 4-5. NMC stated in its ER (NMC 2005a) that it is not aware of any new and significant information associated with the renewal of the Palisades OL. The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS (NRC 1996). For these issues, the NRC staff concluded in the GEIS that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-5. Category 1 Issues Applicable to Socioeconomics During the Renewal Term

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
SOCIOECONOMICS	
Public services: public safety, social services, and tourism and recreation	4.7.3; 4.7.3.3; 4.7.3.4; 4.7.3.6
Public services: education (license renewal term)	4.7.3.1
Aesthetic impacts (license renewal term)	4.7.6
Aesthetic impacts of transmission lines (license renewal term)	4.5.8

Environmental Impacts of Operation

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

- Public services: public safety, social services, and tourism and recreation. Based on information in the GEIS, the Commission found that

  > Impacts on public safety, social services, and tourism and recreation are expected to be of SMALL significance at all sites.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts on public safety, social services, and tourism and recreation during the renewal term beyond those discussed in the GEIS.

- Public services: education (license renewal term). Based on information in the GEIS, the Commission found that

  > Only impacts of SMALL significance are expected.

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

- Aesthetic impacts (license renewal term). Based on information in the GEIS, the Commission found that

  > No significant impacts are expected during the license renewal term.

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

- Aesthetic impacts of transmission lines (license renewal term). Based on information in the GEIS, the Commission found that

  > No significant impacts are expected during the license renewal term.

The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no aesthetic impacts of transmission lines during the renewal term beyond those discussed in the GEIS.

Table 4-6 lists the Category 2 socioeconomic issues, which require plant-specific analysis, and environmental justice, which was not addressed in the GEIS.

Table 4-6. Environmental Justice and GEIS Category 2 Issues Applicable to Socioeconomics 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
	SOCIOECONOMICS		
Housing impacts	4.7.1	I	4.4.1
Public services: public utilities	4.7.3.5	I	4.4.2
Offsite land use (license renewal term)	4.7.4	I	4.4.3
Public services, transportation	4.7.3.2	J	4.4.4
Historic and archaeological resources	4.7.7	K	4.4.5
Environmental justice	Not addressed[(a)]	Not addressed[(a)]	4.4.6

(a) Guidance related to environmental justice was not in place at the time the GEIS and the associated revision to 10 CFR Part 51 were prepared. Therefore, environmental justice must be addressed in the NRC staff's environmental impact statement.

4.4.1 Housing Impacts During Operations

In determining housing impacts, the applicant chose to follow Appendix C of the GEIS (NRC 1996), which presents a population characterization method that is based on two factors, "sparseness" and "proximity" (GEIS Section C.1.4 (NRC 1996)). Sparseness measures population density within 20 mi of the site, and proximity measures population density and city size within 50 mi. Each factor has categories of density and size (GEIS Table C.1), and a matrix is used to rank the population category as low, medium, or high (GEIS Figure C.1).

In 2000, 118,667 people were living within 20 mi of the Palisades site. Based on the GEIS measure of sparseness, the area within 20 mi has a density of 238 persons/mi^2, placing it in the least sparse (high-density) category, Category 4 (NMC 2005a; U.S. Census Bureau 2004). In 2000, 1,287,558 persons lived within 50 mi of the plant, giving the area a density of

283 persons/mi^2. According to the NRC sparseness and proximity matrix, the area falls into Category 4 for both measures, meaning that the area is classified as a high-density area.

Part 51 of 10 CFR, Subpart A, Appendix B, Table B-1 states that impacts on housing availability are expected to be of small significance at plants located in a high-population area where growth-control measures are not in effect. The Palisades site is located in a high-population area, and Van Buren County is not subject to growth-control measures that would limit housing development. Based on the NRC criteria, NMC anticipates that housing impacts would be SMALL during continued operation of Palisades (NMC 2005a).

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). The NMC ER (NMC 2005a) assumes that a small number of additional workers might be needed during the license renewal period to perform routine maintenance and other activities.

The housing vacancy rate in 2000 was 17.6 percent in Van Buren County and 13.4 percent in Berrien County. If these vacancy rates continue, small increases in the number of workers required at the plant would not require any new housing construction.

The NRC staff reviewed the available information relative to housing impacts and NMC's conclusions. Based on this review, the NRC staff concludes that the impact on housing during the license renewal period would be SMALL, and additional mitigation is not warranted.

4.4.2 Public Services: Public Utility Impacts During Operations

Impacts on public utility services are considered 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).

Analysis of impacts on the public water supply system considered both plant demand and plant-related population growth. Section 2.2.2 describes the Palisades permitted withdrawal rate and actual use of water.

The NRC staff has reviewed the available information, including permitted and actual water use rates at Palisades, and water use and water supply capacities for the major water supply systems in Van Buren County. Based on this information, the NRC staff concludes that the

potential impacts of Palisades operation during the license renewal period would be SMALL. During the course of its evaluation, the NRC staff considered mitigation measures for continued operation of Palisades. Based on this evaluation, the NRC staff expects that mitigation measures in place at Palisades are appropriate, and that no additional mitigation measures are 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."

Section 4.7.4 of the GEIS defines 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.

NMC expects to use existing employees, possibly adding a maximum of two employees, to support Palisades operations during the license renewal term. In Section 3.7.5 of the GEIS (NRC 1996), the NRC staff stated that if plant-related population growth is less than 5 percent of the study area's total population, offsite land-use changes would be SMALL, especially if the study area has established patterns of residential and commercial development, a population density of at least 60 persons/mi^2, and at least one urban area with a population of 100,000 or more within a 50-mi radius. In this case, population growth would be 0 percent of the total 2000 population of 1,287,558 within the 50-mi radius. The area has established patterns of residential and commercial development, a population density of 283 persons/mi^2, and at least one urban area (Kalamazoo-Battle Creek Metropolitan Statistical Area) with a population of 100,000 or more within the 50-mi radius. Consequently, the NRC staff concludes that population changes resulting from renewal of the Palisades OL would likely result in SMALL impacts on offsite land use.

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. In Section 4.7.4.1 of the GEIS, the NRC staff 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 jurisdictions 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.

Covert Township and Covert School District receive significant tax payments from Consumers Energy property tax payments. As discussed in Section 2.2.8.6 and shown in Table 2-9, Consumers Energy paid $0.9 million in property taxes to the township in 2004, or approximately 56 percent of the township's revenues. The Covert School District received $2.7 million from taxes paid by Consumers Energy in 2004. These payments represent a substantial, positive impact on the fiscal condition of the township and the school district. In addition to the Covert School District, Covert Township forwards the balance of the property tax revenues to the Van Buren Intermediate School District and Van Buren County. Both the Van Buren Intermediate School District and Van Buren County received $0.8 million, respectively, in property tax payments in 2004, or 3 and 4 percent, respectively, of revenues in each jurisdiction.

Because no refurbishment or new construction activities are associated with the license renewal, no additional sources of plant-related tax payments are expected that could influence land use in the township or the county. The continued collection of property taxes from Consumers Energy for Palisades will result in moderate indirect tax-driven land-use impacts through sewer and water system improvements and expansion, lower property taxes, and improved educational services and facilities. This source of revenue allows the township, school district, and county to keep tax rates below the levels they would otherwise have in order to fund the higher levels of public infrastructure and services, schools, and government services.

Van Buren County's population growth rates over the last 30 years have been both moderate and stable (Table 2-8). NMC projects the addition of one or two additional employees to support the operation of Palisades during the license renewal term; thus, land-use changes from Palisades population-related growth would be negligible. While the county has experienced significant residential, industrial, and commercial growth during this 30-year period, Van Buren County has developed an overall land-use decision-making strategy that encourages

municipalities to implement a "smart growth" methodology that relies on a mix of development and planning tools.[(a)]

NMC projects that annual property taxes from Palisades to Covert Township, Covert School District, Van Buren County Intermediate School District, and Van Buren County will remain relatively constant throughout the license renewal period. However, the Michigan Public Service Commission is currently implementing the electric utility restructuring legislation that was enacted in June 2000, and the impacts are not fully known at this time. Any changes to tax rates for the Palisades property due to the restructuring would be independent of license renewal (NMC 2005a).

No adverse impacts on offsite land use would occur because of license renewal. Consequently, the NRC staff concludes that offsite land-use impacts would likely be SMALL, and additional mitigation is not warranted.

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.

Given the small number of additional workers required during the renewal period, there would be no additional impacts on the transportation network in the vicinity of the Palisades site. Therefore, the NRC staff concludes that during the license renewal period, transportation impacts during operation would likely be SMALL. Additional mitigation is not warranted.

4.4.5 Historic and Archaeological Resources

The National Historic Preservation Act of 1966 (NHPA), as amended through 2000, requires Federal agencies to take into account the potential effects of their undertakings on historic properties. The historic-review process mandated by Section 106 of the NHPA is outlined in regulations issued by the Advisory Council on Historic Preservation at 36 CFR Part 800. The renewal of an OL for a nuclear power plant is an undertaking that could potentially affect either known or potential historic properties that may be located at the plant's site. In accordance with the provisions of the NHPA, the NRC is required to make a reasonable effort to identify historic properties in the potentially affected areas and notify the State Historic Preservation Office

(a) Interview with K. Getman and M. Thomas, Michigan Economic Development Corporation (July 2005).

(SHPO) before proceeding. If historic properties are determined to be present, an assessment is required to resolve any possible adverse effects of the undertaking.

At Palisades, the potential exists that presently unknown significant archaeological resources may be present on or below the ground surface at the site and along the transmission line corridors. Any such resources could be inadvertently disturbed or destroyed by construction or other ground-disturbing activities. The applicant has indicated that no major refurbishment or replacement activities at Palisades or along the transmission line corridors are associated with its license renewal request (NMC 2005a). However, routine operations and maintenance activities that will take place during the renewal period could potentially affect presently unknown archaeological resources. The applicant has procedures in place to protect any resources from such inadvertent disturbance or destruction from these activities.

The NRC staff reviewed the applicant's environmental review procedures for Palisades during the site audit. These procedures are in place to ensure that any archaeological resources that may be present receive consideration and protection. The procedures require that an archaeological survey be undertaken for any construction and modification activities that involve all ground-disturbing activities in the owner-controlled area of NMC operated nuclear facilities and to those activities including, but not limited to the construction or expansion of buildings, facilities, substations, parking lots, roads, or overhead or underground utility lines. In the event that items of potential historic significance are discovered during surveys, NMC and Consumers Energy would consult with the SHPO prior to proceeding. The NRC staff's independent review of records on file at the SHPO office did not locate records related to project-specific archaeological surveys conducted at Palisades for ground-disturbing activities. However, Consumers Energy did locate in its records one such report that documented a cultural resource field visit to the Palisades site by archaeologists in 1982 for three proposed projects (CAI 1982).

During the site audit, the NRC staff also reviewed the applicant's excavation and trenching control procedures, which require that any planned excavation activities that occur at a depth greater than 6 in. within previously undisturbed land be reviewed by the NMC Environmental Coordinator. The Environmental Coordinator's responsibilities (as defined in NMC's Archaeological, Cultural & Historic Resources procedures) include reviewing excavation and trenching plans to determine if any known archaeological resources are located within the proposed ground disturbance area, assessing the potential importance of any archaeological resources discovered during construction, and coordinating with the SHPO when potentially culturally important resource discoveries are made. The procedures also include a list of the types of archaeological materials that could be encountered during construction. During the site audit, the NRC staff expressed concerns about the NMC procedures not requiring a qualified archaeologist to survey the proposed ground disturbance area for archaeological resources prior to construction. In addition, the NRC staff noted that the procedure did not specify the training, experience, or credential requirements for the site's Environmental Coordinator to

recognize archaeological materials or assess the potential significance of historic or archaeological resources. Subsequent to the NRC staff's comments, the applicant revised and implemented its procedures in January 2006 (NMC 2006a) to reflect these concerns.

Based on the NRC staff's review of agency files, published literature, and information provided by the applicant, the NRC staff concludes that potential impacts on historic and archaeological resources would be SMALL. This conclusion is based on the fact that (1) no major refurbishment or replacement activities would occur during the renewal period; and (2) the applicant has environmental review procedures in place to ensure that any archaeological resources that may be present receive consideration and protection.

4.4.6 Environmental Justice

Environmental justice refers to a Federal policy that requires that Federal agencies 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. Specific guidance is provided in NRC Office of Nuclear Reactor Regulation Office Instruction LIC-203, *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues Rev. 1* (NRC 2004a). In 2004, the Commission issued a final *Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions* (NRC 2004b).

The scope of the review, as defined in NRC guidance (NRC 2004a), includes identification of impacts on minority and low-income populations, the location and significance of any environmental impacts during operations on populations that are particularly sensitive, and information pertaining to mitigation. It also includes evaluation of whether these impacts are likely to be disproportionately high and adverse. The NRC staff looks for minority and low-income populations within the 50-mi radius of the site. For the NRC staff's review, a minority

(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 2004a).

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 percentage of minorities in the state of which it is a part by 20 percentage points, or the corresponding 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 within a census block group exceeds the corresponding percentage of low-income population in the state of which it is a part by 20 percentage points, or if the corresponding percentage of low-income population within a census block group is at least 50 percent.

For the Palisades review, the NRC staff examined the geographic distribution of minority and low-income populations within 50-mi of the site, employing data from the 2000 census for low-income populations and for minority populations (NMC 2005a). The analysis was supplemented by discussions with the planning department and social service agencies in Van Buren County.

Figures 4-1 and 4-2 show the geographic distribution of minority and low-income groups within 50 mi of the plant. A number of tracts within Van Buren County exceed the NRC thresholds defining low-income; these are located in Covert. Other tracts within the 50-mi region are located in Kalamazoo to the east of Palisades and South Bend to the southeast. Census block groups with a minority population within the 50-mi region in Michigan are located in Covert and Keeler in Van Buren County, and in Berrien, Cass, Van Buren, and Allegan Counties. In Indiana, minority populations are located in South Bend, Mishawaka, and Elkhart.

With the locations of minority and low-income populations identified, the NRC staff proceeded to evaluate whether any of the environmental impacts of the proposed action could affect these populations in a disproportionately high and adverse manner. Based on NRC staff guidance (NRC 2004a), air, land, and water resources within about 50-mi of the Palisades site were examined. Within that area, a few potential environmental impacts could affect human populations; all of these were considered SMALL for the general population.

The pathways through which the environmental impacts associated with license renewal for Palisades can affect human populations are discussed throughout this SEIS. The NRC staff evaluated whether minority and low-income populations could be disproportionately affected by

(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 U.S. Census Bureau 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 U.S. Census Bureau guidelines for the purpose of collecting and presenting decennial census data. Census block groups are subsets of census tracts (U.S. Census Bureau 2004).

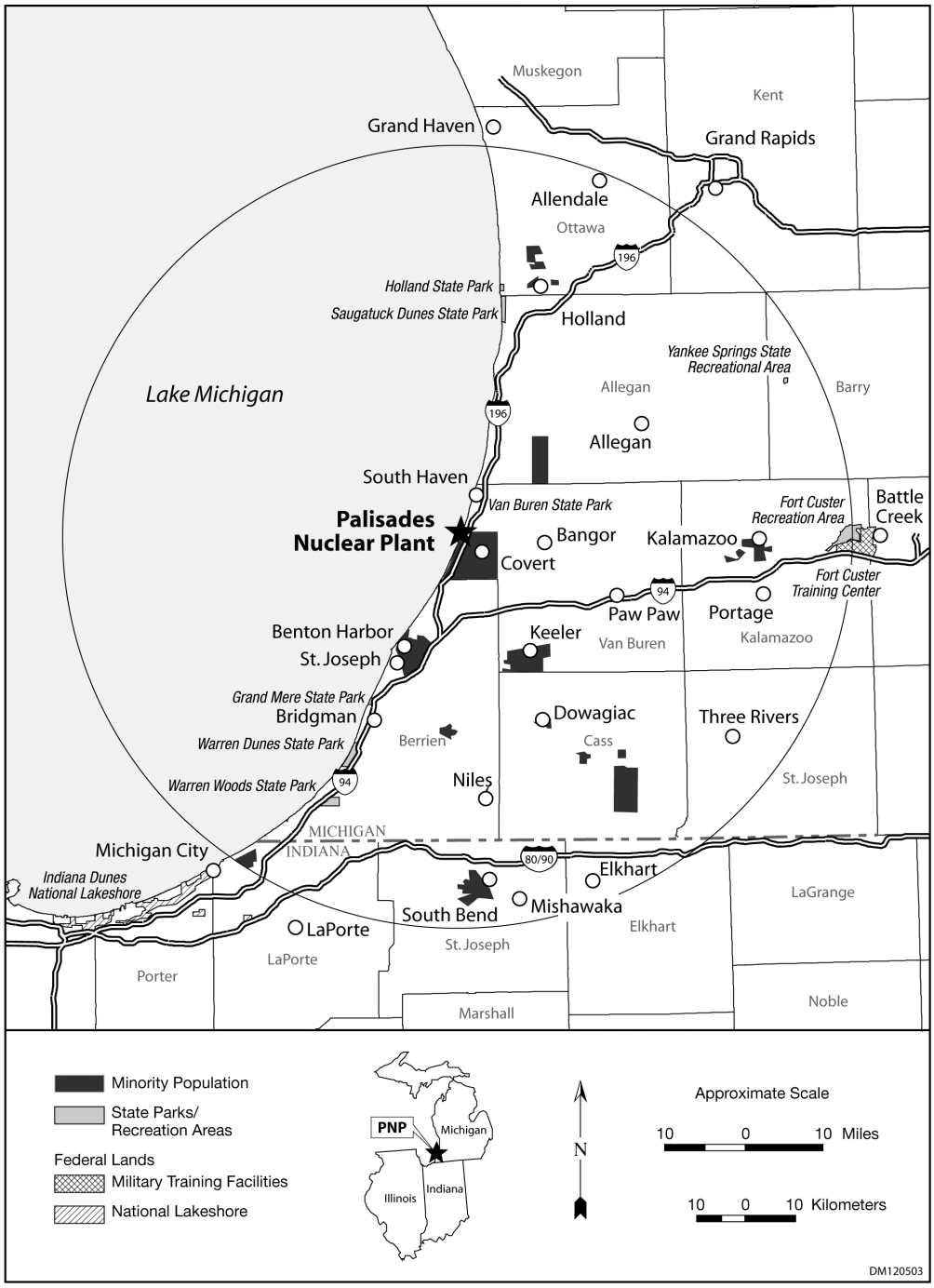

Figure 4-1. Geographic Distribution of Minority Populations (shown in shaded areas) Within 50 mi of Palisades Based on Census Block Group Data

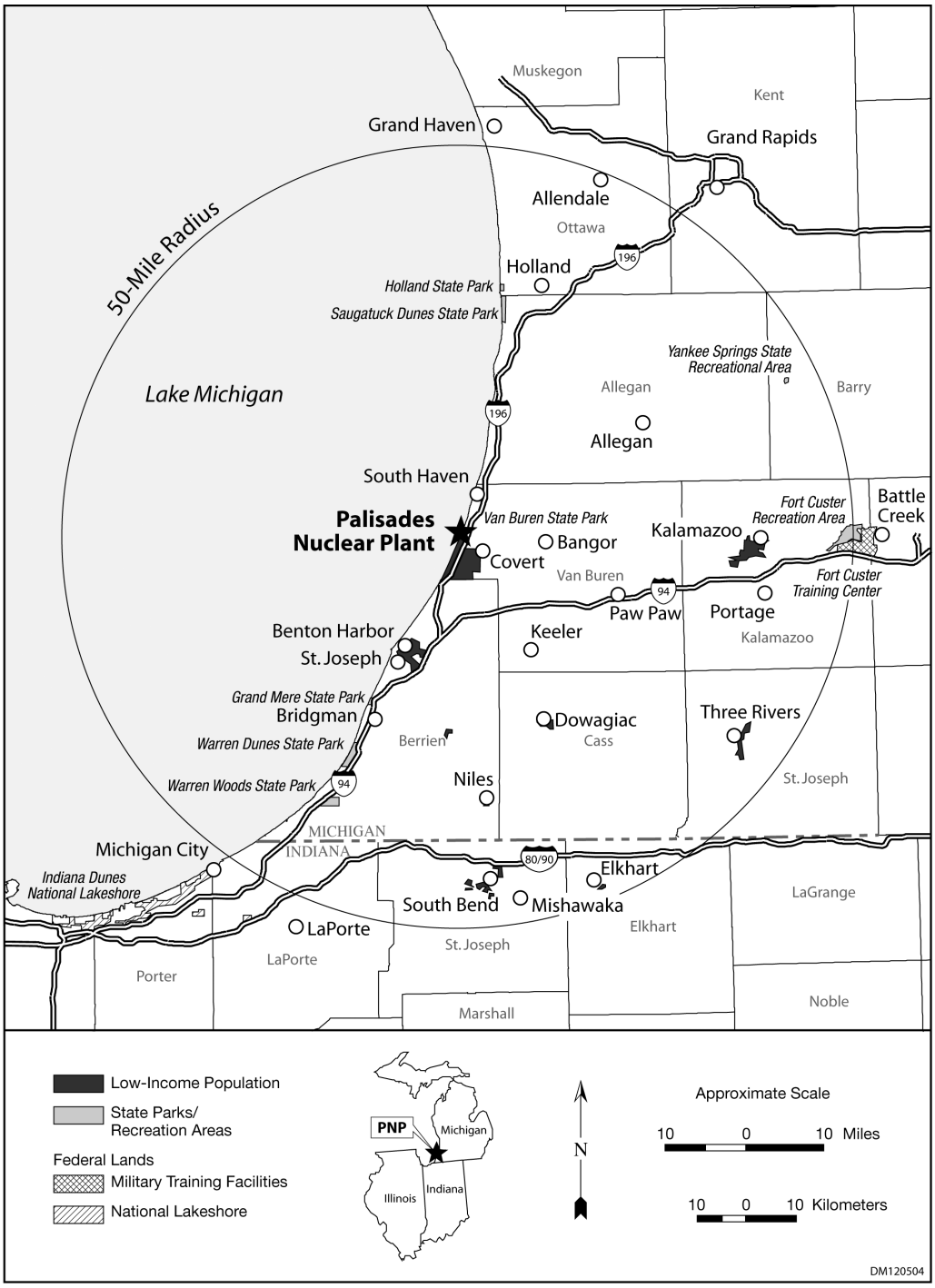

Figure 4-2. Geographic Distribution of Low-Income Populations (shown in Shaded areas) Within 50 mi of Palisades Based on Census Block Group Data

these impacts. The NRC staff found no unusual resource dependencies or practices, such as subsistence agriculture, hunting, or fishing, through which the populations could be disproportionately high and adversely affected. In addition, the NRC staff did not identify any location-dependent disproportionately high and adverse impacts affecting these minority and low-income populations, including impacts on the seasonal migrant farm labor force, many of whom could be minority. The NRC staff concludes that offsite impacts from Palisades on minority and low-income populations would be SMALL, and no special mitigation actions are warranted.

4.5 Groundwater Use and Quality

Of the Category 1 issues related to groundwater use and quality that are identified in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, only one is applicable to Palisades and it is listed in Table 4-7.

Table 4-7. 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 Section
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 NRC staff's review regarding this issue 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, Palisades has three operable groundwater production wells for grounds maintenance or other miscellaneous uses. Their combined pumping rate is 24 gpm, which is below the 100-gpm threshold.

The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC staff concludes that there would be no impacts related to this issue beyond those discussed in the GEIS. For this

issue, 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.

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 4-8.

Table 4-8. 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 Federally listed threatened or endangered species in the vicinity of the Palisades site and its associated transmission lines is discussed in Sections 2.2.5 and 2.2.6.

On June 30, 2005, the NRC contacted the FWS to request information on Federally listed threatened and endangered species and the impacts of relicensing (NRC 2005). In response, on July 29, 2005, the FWS provided information regarding Federally listed species that could occur in the vicinity of Palisades or along the transmission line rights-of-way (FWS 2005b).

4.6.1 Aquatic Species

The NRC staff has reviewed the information provided by the applicant and public information and has contacted the FWS and the MDNR. No Federally listed threatened or endangered aquatic species occur in Lake Michigan in the vicinity of the Palisades site, and no Federally listed threatened or endangered species occur in the streams crossed by the Palisades-Argenta transmission line. Therefore, license renewal would have no effect on any Federally listed aquatic species.

4.6.2 Terrestrial Species

The FWS identified four Federally listed and one candidate terrestrial species that they believe could occur on the Palisades site or along the associated transmission line rights-of-way: Pitcher's thistle (*Cirsium pitcheri*; threatened), Karner blue butterfly (*Lycaeides melissa samuelis*; endangered), Mitchell's satyr butterfly (*Neonympha mitchelli mitchelli*; endangered), Indiana bat (*Myotis sodalis*; endangered), and eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*; candidate) (FWS 2005b). These species, their preferred habitat, and county distributions are described in Section 2.2.6.

Pitcher's thistle is the only Federally listed species known to exist on the Palisades site, where it occurs in open dune habitats (NMC 2005a).[(a)] License renewal and continued operation of Palisades are not likely to adversely affect the Pitcher's thistle for several reasons. No refurbishment is considered necessary during the license renewal period at the Palisades site (NMC 2005a); therefore, significant land disturbance during that period is not considered likely. However, any activities during the renewal period that could result in land disturbance would undergo a predisturbance evaluation and consideration of impacts to threatened and endangered species (NMC 2005a). In addition, all dune areas on the site where the Pitcher's thistle is most likely to occur are protected under authority of Michigan's Natural Resources and Environmental Protection Act, Part 353, and any action that would disturb dune habitats would require a permit from the State (MDEQ 2005). The Pitcher's thistle does not occur in areas affected by current operations, including those areas affected by cooling-tower drift. On the basis of these considerations, continued operation of Palisades during the license renewal period would not be expected to adversely affect the Pitcher's thistle.

Of the counties in the project area, the Karner blue butterfly is known only from Allegan County (MNFI 2005; FWS 2005a), which is crossed by a very short length of the Palisades-Argenta line (NMC 2005a). However, Czarnecki (FWS 2005b) suggests that the species could also occur near the Argenta-E. Elkhart line in the eastern portion of Van Buren County. This species was not observed during field surveys of the Palisades site and transmission line corridors conducted in 1979 (Asplundh 1979) and 1991 (Higman and Goff 1991; Goff 1992). The applicant's vegetation-management practices that maintain habitat within transmission line rights-of-way in early successional stages (NMC 2005a) are consistent with protecting habitats occupied by this species, and continued maintenance over the license renewal period is not expected to adversely affect this species or its habitat. The owner of Palisades is partnering with the MDNR, the Nature Conservancy, and others to develop a habitat conservation plan for the Karner blue butterfly (NMC 2005a).

(a) Interview with G. Dawson, Consumers Energy Company, Environmental and Laboratory Services (July 26, 2005).

The Mitchell's satyr butterfly may occur in wetland areas along portions of the transmission lines in Kalamazoo and Van Buren Counties (FWS 2005a; MNFI 2005); however, this species was not observed during field surveys conducted in 1979 (Asplundh 1979) and 1991 (Higman and Goff 1991; Goff 1992). License renewal and continued operations of Palisades are not likely to adversely affect the Mitchell's satyr butterfly for several reasons. Preferred habitat for this species (calcareous wetlands) is not known to occur within or adjacent to transmission line rights-of-way associated with Palisades (NMC 2005a). The applicant's vegetation-management practices that maintain habitat within transmission line rights-of-way as herbaceous or low-growing shrub communities (NMC 2005a) are consistent with protecting habitats occupied by this species. Therefore, continued maintenance of rights-of-way over the license renewal period would not be expected to adversely affect this species or its habitat.

The Indiana bat is not known to occur at the Palisades site or along associated transmission lines, but potential habitat occurs within the project area (FWS 2005b). It should be noted, however, that this species is difficult to detect without conducting specialized surveys, and such surveys of the site have not been conducted. The Indiana bat is reported to occur in suitable habitat during the summer months in all counties crossed by the Palisades transmission line (FWS 2005a). Tree species, such as the shagbark hickory (*Carya ovata*), red oak (*Quercus rubra*), and bur oak (*Quercus macrocarpa*), often have loose or decaying bark that provide nursery habitat for females with young. License renewal and continued operations of Palisades are not likely to adversely affect the Indiana bat for several reasons. No refurbishment is considered necessary during the license renewal period at the Palisades site (NMC 2005a), and, therefore, significant land disturbance during that period is not considered likely. However, any activities during the renewal period that could result in land disturbance would undergo a predisturbance evaluation and consideration of impacts on threatened and endangered species (NMC 2005a). Vegetation management within the transmission line rights-of-way prevents the establishment of large trees within the rights-of-way that could be used by the Indiana bat. Only danger trees in the border zone of the rights-of-way are removed during routine vegetation management (NMC 2005a). This greatly limits the likelihood that a tree used by Indiana bats for roosting or nursery habitat would be affected. On the basis of these considerations, continued operation of Palisades during the license renewal period would not be expected to adversely affect the Indiana bat.

The eastern massasauga rattlesnake, a Federal candidate for listing, could occur in wetland areas such as bogs, ponds, or swamps, and prefers open canopy with a sedge or grass ground cover (FWS 2005b). It is unlikely that the eastern massasauga would be adversely affected by continued operation of Palisades during the license renewal period because no land-disturbing refurbishment activities are planned at the Palisades site, and vegetation maintenance procedures for Palisades transmission line rights-of-way (NMC 2005a) maintain the open habitats preferred by this species.

Based on the NRC staff's review of the applicant's environmental report and the NRC staff's independent analysis, the NRC staff has concluded that continued operation of Palisades during the license renewal term would not likely adversely affect any species that are Federally listed, proposed for listing, or candidates for listing as endangered or threatened within the immediate vicinity of the Palisades site and its associated transmission lines. The applicant currently plans no power plant refurbishment activities. The NRC staff anticipates that best management practices for protecting Federally listed species and their habitats, while carrying out vegetation-management activities, will be implemented by the applicant and its contractors. Therefore, it is the NRC staff's finding that the impact on threatened or endangered species of an additional 20 years of operation of Palisades and associated transmission lines would be SMALL, and further mitigation is not warranted.

4.7 Evaluation of New and Potentially Significant Information on Impacts of Operations During the Renewal Term

The NRC staff has not identified any 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. The NRC staff also determined that information provided during the public comment period did not identify any new issue that requires site-specific assessment. The NRC 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. 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

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 Palisades cooling system is primarily the southeastern portion of Lake Michigan, particularly that portion bounded by South Haven to the north and Hagar Shore to the south and extending to about 1.9 mi from shore (i.e., the location of the thermal bar separating the inshore and offshore water masses during spring (Thurber and Jude 1985)). As discussed in Section 4.1, the NRC staff found no new and significant information that would indicate that the conclusions regarding any of the cooling-system-related Category 1 issues related to Palisades are inconsistent with the conclusions in the GEIS (NRC 1996). Because Palisades has a closed-cycle cooling system, impacts from Category 2 plant cooling system

issues (i.e., entrainment, impingement, and heat shock) that would have an impact on local water quality and aquatic resources are not addressed in Section 4.1. Nevertheless, entrainment, impingement, and heat shock have not been found to have greater than a minimal impact on aquatic biota (Consumers Energy and NMC 2001; NRC 1978). Therefore, operation of the Palisades cooling system would not contribute significantly to the cumulative impacts that would impact water quality and aquatic resources of southeastern Lake Michigan.

The cumulative impacts of past actions have resulted in the existing conditions of local water quality and 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. Physical and chemical stresses that have impacted Lake Michigan and its tributaries include urban, industrial, and agricultural contaminants (e.g., nutrients, toxic chemicals, and 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 that have occurred in the fish communities due to 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 (IDNR 2004). In the 1960s, programs to extend control of sea lamprey and stock trout and salmon 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 on 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). Primary management challenges will be to keep the salmonid community in balance with an 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).

Large oil or chemical spills could potentially severely impact aquatic resources within Lake Michigan; the probability of such spills, however, is relatively small. The probability of smaller spills is higher, but the impacts from such spills would probably be small, temporary, additive, 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, which has 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 needs of the facility for cooling purposes under all conditions. The NRC staff, while preparing this assessment, assumed that other industrial, commercial, or public installations could be located in the general vicinity of the Palisades site prior to the end of plant operations. The discharge of water to Lake Michigan from these facilities would be regulated by the MDEQ. The discharge limits are set considering the overall or cumulative impact of all other regulated activities in the area. Compliance with the Clean Water Act of 1977 and the NPDES permit for Palisades minimizes cumulative impacts on aquatic resources. Continued operation of Palisades would require renewed discharge permits from the MDEQ, which could address changing requirements so that cumulative water quality objectives are served.

The NRC staff concludes that the SMALL impacts of the Palisades cooling system operations, including entrainment and impingement of fish and shellfish, heat shock, or any of the cooling system-related Category 1 issues, would not contribute to an overall decline in water quality or the status of the fishery or other aquatic resources. Therefore, the NRC staff concludes that the potential cumulative impacts of operation of the cooling system of Palisades would be SMALL, and that no further mitigation measures would be warranted.

4.8.2 Cumulative Impacts Resulting from Continued Operation of the Transmission Lines

Continued operation of the electrical transmission facilities associated with license renewal for Palisades 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 on terrestrial resources (e.g., wildlife populations, the size and distribution of habitat areas), wetlands, floodplains, or aquatic resources. For the purposes of this analysis, the geographic area that

encompasses the past, present, and foreseeable future actions that could contribute to adverse cumulative impacts includes those Michigan counties that contain the transmission lines associated with Palisades (Allegan, Kalamazoo, and Van Buren Counties).

As described in Section 4.2, the NRC staff found no new and significant information indicating that the conclusions regarding any of the transmission-line-related Category 1 issues as related to Palisades are inconsistent with the conclusions within the GEIS. The applicant uses vegetation-management procedures over all of its rights-of-way that are protective of wildlife and habitat resources (NMC 2005a). These vegetation-management practices are not expected to change during the license renewal period and, therefore, are not expected to result in any changes to current levels of cumulative impacts. None of the management procedures alter wetland or floodplain hydrology or adversely affect vegetation characteristics of these habitats or other habitats. Vegetation-maintenance procedures within rights-of-way ensure minimal disturbance to ecological systems and species. In addition, these procedures maintain habitats that are beneficial to some of the Federally listed threatened and endangered species that could occur within them. Continued operation and maintenance of these rights-of-way are not likely to contribute to a regional decline in wildlife and habitat resources.

As discussed in Section 2.2.6, four Federally listed threatened or endangered species are known to occur or could occur within this area. These species include the Pitcher's thistle, Karner blue butterfly, Mitchell's satyr butterfly, and Indiana bat. The eastern massasauga rattlesnake, a candidate for Federal listing, could also occur in habitats traversed by Palisades transmission lines. No critical habitat, as designated in the Endangered Species Act of 1973, occurs in the area affected by Palisades or its associated transmission lines. The NRC staff's findings, presented in Section 4.6, are that continued operation of Palisades during the license renewal period would not likely adversely affect listed, proposed, or candidate species; therefore, the impact on these species would be SMALL. Consequently, the continued operation of Palisades during the renewal term would not contribute to cumulative impacts on these species. Therefore, the cumulative impacts on these species would be SMALL, and additional mitigation measure would not be warranted.

Based on these considerations, the NRC staff has determined that the cumulative impacts of the continued operation of the Palisades transmission lines would be SMALL, and no additional mitigation is warranted.

4.8.3 Cumulative Radiological Impacts

The radiological dose limits for protection of the public and workers have been developed by the U.S. Environmental Protection Agency and the NRC to address the cumulative impact of acute and long-term exposure to radiation and radioactive material. These dose limits are codified in 40 CFR Part 190, 10 CFR Part 20, and 10 CFR Part 50, Appendix I. For the purpose of this analysis, the area within a 50-mi radius region of interest (ROI) of the Palisades site was

included. The Indiana and Michigan Power Company's Donald C. Cook Nuclear Plant (D.C. Cook) Units 1 and 2 are located approximately 28 mi south-southwest of Palisades on the shore of Lake Michigan.

As stated in Section 2.2.7, NMC has conducted a radiological environmental monitoring program (REMP) around the Palisades site since 1971, with results presented annually in the Palisades Annual Radiological Environmental Operating Report (NMC 2001, 2002, 2003a, 2004, 2005b, 2006b). The REMP measures radiation and radioactive materials from all sources, including Palisades and D.C. Cook. The results presented in the reports, therefore, do consider the cumulative radiological impacts within the 50-mi ROI. On the basis of our evaluation, in Sections 2.2.7 and 4.3, the NRC staff concluded that impacts of radiation exposure to the public and workers (occupational) from operation of Palisades during the renewal term would be SMALL. With respect to the future, the REMP has not identified increasing levels or the accumulation of radioactivity in the environment over time. In addition, the NRC staff is not aware of any plans or proposals for new nuclear facilities in the vicinity of Palisades that would potentially contribute to cumulative radiological impacts. The NRC and the States of Michigan and Indiana would regulate any future actions in the vicinity of the Palisades site that could contribute to cumulative radiological impacts. Therefore, the NRC staff concludes that future cumulative radiological impacts would be SMALL, and that no further mitigation measures are warranted.

4.8.4 Cumulative Socioeconomic Impacts

Continued operation of Palisades would not likely result in significant cumulative impacts for any of the socioeconomic impact measures assessed in Section 4.4 of this SEIS (public services, housing, and offsite land use). This is because operating expenditures, NMC staffing levels, and local tax payments during renewal would be similar to those during the current license period. Similarly, the proposed action would not likely 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 plant, socioeconomic impacts resulting from license renewal for Palisades would not produce an incremental change in any of the impact measures used. The NRC 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 NRC staff determined that the impact on offsite land use would be SMALL because no refurbishment activities are planned at Palisades, and no new incremental 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. There are no reasonably foreseeable scenarios that would alter these conclusions in regard to cumulative impacts.

Although no archaeological or architectural surveys have been conducted to date at the Palisades site, and the potential exists for significant cultural resources to be present within the site boundaries, it does not appear likely that the proposed license renewal would adversely affect these resources. The applicant has indicated that no refurbishment or replacement activities, including additional land-disturbing activities, at the plant site (or along existing transmission corridors) are planned for the license renewal period (NMC 2005a). Absent land-disturbing activities, continued operation of Palisades would likely protect any cultural resources present within the Palisades site boundary by protecting those lands from development and providing secured access. If prior to ground-disturbing activity in an undisturbed area, the applicant would evaluate the potential for impacts on cultural resources in consultation with the SHPO and appropriate Native American Tribes, as required under Section 106 of the NHPA, the contribution to a cumulative impact on cultural resources by continued operation of Palisades during the license renewal period would be SMALL.

4.8.5 Cumulative Impacts on Groundwater Use and Quality

Regional geology in Van Buren County consists of 300 to 400 ft of glacial and post-glacial deposits overlying sedimentary bedrock consisting of shale or limestone of the lower Mississippian Coldwater Formation (STS 1987; NMC 2003b). A drilling program conducted at Palisades in the 1960s indicated that the uppermost material is dune sand, which ranges in thickness from about 10 ft in the switchyard area to well over 100 ft near the lake (NMC 2003b). Below the dune sand is dense to very dense gray silty sand or sandy silt, stiff gray clay, and stiff to hard gray glacial till. The bedrock underlies these glacial sediments. The early site studies indicate that unconfined groundwater in the vicinity of Palisades has a hydraulic gradient of approximately 13 ft/mi in a westerly direction, flowing to Lake Michigan at an estimated rate of 650 ft/yr. Field permeability tests during exploratory drilling in 1965 yielded values ranging from 30 to 1720 ft/yr in the site area.

At the power block area, groundwater elevations averaged 580 ft above mean sea level (MSL), approximately equal to the mean level of Lake Michigan. In the eastern portion of the property, groundwater was at approximately 601 ft MSL; beneath the substation, it was at approximately 604 ft MSL (NMC 2003b). These elevations correspond to depths below ground surface of approximately 45 ft at the power block to approximately 10 to 15 ft near the eastern end of the site (NMC 2003b). Hydrogeologic analysis, focused on the sanitary drainfield located just south of the power block, showed the water table to be approximately 30 ft below the surface of the drainfield. The calculated groundwater flow velocity at this site is westward at approximately 23 ft/yr. Groundwater sampling and analysis found no halogenated or aromatic hydrocarbons or metals above detection limits; all parameters detected were present at concentrations well below recommended maximum contaminant levels (STS 1987).

Municipal water has been available at Palisades since approximately 2002. Groundwater use at Palisades since then has been only by three small production wells with a combined production capacity of 24 gpm. The pumped water is for grounds maintenance or other miscellaneous uses. NMC does not expect to develop or use any additional groundwater resources at Palisades in the future.

Several releases to site groundwater and soil have occurred and been remediated. One was a hydrocarbon release at a fuel depot. MDEQ has concurred that the remediation of this site is completed. Another was a release of solvents (trichloroethylene and perchloroethylene) from barrels stored onsite. Following a remediation that included pumping and vapor extraction, MDEQ approved closure of this site (MDEQ 2000). In a 1995 incident, 5 to 10 gal of hydraulic oil were released from mechanical equipment due to a line break. The contaminated soil was removed, and MDNR concurred that no further action was necessary (Consumers Power 1995). Groundwater monitoring wells are now only at the Steam Generator Storage Building, which houses former equipment.

Groundwater is no longer used significantly as a resource at Palisades. The facility relies on municipal water, and the three remaining production wells are used for landscape watering at low withdrawal rates. Potential impacts on local groundwater have included fuel and solvent leaks, which have been remediated adequately. Septic systems were constructed with approved methods. Their sludge is monitored for detectable radioactivity twice per year on a voluntary basis. The downgradient groundwater flow direction from facilities at Palisades is west, toward Lake Michigan.

Because of the lack of groundwater receptors, the remediation of past sources of groundwater contamination, and good management practices relative to groundwater quality, the cumulative impact on groundwater resources during the license renewal period would be SMALL, and additional mitigation would not be warranted.

4.8.6 Conclusions Regarding Cumulative Impacts

The NRC staff considered the potential impacts resulting from operation of Palisades during the license renewal term and other past, present, and future actions in the vicinity of Palisades. The NRC staff's determination is that the potential cumulative impacts resulting from operation of Palisades during the license renewal term would be SMALL.

4.9 Summary of Impacts of Operations During the Renewal Term

Based on its analysis, NMC has stated that it is not aware of information that is both new and significant related to any of the applicable Category 1 issues associated with operation of Palisades during the renewal term. The NRC staff, after reviewing the application and performing the site audit, also did not find any new and significant information related to any of the applicable Category 1 issues associated with operations of Palisades during the renewal term. Consequently, the NRC 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 eight Category 2 issues applicable to operation of Palisades during the renewal term and for environmental justice and chronic effects of electromagnetic fields. For all eight issues and environmental justice, the NRC staff concludes that the potential environmental impact of operation of Palisades during the renewal term 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 NRC staff determined that a conclusion has not been reached by the appropriate Federal health agencies regarding chronic adverse effects from electromagnetic fields. Therefore, the NRC staff did not conduct an evaluation of this issue.

Cumulative impacts of past, present, and reasonably foreseeable future actions were considered, regardless of any other action undertaken by agencies or persons. For purposes of this analysis, where Palisades license renewal impacts are deemed to be SMALL, the NRC staff concluded that these impacts would not result in significant cumulative impacts on potentially affected resources.

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 Properties.”

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

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 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 Addendum 1.

5.1.1 Design-Basis Accidents

In order to receive U.S. Nuclear Regulatory Commission (NRC) approval to operate a nuclear power facility, an applicant for an initial operating license (OL) 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.

Design-basis accidents (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 Part 50 and Part 100 of Title 10 of the *Code of Federal Regulations* (10 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 OL. The results of these evaluations are found in license documentation such as the applicant's Final Safety Analysis Report (FSAR), the NRC 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 maximally 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 the Palisades Nuclear Plant (Palisades), 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 2005a) that it is not aware of any new and significant information associated with the renewal of the Palisades OL. The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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, regardless of offsite consequences. In the GEIS, the NRC staff assessed the impacts of severe accidents 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 Palisades site in the GEIS (NRC 1996). However, in the GEIS, the NRC 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 beyond-design-basis earthquakes at existing nuclear power plants is SMALL. Additionally, compliance with the NRC regulatory requirements under 10 CFR Part 73 provide reasonable assurance that the risk from sabotage is SMALL. Even if such events were to occur, the Commission would expect that resultant core damage and radiological releases would be no worse than those expected from internally initiated events. Based on the above, the Commission concludes that the risk from sabotage and beyond design basis earthquakes at existing nuclear power plants is

small and additionally, 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 Palisades, 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 NRC 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, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has reviewed severe accident mitigation alternatives (SAMAs) for Palisades. The results of its review are discussed in Section 5.2.

5.2 Severe Accident Mitigation Alternatives

Section 51.53(c)(3)(ii)(L) of 10 CFR requires that license renewal applicants consider alternatives to mitigate severe accidents if the NRC staff has not previously evaluated SAMAs for the applicant's plant in an 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 Palisades; therefore, the remainder of Chapter 5 addresses those alternatives.

5.2.1 Introduction

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

The SAMA evaluation for Palisades was 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 Safety Assessment (PSA) and other risk models.

In the second step, NMC examined the major risk contributors and identified possible ways (i.e., SAMAs) of reducing that risk. Common ways of reducing risk are changes to components, systems, procedures, and training. NMC initially identified 23 potential SAMAs for Palisades. NMC then screened out 14 SAMAs from further consideration because of non-applicability at Palisades due to (1) design differences; (2) the required extensive changes that would involve implementation costs known to exceed any possible benefit; (3) the excessive dollar value associated with completely eliminating all internal and external event severe accident risk at Palisades, or (4) having only effects on systems with low risk significance based on the plant-specific PSA. The remaining 9 SAMAs were subjected to further evaluation. During the second phase of the evaluation, NMC screened out one additional SAMA based on risk insights and other factors, leaving 8 SAMAs to be evaluated.

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 (positive cost-benefit). NMC found five SAMAs to be potentially cost-beneficial in the baseline analysis, and one additional SAMA to be potentially cost-beneficial when alternative discount rates and analysis uncertainties are considered (NMC 2005a).

None of the SAMAs evaluated relate directly to adequately managing the effects of aging during the period of extended operation; therefore, they need not be implemented as part of license renewal pursuant to 10 CFR Part 54. NMC has indicated that it plans to further evaluate the potentially cost-beneficial SAMAs for possible implementation. NMC's SAMA analyses and the NRC's review are discussed in more detail below.

5.2.1 Estimate of Risk

NMC submitted an assessment of SAMAs for Palisades as part of its ER (NMC 2005a) for license renewal. This assessment was based on the most recent Palisades PSA 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 Palisades Individual Plant Examination (IPE) (Consumers Power 1993) and Individual Plant Examination of External Events (IPEEE) (Consumers Power 1995, 1996).

The baseline core damage frequency (CDF) for the purpose of the SAMA evaluation is approximately 4.05 x 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 Palisades risk estimates; however, it did account for the potential risk reduction benefits associated with external events by increasing the estimated benefits for internal events by a factor of 2. The breakdown of CDF by initiating event is provided in Table 5-3.

As shown in Table 5-3, events initiated by loss of offsite power, small break loss of coolant accidents (LOCAs), and steam generator tube rupture (SGTR) are the dominant contributors to CDF.

In the ER, NMC estimated the dose to the population within 50 mi of the Palisades site to be approximately 0.319 person-Sv per year. The breakdown of the total population dose by containment release mode is summarized in Table 5-4. Basemat failures SGTRs dominate the population dose risk at Palisades.

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 NRC staff based its assessment of offsite risk on the CDFs and offsite doses reported by NMC.

5.2.2 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 PSA (i.e., SAMA analyses performed for other operating plants that have submitted license renewal applications, as well as SAMAs that could further reduce the risk of the dominant fire areas and seismic risk contributors). NMC identified 23 potential risk-reducing improvements (SAMAs) to plant components, systems, procedures, and training.

Table 5-3. Palisades Core Damage Frequency for Internal Events

Initiating Event	CDF (Per Year)	% Contribution to CDF
Loss of offsite power (including station blackout)	1.24×10^{-5}	31
Small break loss of coolant accident	1.02×10^{-5}	25
SGTR	6.06×10^{-6}	15
General transient with main condenser available	2.94×10^{-6}	7
Loss of instrument air	2.41×10^{-6}	6
Loss of service water	1.84×10^{-6}	5
Loss of main feedwater	9.07×10^{-7}	2
Loss of the main condenser	6.46×10^{-7}	2
Pressurizer safety valve spurious opening	4.08×10^{-7}	1
Other initiators	2.69×10^{-7}	6
Total CDF (internal events)	4.05×10^{-5}	100[a]

(a) Total may not equal 100% because of rounding.

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

Containment Release Mode	Population Dose (Person-Rem[a] per Year)	% Contribution
SGTR	7.6	23.9
Early containment failure	1.6	5
Late containment failure	0.3	0.9
Intact containment	0.6	1.9
Basemat failure	21.6	67.8
Containment isolation failure	0.2	0.6
Total population dose	31.9	100[b]

(a) One person-rem = 0.01 person-Sv.
(b) Total may not equal 100% because of rounding.

Fourteen SAMAs were removed from further consideration because of nonapplicability at Palisades due to (1) design differences; (2) the required extensive changes that would involve implementation costs known to exceed any possible benefit, or (3) the excessive dollar value associated with completely eliminating all internal and external event severe accident risk at Palisades, or (4) having only effects on systems with low risk significance based on the plant-

specific PSA. The remaining nine SAMAs were subjected to further evaluation. During the second phase of the evaluation, NMC screened out one additional SAMA based on risk insights and other factors. A detailed cost-benefit analysis was performed for each of the eight remaining SAMAs.

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

5.2.3 Evaluation of Risk Reduction and Costs of Improvements

In the third step of its SAMA evaluation, NMC evaluated the risk-reduction potential for each of the remaining eight SAMAs. Most 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.

NMC estimated the costs of implementing the eight candidate SAMAs through the application of engineering judgment, use of other licensees' estimates for similar improvements, and development of site-specific cost estimates. The cost estimates conservatively did not include the cost of replacement power during extended outages required to implement the modifications, nor did they include contingency costs associated with unforeseen implementation obstacles.

The NRC staff 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 conservative (i.e., the estimated risk reduction is similar to or higher than what would actually be realized). Accordingly, the NRC staff based its estimates of averted risk for the various SAMAs on NMC's risk reduction estimates.

The NRC staff reviewed the bases for the applicant's cost estimates. For certain improvements, the NRC staff 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 NRC staff found the cost estimates to be consistent with estimates provided in support of other plants' analyses.

Subsequently, the NRC staff concludes that the risk reduction and the cost estimates provided by NMC are sufficient and appropriate for use in the SAMA evaluation.

5.2.4 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. NUREG/BR-0058 has recently been revised to reflect the NRC's revised policy on discount rates. Revision 4 of NUREG/BR-0058 states that two sets of estimates should be developed – one at 3 percent and one at 7 percent (NRC 2004). NMC provided both sets of estimates (NMC 2005a).

NMC identified five potentially cost-beneficial SAMAs in the baseline analysis contained in the ER (using a 7 percent discount rate). Based on an analysis using a 3 percent real discount rate, as recommended in NUREG/BR-0058 (NRC 2004), no additional SAMA candidates were determined to be potentially cost-beneficial. The potentially cost-beneficial SAMAs are:

- SAMA 10 – Modify the turbine-driven auxiliary feedwater (AFW) system so that it can operate indefinitely without alternating current (AC), direct current (DC), or pneumatic support. This SAMA involves a procedural revision and analysis to direct AFW flow adjustments based on decay heat level so that the steam generator level can be maintained when instrumentation fails on DC power depletion.

- SAMA 13 – Add a nitrogen station. This SAMA involves the use of a nitrogen station to automatically provide backup air supply for critical instrumentation and reduce the importance of loss of instrument air.

- SAMA 16 – Add insulation to the emergency diesel generator (EDG) exhaust ducts. This SAMA involves insulating the EDG exhaust ducts and making procedural modifications to prevent overheating of the EDGs engines.

- SAMA 22 – Replace undervoltage relays with seismically qualified model. This SAMA involves replacing relays to reduce the likelihood of failure of automatic start of the EDGs and reduce the contributions from loss of power due to the relays.

- SAMA 23 – Modify procedures for primary coolant system cooldown and provide associated training. This SAMA involves procedural modifications to reduce the probability of reactor coolant pump seal failures related to long-term high temperature exposure after recovery of component cooling water.

NMC performed additional analyses to evaluate the impact of parameter choices and uncertainties on the results of the SAMA assessment (NMC 2005a). With the benefits increased by a factor of 2.3 to account for uncertainties, one additional SAMA (SAMA 3 – Add a direct drive diesel-driven injection pump) was determined to be potentially cost-beneficial.

NMC noted in its ER that while the above results are believed to accurately reflect areas for improvement at the plant, additional engineering reviews are necessary to determine ultimate implementation. NMC stated that it will implement or continue to consider the six SAMAs identified in the analysis through the appropriate Palisades design process (SAMAs 3, 10, 13, 16, 22, and 23). In response to requests for additional information by the NRC staff (NMC 2005b, 2005c), NMC also committed to further evaluate possible lower cost alternatives for two SAMAs originally eliminated in the Phase 1 screening analysis (SAMAs 1 and 18), and to further evaluate two additional SAMAs determined to be applicable to Palisades but not yet evaluated by NMC (adding capability to flash the field on the EDG and replacing an existing air-operated containment sump valve with a motor-operated valve). NMC has entered these 10 potentially cost-beneficial items into the Palisades corrective action system for further review. If determined to be cost-beneficial, these alternatives will be evaluated for possible implementation in accordance with Palisades plant design processes.

The NRC staff, therefore, concludes that with the exception of the 10 potentially cost-beneficial SAMAs discussed above, the costs of the SAMAs evaluated would be higher than the associated benefits.

5.2.5 Conclusions

The NRC staff reviewed NMC's analysis and concluded that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs supports the general conclusion that the SAMA evaluations performed by NMC are reasonable and sufficient for the license renewal submittal. Although the treatment of SAMAs for external events was limited by the unavailability of an external event PSA, the likelihood of there being cost-beneficial enhancements in this area was minimized by including several candidate SAMAs related to dominant seismic and fire events and increasing the estimated SAMA benefits for internal events by a factor of 2 to account for potential benefits in external events.

Based on its review of the SAMA analysis, the NRC staff concurs with NMC's identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of all or a subset of the identified, potentially cost-beneficial SAMA. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that further evaluation of these SAMAs by NMC is warranted. However, none of the potentially cost-beneficial SAMAs directly relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

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."

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U.S. Nuclear Regulatory Commission (NRC). 2004. *Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission*. NUREG/BR-0058, Rev. 4, Washington, D.C.

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 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 (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, Part 51, of the *Code of Federal Regulations* (10 CFR Part 51), Subpart A, Appendix B, and are applicable to the Palisades Nuclear Plant (Palisades). 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 impacts provided in 10 CFR 51.51(b), Table S-3, “Table of Uranium Fuel Cycle Environmental

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(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.

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 U.S. Nuclear Regulatory Commission (NRC) 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 Palisades 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 disposal)	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 2005) that it is not aware of any new and significant information associated with the renewal of the Palisades operating license (OL). The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft Supplemental Environmental Impact Statement (SEIS). Therefore, the NRC staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For these issues, the NRC staff concluded in the GEIS that the impacts are 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 NRC 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 HLW). 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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, HLW and spent fuel disposal excepted, is calculated to be about 14,800 person rem, 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 United States. 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 that will not ever be mitigated (e.g., 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 judgment 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 judgment 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 HLW disposal). Based on information in the GEIS, the Commission found that

  For the HLW 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 mrem 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 mrem 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 mrem per year. The lifetime individual risk from a 100-mrem 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 HLW 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, the 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 the 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, worldwide for a 100,000 metric tonne (MTHM) repository.

Nevertheless, despite all the uncertainty, some judgment as to the regulatory NEPA implications of these matters should be made and it makes no sense to repeat the same judgment 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 HLW 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 high-level nuclear waste. 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 high-level nuclear waste.

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 the 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 NRC's licensing criteria for the candidate repository in 10 CFR Part 63. In response to the Court's decision, the EPA issued its proposed revised standards on August 22, 2005 (*Federal Register*, Volume 40, page 49014 (70 FR 49014)). In order to be consistent with the EPA's revised standards, the NRC proposed revisions to 10 CFR Part 63 on September 8, 2005 (70 FR 53313).

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 NRC staff assumed that limits would be developed along the lines of the 1995 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 that would comply with such limits could and likely would be developed at some site.

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 NRC staff concludes that these impacts are 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 onsite with small environmental effects through dry or pool storage at all plants if a permanent repository or monitored retrievable storage is not available.

The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 the NRC up to 62,000 MWd/MTU and the cumulative impacts of transporting HLW 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 the summary table.

Palisades meets the fuel-enrichment and burnup conditions set forth in Addendum 1 to the GEIS. The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information, and public comments on the draft SEIS. Therefore, the NRC 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 USC 4321, et. seq.

Nuclear Management Company, LLC (NMC). 2005. *Applicant's Environmental Report – Operating License Renewal Stage, Palisades Nuclear Plant*. Docket No. 50-255. Covert, Michigan. (March 2005).

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. Environmental Protection Agency (EPA). 2005. "Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada." *Federal Register*, Vol. 70, No. 161, pp. 49014–49068. Washington, D.C. (August 22, 2005).

Fuel Cycle

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

U.S. Nuclear Regulatory Commission (NRC). 2005. "Implementation of a Dose Standard After 10,000 Years." *Federal Register,* Vol. 63, No. 173, pp. 53313–53320. Washington, D.C. (September 8, 2005).

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: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors*, NUREG-0586, Supplement 1 (NRC 2002). The U.S. Nuclear Regulatory Commission (NRC) staff's evaluation of the environmental impacts of decommissioning presented in NUREG-0586, Supplement 1, identifies a range of impacts for each environmental issue.

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 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 were 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 Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51), Subpart A, Appendix B, that are applicable to Palisades Nuclear Plant (Palisades) decommissioning following the renewal term are listed in Table 7-1. Nuclear Management Company, LLC (NMC), stated in its Environmental Report (ER) (NMC 2005) that it is aware of no new and significant information regarding the environmental impacts of license renewal for Palisades. The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and comments on the draft Supplemental Environmental Impact Statement (SEIS). Therefore, the NRC staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of these issues, the NRC staff concluded in the GEIS that the impacts are 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 Palisades 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 NRC 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 person-rem caused by buildup of long-lived radionuclides during the license renewal term.

  The NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, the evaluation of other available

information, or public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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 NRC staff has not identified any new and significant information during its independent review of the NMC ER, the site visit, the scoping process, and its evaluation of other available information and public comments on the draft SEIS. Therefore, the NRC 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). 2005. *Applicant's Environmental Report – Operating License Renewal Stage, Palisades Nuclear Plant.* Docket No. 50-255, Covert, Michigan (March 2005).

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

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

8.0 Environmental Impacts of Alternatives to License Renewal

This chapter examines the potential environmental impacts associated with denying the renewal of an operating license (OL) (i.e., the no-action alternative); the potential environmental impacts from electric-generating sources other than Palisades Nuclear Plant (Palisades); the possibility of purchasing electric power from other sources to replace power generated by Palisades and the associated environmental impacts; the potential environmental impacts from a combination of generating and conservation measures; and other generation alternatives that were deemed unsuitable for replacement of power generated by Palisades. 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 Part 51 of Title 10 of the *Code of Federal Regulations* (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.

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 and transportation.

8.1 No-Action Alternative

The NRC's regulations implementing the National Environmental Policy Act of 1969 (NEPA), 10 CFR Part 51, Subpart A, Appendix A(4), specify that the no-action alternative be discussed in an NRC Environmental Impact Statement (EIS). For license renewal, the no-action alternative refers to a scenario in which the NRC would not renew the Palisades OL, and Nuclear Management Company, LLC (NMC), would then cease plant operations by the end of

(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.

the current license and initiate the decommissioning of the plant. NMC would be required to shut down Palisades and to comply with NRC decommissioning requirements in 10 CFR 50.82, whether or not the OL is renewed. If the Palisades OL is renewed, shutdown of the unit and decommissioning activities would not be avoided, but would be postponed for up to an additional 20 years.

The environmental impacts associated with decommissioning under a license renewal or 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 decommissioning are considered here. These impacts would occur when the unit shuts down regardless of whether the license is renewed or not and are discussed below, with the results presented in Table 8-1. Plant shutdown would result in a net reduction in power production capacity. The power not generated by Palisades during the license renewal term would likely be replaced by (1) power purchased from other electricity providers, (2) generating alternatives other than Palisades, (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 NRC staff concluded that the impacts of continued plant operation on land use 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 the rights-of-way will continue as before. Therefore, the NRC 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. The results of the analysis in Appendix J, however, were not incorporated into the analysis presented in the main body of the NUREG.

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 would not be expected to result in changes to onsite or offsite land use.
Ecology	SMALL	Impacts are expected to be SMALL because aquatic impacts would be reduced, and terrestrial impacts are not expected because there would not be any changes in rights-of-way maintenance practices.
Water use and quality – surface water	SMALL	Impacts are expected to be SMALL because surface-water intake and discharges would be eliminated.
Water use and quality – groundwater	SMALL	Impacts are expected to be SMALL because discharge to the sanitary drain field would be eliminated.
Air quality	SMALL	Impacts are expected to be SMALL because emissions related to plant operation and worker transportation would decrease.
Waste	SMALL	Impacts are expected to be SMALL because generation of high-level waste would stop, and generation of low-level and mixed waste would 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, would be further reduced.
Socioeconomics	SMALL to LARGE	Impacts are expected to range from SMALL to LARGE 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 be SMALL because plant structures would remain in place, and the visibility of plumes from the cooling towers would be eliminated.
Historic and archaeological resources	SMALL	Impacts are expected to be SMALL because shutdown of the plant would not result in land disturbance.
Environmental justice	SMALL to LARGE	Impacts are expected to range from SMALL to LARGE because a loss of employment opportunities would be expected.

- **Ecology**

In Chapter 4 of this SEIS, the NRC staff concluded that the ecological impacts of continued plant operation would be SMALL. Cessation of operations would be accompanied by a reduction in cooling-water flow and the thermal plume from the plant. These changes would reduce environmental impacts on aquatic species. The transmission lines associated with Palisades are expected to remain in service after Palisades stops operating. As a result, maintenance of the rights-of-way and subsequent impacts on the terrestrial ecosystem would continue as before. Therefore, the NRC staff concludes that ecological impacts from shutdown of the plant would be SMALL.

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

In Chapter 4 of this SEIS, the NRC staff concluded that impacts of continued plant operation on surface-water use and quality would be SMALL. When the plant stops operating, there would 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. Therefore, the NRC 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 of this SEIS, the NRC staff concluded that impacts of continued plant groundwater use on groundwater availability and quality would be SMALL. Groundwater use is limited to that used only for maintenance of the grounds. When the plant stops operating, there would be virtually no change in groundwater use at the site as the facilities would remain until decommissioning. In addition, domestic water disposal would no longer occur at the three onsite sanitary drain fields. Therefore, the NRC staff concludes that groundwater use and quality impacts from shutdown of the plant would be SMALL.

- **Air Quality**

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

- **Waste**

The impacts of waste generated by continued plant operation are discussed in Chapter 6. The impacts of low-level and mixed waste from plant operation are characterized as SMALL. When Palisades stops operating, it would stop generating high-level waste (HLW), and the

generation of low-level and mixed waste associated with plant operation and maintenance would be reduced. Therefore, the NRC staff concludes that the impact of waste generated after shutdown of the plant would be SMALL.

- **Human Health**

  In Chapter 4 of this SEIS, the NRC staff concluded that the impacts of continued plant operation 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 would be reduced. Therefore, the NRC staff concludes that the impact of shutdown of the plant on human health would be SMALL. In addition, the variety of potential accidents at the plant would be reduced to a limited set associated with shutdown events and fuel handling. In Chapter 5 of this SEIS, the NRC staff concluded that the impacts of accidents during operation would be SMALL. Therefore, the NRC staff concludes that the impacts of potential accidents following shutdown of the plant would be SMALL.

- **Socioeconomics**

  In Chapter 4 of this SEIS, the NRC staff concluded that the socioeconomic impacts of continued plant operation 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 property tax revenues for Covert Township and Van Buren County. The overall impacts would depend on the state of the economy, the net change in workforce at the plant, and the changes in local government tax receipts. Appendix J of Supplement 1 to NUREG-0586 (NRC 2002) shows that the overall socioeconomic impact of plant closure plus decommissioning could be greater than SMALL. The NRC staff concludes that the socioeconomic impacts of plant shutdown would range from SMALL to LARGE. Some of these impacts could be offset if new power-generating facilities are built at or near the current site.

- **Transportation**

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

- **Aesthetics**

  In Chapter 4 of this SEIS, the NRC staff concluded that the aesthetic impacts of continued plant operation would be SMALL. Cessation of operations would be accompanied by the elimination of visible plumes from the cooling towers. Plant structures and other facilities are likely to remain in place until decommissioning. Therefore, the NRC staff concludes that the aesthetic impacts of plant closure would be SMALL.

- **Historic and Archaeological Resources**

  In Chapter 4 of this SEIS, the NRC staff concluded that the impacts of continued plant operation on historic and archaeological resources would likely be SMALL. Onsite land use would not be affected immediately by the cessation of operations. Plant structures and other facilities would likely 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 rights-of-way would continue as before. Therefore, the NRC staff concludes that the impacts on historic and archaeological resources from plant shutdown would be SMALL.

- **Environmental Justice**

  In Chapter 4 of this SEIS, the NRC staff concluded that the environmental justice impact of continued operation of the plant would be SMALL. Continued operation of the plant would not have a disproportionately high and adverse impact on minority and low-income populations. Shutdown of the plant could have disproportionately high and adverse impacts on minority and low-income populations because of the loss of employment opportunities at the site and because of secondary socioeconomic impacts (e.g., loss of patronage at local businesses). The NRC staff concludes that the environmental justice impacts of plant shutdown could range from SMALL to LARGE. 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 (NRC 2002), for additional discussion of these impacts.

8.2 Alternative Energy Sources

This section discusses the environmental impacts associated with alternative sources of electric power to replace the power generated by Palisades, assuming that the OL for Palisades is 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 an alternate site (Section 8.2.1),
- Natural-gas-fired generation at the Palisades site and an alternate site (Section 8.2.2), and
- Nuclear generation at the Palisades site and an alternate site (Section 8.2.3).

The alternative of purchasing power from other sources to replace power generated at Palisades is discussed in Section 8.2.4. Other power-generation alternatives and conservation alternatives considered by the NRC staff and found not to be reasonable replacements for Palisades 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 2006 with Projections to 2030*, the EIA projects that more than 57 percent of new electric-generating capacity between 2006 and 2030 will be coal-fired plants (EIA 2006). The amount of electricity produced by coal-fired plants will rise slowly in the near future but will grow considerably compared with other types of plants because of reliability and rising natural gas prices. Natural-gas-fired plants accounted for 18 percent of the total supply in 2004, but the EIA predicts that their contribution will decline to 17 percent by 2030 (EIA 2006). A slight rise in the percentage of natural-gas-fired plants in the near term is predicted because of new, more efficient technologies; however, the rising cost of natural gas will eventually reduce this share. Renewable fuel technologies, such as wind, solar, and hydropower, provided 9 percent of the total electricity consumed in 2004 and this is expected to rise to only 9.4 by 2030 (EIA 2006). Of the renewable fuels, hydropower provides the most power at 6.8 percent in 2004 and is expected to fall to 5.1 percent in 2030 (EIA 2006). The drop in hydropower is due to the lack of new locations for development. The share of power resulting from other renewable sources of power is expected to rise from 2.2 in 2004 to 4.3 percent in 2030 because of technological advances and State and Federal support (EIA 2006).

Nuclear plants currently provide 20 percent of the power in the United States (EIA 2006). New nuclear plants are expected to be built partly due to Energy Policy Act of 2005 tax incentives. By 2030, nuclear power is expected to drop to only 15 percent of the total power produced in the United States (EIA 2006). Despite that projection, there has been an increased interest in constructing new nuclear power facilities, as evidenced by the certification of three standard nuclear power plant designs and recent activities involving the review of other plant designs and potential sites (see Section 8.2.3). In addition, the NRC established a new reactor licensing program organization in 2001 to prepare for and manage future reactor and site licensing applications (NRC 2001). Furthermore, the Energy Policy Act contains provisions to ensure that nuclear energy continues to be a major component of the nation's energy supply. This Act also establishes a production tax credit for new nuclear power facilities. Therefore, despite the EIA

projection, a new nuclear plant alternative for replacing power generated by Palisades is considered in this SEIS.

Palisades has a net summer capacity of 786 megawatts electric (MW(e)) (NMC 2005). For the coal-fired and natural gas alternatives, the NRC staff assumed construction of an approximately 800-MW(e) plant, which is consistent with NMC's Environmental Report (ER) (NMC 2005). For the new nuclear alternative, the staff assumed the same capacity as Palisades.

The Palisades site does not have sufficient land suitable for siting a coal-fired plant; thus, only an alternate site is considered under this alternative. Approximately 30 ac is available in the northeast quadrant of the Palisades site, which could be developed to house a gas-fired plant; therefore, both the Palisades site and an alternate site are evaluated under the gas-fired alternative. No specific alternate sites were identified by the applicant in the ER for the coal-fired or gas-fired plants; however, it was assumed that a suitable location could be found in the region (NMC 2005). A new nuclear alternative was not considered by the applicant. Therefore, this SEIS evaluates both the Palisades site and an alternate generic site for the analysis of environmental impacts for the nuclear alternative.

8.2.1 Coal-Fired Generation

The coal-fired alternative is analyzed for a generic alternate site. Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.1 are from the NMC ER (NMC 2005). The staff reviewed the information in the NMC ER and compared it with environmental impact information in the GEIS for license renewal. 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 NRC staff assumed the Palisades plant would remain in operation while the alternative coal-fired plant was constructed.

The NRC staff assumed the construction of two standard 400-MW(e) units for a total capacity of 800 MW(e), as potential replacements for Palisades, which is consistent with the NMC ER (NMC 2005). The coal-fired plant would consume approximately 3.2 million tons per year of pulverized bituminous coal with an ash content of approximately 7.66 percent (NMC 2005). NMC assumes a heat rate[(a)] of 9800 Btu/kWh and a capacity factor[(b)] of 0.85 in its ER (NMC 2005).

(a) Heat rate is a measure of generating station thermal efficiency. In English units, it is generally expressed in British thermal units (Btus) 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.

(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.

In addition to the impacts discussed below for a coal-fired plant at an alternate site, impacts would occur offsite as a result of the mining of coal and limestone. Impacts of mining operations would 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 22,000 ac would be affected for mining the coal and disposing of the waste to support a 1000-MW(e) coal-fired plant during its operational life (NRC 1996). Proportionally, less land would be affected with the construction of an 800-MW(e) plant. Partially offsetting this offsite land use would be the elimination of the need for uranium mining to supply fuel for Palisades. In the GEIS, the NRC staff estimated that approximately 1000 ac would be affected for mining the uranium and processing it during the operating life of a nuclear power plant.

8.2.1.1 Closed-Cycle Cooling System

In this section, the NRC staff evaluates the impacts of a coal-fired plant located at a generic alternate site that uses a closed-cycle cooling system.

The overall impacts of the coal-fired generating system are discussed in the following sections and summarized in Table 8-2. The magnitude of impacts for an alternate site would depend on the particular site selected.

- **Land Use**

  The GEIS estimates that approximately 1700 ac would be needed for a 1000-MW(e) coal-fired plant (NRC 1996). This estimate would be scaled down for the 800-MW(e) capacity of the proposed coal-fired alternative (i.e., 1360 ac). Additional land might be needed for transmission lines and rail lines, depending on the location of the site relative to the nearest intertie connection and rail spur.

  Up to 160 ac could be needed for a rail spur if the alternative site is within 10 mi of the nearest railway connection. Additional land would likely be needed for a transmission line to connect to existing lines to transmit power to NMC customers in the area. NMC estimated that approximately 5 mi of a new 345-kV transmission line would be needed (NMC 2005).

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

Impact Category	Impact	Comments
Land use	MODERATE to LARGE	Uses approximately 1460 ac for plant, offices, parking, and waste disposal. Additional land (amount dependent on site chosen) needed for rail spur and transmission line.
Ecology	MODERATE to LARGE	Impact would depend on location and ecology of the site, surface-water body used for intake and discharge, and transmission line and rail spur routes; potential habitat loss and fragmentation; reduced productivity and biological diversity.
Water use and quality – surface water	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 to MODERATE	Impact would depend on the volume of water withdrawn and discharged and the characteristics of the aquifers.
Air quality	MODERATE	Sulfur oxides • 2750 tons/yr Nitrogen oxides • 690 tons/yr Particulates • 120 tons/yr of total suspended particulates • 28 tons/yr of PM_{10} Carbon monoxide • 800 tons/yr Small amounts of mercury and other hazardous air pollutants and naturally occurring radioactive materials – mainly uranium and thorium.
Waste	MODERATE	Total waste volume would be approximately 319,000 tons/yr of ash and scrubber sludge, requiring approximately 100 ac for disposal during the 40-year life of the plant. Debris would be generated and removed during construction.
Human health	SMALL	Impacts are uncertain, but considered SMALL in the absence of more quantitative data.

Table 8-2. (contd)

Impact Category	Impact	Comments
Socioeconomics	SMALL to LARGE	Construction impacts depend on location, but could be LARGE if plant is located in an area that is rural. Up to 1500 workers during the peak period of the 5-year construction period. Operation would result in a workforce of 75 to 120 full-time employees, which is a net loss of approximately 500 jobs. Van Buren County's tax base would experience a loss and an additional reduction in employment if the alternate site is not located within the county. Employment impacts could be offset by other economic growth in the area.
Transportation	SMALL to LARGE	Transportation impacts associated with construction workers 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. For rail transportation of coal and lime, the impact is considered MODERATE to LARGE.
Aesthetics	MODERATE to LARGE	Aesthetic impacts due to the presence of plant units, cooling towers, plume stacks, and coal piles. Intermittent noise from construction, commuter traffic, and waste disposal; continuous noise from cooling towers and mechanical equipment. Rail transportation of coal and lime would result in MODERATE noise impacts. Additional impacts would occur from the new transmission line and rail spur that would be needed. Depending on the location of the site chosen, these impacts could be LARGE.
Historic and archaeological resources	SMALL to MODERATE	An alternate location would necessitate cultural resource studies to identify, evaluate, and mitigate potential impacts of new plant construction at developed and undeveloped sites.
Environmental justice	SMALL to MODERATE	Impacts would vary depending on population distribution and makeup at the site. Impacts should be similar to those experienced by the population as a whole. Some impacts on housing could occur during construction. Loss of jobs could reduce employment prospects. Impacts could be offset by economic growth in the area and the ability of affected workers to commute to other jobs.

The waste would be disposed of onsite, accounting for approximately 100 ac of land area over the 40-year plant life.[(a)]

Depending particularly on the location and length of the transmission line and rail line routing, this alternative would result in MODERATE to LARGE land-use impacts.

- **Ecology**

Locating a coal-fired plant at an alternate site would result in construction and operational impacts. Approximately 1460 ac of land would be converted to industrial use. Even assuming siting at a previously disturbed area, the impacts would affect ecological resources. 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 cause entrainment and impingement of fish and other aquatic organisms, and result in adverse impacts on aquatic resources. If needed, construction and maintenance of an electric power transmission line and a rail spur also would have ecological impacts. There would be some additional impact on terrestrial ecology from drift from the cooling towers. Overall, the ecological impacts of constructing a coal-fired plant with a closed-cycle cooling system at an alternate site are considered to be MODERATE to LARGE and would be greater than renewal of the Palisades OL.

- **Water Use and Quality**

Surface water. The coal-fired generation alternative at an alternate site is assumed to use a closed-cycle cooling system with cooling towers. For alternate sites, 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 of Michigan. The impacts would be SMALL to MODERATE and dependent on the receiving body of water.

Groundwater. Groundwater use is possible for a coal-fired plant at an alternate site if surface-water resources are limited for makeup and potable water. Groundwater withdrawal could require a permit. Impacts on groundwater use and quality of a coal-fired plant with a closed-cycle cooling system at an alternate site would be SMALL to MODERATE, depending on the volume of groundwater withdrawn.

(a) Only half of the land area needed for by-product disposal is directly attributable to the alternative of renewing the Palisades OL for 20 years.

- **Air Quality**

The air quality impacts of coal-fired generation vary considerably from those of nuclear generation due to emissions of sulfur oxides (SO_x), nitrogen oxides (NO_x), particulate matter, carbon monoxide (CO), hazardous air pollutants such as mercury, and naturally occurring radioactive materials.

A new coal-fired generating plant located in southern Michigan would likely need a prevention of significant deterioration (PSD) permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants as set forth in 40 CFR Part 60, Subpart D(a). The standards establish limits for particulate matter and opacity (40 CFR 60.42(a)), sulfur dioxide (SO_2) (40 CFR 60.43(a)), and NO_x (40 CFR 60.44(a)).

The U.S. Environmental Protection Agency (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 Clean Air Act. All of Michigan has been classified as attainment or unclassified for criteria pollutants (40 CFR 81.323). In the posted amendment to that classification, dated April 30, 2004, there are several instances of nonattainment for ozone, including one for Van Buren County (EPA 2004a).

Section 169A of the Clean Air Act 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 toward 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. Isle Royale National Park and Seney National Wildlife Refuge are Class I areas where visibility is an important value (40 CFR 81.407). Both of these areas are located in the Upper Peninsula of Michigan. Air quality in these areas would not likely be affected by a coal-fired plant at an alternate site in southern Michigan in the vicinity of Palisades.

In 1998, the EPA issued a rule requiring 22 eastern states, including Michigan, to revise their state implementation plans to reduce NO_x emissions. Nitrogen oxide emissions contribute to violations of the national ambient air quality standard for ozone (40 CFR 50.9).

The total amount of NO_x that can be emitted by each of the 22 states in the year 2007 ozone season (May 1 to September 30) is presented in 40 CFR 51.121(e). For Michigan, the amount is 229,702 tons.

Anticipated impacts for particular pollutants that would result from a coal-fired plant at an alternate site are as follows:

Sulfur oxides. A new coal-fired power plant would be subject to the requirements in Title IV of the Clean Air Act. Title IV was enacted to reduce SO_2 and NO_x emissions, 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. The 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 acquire allowances from owners of other power plants by purchase 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 regional 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 wet limestone flue gas desulfurization to minimize SO_x emissions (90 percent removal), the total annual stack emissions would be approximately 2750 tons of SO_x (NMC 2005).

Nitrogen oxides. Section 407 of the Clean Air Act 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, issued on September 16, 1998 (EPA 1998), limits the discharge of any gases that contain NO_x (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 by using NO_x burners with overfire air and selective catalytic reduction (SCR) (95 percent reduction), the total annual NO_x emissions for a new coal-fired power plant would be approximately 690 tons (NMC 2005). This level of NO_x emissions would be greater than the Palisades OL renewal alternative.

Particulate matter. NMC estimates that the total annual stack emissions would include 120 tons of filterable total suspended particulates and 28 tons of particulate matter having an aerodynamic diameter less than or equal to 10 μm (PM_{10}) (40 CFR 50.6). Fabric filters (99.9 percent removal) 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 under the Palisades 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 CO emissions would be approximately 800 tons per year (NMC 2005). This level of emissions is greater than that under the Palisades 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. The EPA found that coal-fired power plants 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, on March 15, 2005, the EPA issued the Clean Air Mercury Rule to permanently cap and reduce mercury emissions from coal-fired power plants (EPA 2005).

Uranium and thorium. Coal contains uranium and thorium. 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 5.2 tons of uranium and 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 that under 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 at an alternate site would be MODERATE. The impacts would be clearly noticeable but would not destabilize air quality.

- **Waste**

  Debris would be generated during construction activities. During operations, coal combustion generates waste in the form of ash, and equipment for controlling air pollution generates additional ash and scrubber sludge. Two 400-MW(e) coal-fired plants would generate approximately 319,000 tons of this waste annually for 40 years (NMC 2005). The ash and scrubber sludge would be disposed of onsite, accounting for approximately 100 ac of land area over the 40-year plant life. Waste impacts on groundwater and surface water could extend beyond the operating life of the plant if leachate and runoff from the waste storage area occurs. Disposal of the waste could noticeably affect land use and groundwater quality; however, 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.

  In May 2000, the EPA issued a "Notice of Regulatory Determination on Wastes from the Combustion of Fossil Fuels" (EPA 2000b). The EPA concluded that some form of national regulation is warranted to address coal combustion waste products because: (a) the composition of these wastes could present danger to human health and the environment under certain conditions; (b) the 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; (c) present disposal practices are such that, in 1995, these wastes were being managed in 40 to 70 percent of landfills and surface impoundments without reasonable controls in place, particularly in the area of groundwater monitoring; and (d) 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 of 1976.

  For all of the preceding reasons, the appropriate characterization of impacts from waste generated from burning coal is MODERATE; the impacts would be clearly noticeable but would not destabilize any important resource.

- **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 NRC 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 a coal-fired plant would take approximately 5 years. The NRC staff assumed that construction would take place while Palisades continues operation and would be completed by the time Palisades permanently ceases operations. The workforce would be expected to vary between 600 and 1500 workers during the 5-year construction period (NRC 1996). These workers would be in addition to the approximately 644 workers employed at Palisades (534 permanent employees and 110 contractors as of the writing of the ER; NMC 2005). 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 Van Buren and Berrien Counties or from other counties in the Kalamazoo area. After construction, the communities would be impacted by the loss of the construction jobs, although this loss would be possibly offset by other growth currently being projected for the Kalamazoo area.

Construction of a replacement coal-fired power plant at an alternate site would impact the communities around Palisades as they would experience the impact of operational job loss. The communities around the new site would have to absorb the impacts of a large, temporary workforce (up to 1500 workers at the peak of construction) and a permanent workforce of approximately 75 to 120 workers. In the GEIS, the NRC 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. Alternate sites would need to be analyzed on a case-by-case basis, and socioeconomic impacts could range from SMALL to LARGE.

- **Transportation**

  During the 5-year construction period of replacement coal-fired units, up to 1500 construction workers would be working at the site. The addition of these workers could affect traffic loads on existing highways. 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 and lime would likely be delivered by rail. Transportation impacts would depend upon the site location. Socioeconomic impacts associated with rail transportation would likely be MODERATE to LARGE.

- **Aesthetics**

  The two coal-fired power plant units could be as much as 200 ft tall with cooling towers, stacks, and coal piles visible in daylight hours. The exhaust stacks could be as much as 650 ft high. The units and associated stacks would also be visible at night because of outside lighting. 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, providing that the lighting meets Federal Aviation Administration requirements (FAA 2000), and appropriate use of shielding. There could be a significant impact if construction of a new transmission line and/or rail spur is needed. Overall, the addition of a coal-fired plant and the associated stacks at an alternate site would likely have a MODERATE aesthetic impact.

  Coal-fired plant generation would introduce mechanical sources of noise that would be audible offsite. 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, such as cooling towers. Intermittent sources include the equipment related to coal handling, solid-waste disposal, transportation related to coal and lime delivery, use of outside loudspeakers, and the commuting of plant employees. These impacts are considered to be MODERATE.

  Noise impacts associated with rail delivery of coal and lime to a plant at an alternate 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 impacts of noise on residents in the vicinity of the facility and the rail line are considered MODERATE.

Aesthetic impacts associated with the construction and presence of the new transmission line and rail spur could be LARGE, depending on the location of the site chosen. Overall, the aesthetic impacts associated with locating a coal-fired plant at an alternate site can be categorized as MODERATE to LARGE.

- **Historic and Archaeological Resources**

  Before construction or any ground disturbance at an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on historic and archaeological 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 corridors, rail lines, or other rights-of-way). Other lands, if any, that are acquired to support the plant would also likely need an inventory of cultural resources to identify and evaluate existing historic and archaeological resources and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

  Historic and archaeological resources must be evaluated on a site-specific basis. The impacts can generally be effectively managed under current laws and regulations, and as such, the categorization of impacts could range from SMALL to MODERATE, depending on what resources are present, and whether mitigation is necessary.

- **Environmental Justice**

  Environmental justice impacts would depend upon the site chosen and the nearby population distribution. Construction activities would offer new employment possibilities. This could affect housing availability and prices during construction, which could disproportionately affect minority and low-income populations. The closure of Palisades would result in a decrease in employment of approximately 644 operating employees. However, these projected job losses could be offset by economic growth in the Kalamazoo area. Overall, environmental justice impacts would range from SMALL to MODERATE.

8.2.1.2 Once-Through Cooling System

This section discusses the environmental impacts of constructing a coal-fired generation system using once-through cooling at an alternate 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. However, the design and operation of the intake would need to comply with Phase II performance standards of the EPA's 316(b) regulations to minimize adverse impacts associated with water withdrawal, and heated discharges would need to comply with 316(a) regulations.

Table 8-3. Summary of Environmental Impacts of Coal-Fired Generation Using Once-Through Cooling at an Alternate Site

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land use	Impacts may be less (e.g., through elimination of cooling towers) or greater (e.g., if a reservoir is required).
Ecology	Impacts would depend on ecology at the site. Possible impacts associated with entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock. No impact on terrestrial ecology from cooling-tower drift.
Water use and quality – surface water	Increased water withdrawal leading to possible water-use conflicts; thermal load higher on receiving body of water than with closed-cycle cooling; no discharge of cooling-tower blowdown.
Water use and quality – groundwater	No change
Air quality	No change
Waste	No change
Human health	No change
Socioeconomics	No change
Transportation	No change
Aesthetics	Less aesthetic impact because cooling towers would not be used.
Historic and archaeological resources	No change
Environmental justice	No change

8.2.2 Natural-Gas-Fired Generation

The environmental impacts of the natural-gas-fired generation alternative are examined in this section for both the Palisades site and an alternate site. The NRC staff assumed that the plant would use a closed-cycle cooling system (Section 8.2.2.1). In Section 8.2.2.2, the staff also evaluated the impacts of an open-cycle cooling system at an alternate site.

The existing switchyard, offices, and transmission lines would be used for the gas-fired alternative at the Palisades site. For purposes of analysis, NMC estimates that approximately 5 mi of buried gas supply pipeline would need to be constructed (NMC 2005).

If a new natural-gas-fired plant were built at an alternate site in southern Michigan to replace Palisades, construction of a new natural gas supply pipeline and a new transmission line would be needed. NMC estimated 5 mi of new gas pipeline would be needed and approximately 10 mi of new 345-kV transmission line (NMC 2005). In the GEIS, the NRC staff estimated disturbance of up to 2500 ac for construction of a 60-mi transmission line to an alternate greenfield site (NRC 1996).

The NRC staff assumed that a replacement natural-gas-fired plant would use combined-cycle technology (NMC 2005). 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.

NMC assumed two standard-sized units – a 530-MW(e) unit and a 263-MW(e) unit – with a total capacity of 793 MW(e), as the gas-fired alternative at Palisades (NMC 2005). This capacity is approximately equivalent to the Palisades total net capacity of 786 MW(e). NMC estimates that the plant would consume approximately 38.4 billion ft^3 of gas annually (NMC 2005).

Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.2 are from the NMC ER (NMC 2005). The NRC staff reviewed this information and compared it with environmental impact information in the GEIS. Although the OL renewal period is only 20 years, the impact of operating a natural-gas-fired plant for 40 years is considered (as a reasonable projection of the operating life of a natural-gas-fired plant).

8.2.2.1 Closed-Cycle Cooling System

The overall impacts of the natural-gas-generating system are discussed in the following sections and summarized in Table 8-4. The extent of impacts at an alternate site would depend on the location of the particular site selected.

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

Impact Category	Palisades Site		Alternate Site	
	Impact	Comments	Impact	Comments
Land use	MODERATE to LARGE	Uses approximately 30 ac for power block, cooling towers, roads, and parking areas. Additional impact of up to approximately 120 ac for construction of 5 mi of underground gas pipeline.	MODERATE to LARGE	Uses approximately 87 ac for power block, cooling towers, offices, roads, and parking areas. Additional land needed for new transmission line (amount dependent on site chosen) and for construction and/or upgrade of an underground gas pipeline.
Ecology	MODERATE to LARGE	Uses undeveloped areas at current Palisades site, plus construction of a gas pipeline. Impacts on terrestrial ecology from cooling-tower drift are expected.	MODERATE to LARGE	Impacts depend on the location and ecology of the site, surface-water body used for intake and discharge, and transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity.
Water use and quality – surface water	SMALL	Discharge of cooling tower blowdown containing increased dissolved solids and intermittent low concentrations of biocides would be released to Lake Michigan. Temporary erosion and sedimentation could occur in streams crossed by rights-of-way during pipeline construction.	SMALL to MODERATE	Impacts depend on volume of water withdrawn and discharged and characteristics of surface-water body. Discharge of cooling-tower blowdown containing increased dissolved solids and intermittent low concentrations of biocides would be released to surface water. Temporary erosion and sedimentation could occur in streams crossed by rights-of-way during pipeline construction.

Table 8-4. (contd)

Impact Category	Palisades Site		Alternate Site	
	Impact	Comments	Impact	Comments
Water use and quality – groundwater	SMALL	Use of groundwater limited to grounds maintenance. Adequate surface water available from Lake Michigan.	SMALL to MODERATE	Impacts depend on location of site, volume of water withdrawn and discharged, and characteristics of the aquifer.
Air quality	MODERATE	Sulfur oxides • 12 tons/yr Nitrogen oxides • 190 tons/yr Carbon monoxide • 292 tons/yr PM_{10} particulates • 37 tons/yr Some hazardous air pollutants.	MODERATE	Same emissions as Palisades site, although pollution control standards may vary depending on location.
Waste	SMALL	Minimal waste from fuel production. Debris would be generated and removed during construction.	SMALL	Same waste produced as if produced at the Palisades site. Waste disposal constraints may vary.
Human health	SMALL	Human health risks associated with gas-fired plants may result from NO_x emissions, which are regulated. Impacts are expected to be SMALL.	SMALL	Same impacts as the Palisades site.
Socioeconomics	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 420 additional workers during the peak of the 3-year construction period, followed by a reduction of the current Palisades workforce from 644 to 30. Van Buren County would experience reduced demand on socioeconomic resources as well as a loss in its tax base and employment, but potentially offset by projected economic growth in the area. Impacts during operation would be SMALL.	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 420 additional workers during the peak of the 3-year construction period. Van Buren County would experience a loss in its tax base and employment, potentially offset by projected economic growth in the area.

Table 8-4. (contd)

Impact Category	Palisades Site		Alternate Site	
	Impact	Comments	Impact	Comments
Transportation	SMALL to MODERATE	Transportation impacts associated with construction workers would be MODERATE as 644 Palisades workers and 420 construction workers would be commuting to the site. Impacts during operation would be SMALL as the workforce would be reduced to 30 commuters.	SMALL to MODERATE	Transportation impacts associated with 420 construction workers and 30 plant workers would be MODERATE and SMALL, respectively.
Aesthetics	MODERATE	MODERATE aesthetic impacts due to impact of plant units, exhaust stacks, and gas compressors. Intermittent noise from construction and continuous noise from cooling towers and mechanical equipment would result in MODERATE impacts.	MODERATE to LARGE	Impacts would be similar to the Palisades site with additional impact from the new 345-kV transmission line that would be needed.
Historic and archaeological resources	SMALL to MODERATE	Some construction would affect previously developed parts of the Palisades site; a cultural resource inventory would be needed to identify, evaluate, and mitigate potential impacts of new plant construction on cultural resources in undeveloped areas.	SMALL to MODERATE	Cultural resource studies would be needed to identify, evaluate, and mitigate potential impacts of new plant construction at developed and undeveloped sites.
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; loss of 614 operating jobs at Palisades could reduce employ-ment prospects for minority and low-income populations. Impacts could be offset by projected economic growth and ability of affected workers to commute to other jobs.	SMALL to MODERATE	Impacts would vary depending on population distribution and makeup at site.

In addition to the impacts discussed below for a gas-fired plant at either the Palisades site or at an alternate site, impacts would occur offsite as a result of gas production and transportation.

Impacts of production operations would include an increase in fugitive dust emissions, surface-water runoff, erosion, and 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 the production and distribution.

- **Land Use**

  For siting at Palisades, existing facilities and infrastructure 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 replacement plant alternative would use the switchyard, offices, and transmission lines. Much of the land that would be used has been previously disturbed. At Palisades, the staff assumed that approximately 30 ac would be needed for the plant and associated infrastructure. There would be an additional impact of up to approximately 120 ac for construction of a gas pipeline. Approximately 30 ac of undeveloped land at the Palisades site is available in the northeastern portion of the site. However, there would be insufficient buffer available between the plant and Van Buren State Park (adjacent to the Palisades site to the north).

  For construction at an alternate site, the NRC staff assumed in the GEIS that 110 ac would be needed for a 1000-MW(e) plant and associated infrastructure (NRC 1996). This estimate would be scaled down for the 793-MW(e) capacity of the proposed gas-fired alternative (i.e., 87 ac). The additional amount of land impacted by the construction of a new transmission line and a gas pipeline is dependent on the site location chosen. The NRC staff assumed in the GEIS that approximately 2500 ac would be impacted for construction of a 60-mi transmission line (NRC 1996), although NMC estimates only 10 mi of transmission line might be needed. In addition, approximately 120 ac could be disturbed during construction and/or upgrade of an underground pipeline, assuming an alternate site would be located within 5 mi of a gas pipeline connection.

  Regardless of where a gas-fired plant is built, additional land (approximately 3600 ac) would be required for natural gas wells and collection stations (NRC 1996). Partially offsetting these offsite land requirements would be the elimination of the need for uranium mining to supply fuel for Palisades. In the GEIS (NRC 1996), the NRC staff estimated that approximately 1000 ac would be affected for mining the uranium and processing it during the operating life of a nuclear power plant. Overall, land-use impacts would be MODERATE to LARGE.

- **Ecology**

  At the Palisades site, there would be ecological impacts related to possible habitat loss and to cooling-tower drift associated with siting of the gas-fired plant. There would also be ecological impacts associated with bringing a new underground gas pipeline to the Palisades site. Impacts due to habitat loss could be reduced through the use of previously impacted land. Ecological impacts at an alternate site would depend on the nature of the land converted for the plant and the possible need for a new gas pipeline and/or transmission line. Construction of the transmission line and construction and/or upgrading of the gas pipeline to serve the plant would be expected to have temporary ecological impacts. Ecological impacts on the plant site and utility easements could include impacts on threatened or endangered species, wildlife habitat loss and reduced productivity, habitat fragmentation, and a local reduction in biological diversity. The cooling makeup water intake and discharge could have aquatic resource impacts. Overall, the ecological impacts are considered MODERATE to LARGE at either location.

- **Water Use and Quality**

  Surface water. Each of the natural-gas-fired units would include a heat-recovery boiler, using a portion of the waste heat from the combustion turbines to make steam. The steam would then turn an electric generator. The net result would be an overall reduction in the amount of waste heat rejected from the plant, with an associated reduction in the amount of cooling water required by the plant. Thus, the cooling-water requirements for the natural-gas-fired combined-cycle units would be much less than those for conventional steam-electric generators, including the existing nuclear unit. Plant discharge would consist mostly of cooling-tower blowdown, with the discharge having a higher temperature and increased concentration of dissolved solids relative to the receiving body of water and intermittent low concentrations of biocides (e.g., chlorine). In addition to the cooling-tower blowdown, treated process waste streams and sanitary wastewater might also be discharged. All discharges would be regulated by the State of Michigan through a permit. There would be consumptive use of water due to evaporation from the cooling towers. Construction could cause temporary erosion and sedimentation in streams crossed by the rights-of-way. Overall, the surface-water impacts of the natural-gas-fired alternative at the Palisades site are considered SMALL.

  A natural-gas-fired plant at an alternate site is assumed to 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 with the coal 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. Discharges would be the same as those described above for the Palisades site. Construction could cause temporary erosion and sedimentation in streams crossed by the rights-of-way. Intake from and discharge to any

surface body of water would be regulated by the State of Michigan. The impacts would be SMALL to MODERATE.

Water-quality impacts from sedimentation during construction were characterized in the GEIS as SMALL (NRC 1996). The NRC staff also noted in the GEIS that operational water-quality impacts would be similar to, or less than, those from other generating technologies.

Groundwater. Any groundwater withdrawal would require a permit from the local permitting authority. Impacts on groundwater would depend on the volume and other characteristics of the source water budget. Use of groundwater at the Palisades site is unlikely because adequate surface water is available from Lake Michigan. Therefore, groundwater impacts at the Palisades site would be SMALL. Impacts at an alternate site would be SMALL to MODERATE depending on site-specific conditions.

- **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 Michigan would likely need a PSD permit and an operating permit under the Clean Air Act. A new combined-cycle natural gas power plant would also be subject to the new source performance standards for such units at 40 CFR Part 60, Subparts D(a) and GG. These regulations establish emission limits for particulates, opacity, SO_2, and NO_x.

In 1998, the EPA issued a rule requiring 22 eastern states, including Michigan, to revise their state implementation plans to reduce NO_x emissions. Nitrogen oxide emissions contribute to violations of the national ambient air quality standard (40 CFR 50.9) for ozone. The total amount of NO_x that can be emitted by each of the 22 states in the 2007 ozone season (May 1 to September 30) is presented in 40 CFR 51.121(e). For Michigan, the amount is 229,702 tons.

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 Clean Air Act. All of Michigan has been classified as attainment or unclassified for criteria pollutants (40 CFR 81.323). In the posted amendment to that classification dated April 30, 2004, there are several instances of nonattainment for ozone, including one for Van Buren County (EPA 2004a).

Section 169A of the Clean Air Act 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 (64 FR 35714; July 1,1999 (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 toward 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. Isle Royale National Park and Seney National Wildlife Refuge are Class I areas where visibility is an important value (40 CFR 81.407). Both of these areas are located in the Upper Peninsula of Michigan, and air quality in these areas would not likely be affected by a gas-fired plant at the Palisades site or at an alternate site in southern Michigan.

NMC projects the following emissions for the natural gas-fired alternative (NMC 2005):

Sulfur oxides – 12 tons/yr
Nitrogen oxides – 190 tons/yr
Carbon monoxide – 292 tons/yr
PM_{10} particulates – 37 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). The EPA found that natural-gas-fired power plants emit arsenic, formaldehyde, and nickel (EPA 2000a). Unlike coal- and oil-fired plants, the EPA did not determine that emissions of hazardous air pollutants from natural-gas-fired power plants should be regulated under Section 112 of the Clean Air Act.

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

The preceding emissions would likely be the same at Palisades 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 overall air quality impact for a new natural-gas-fired plant sited at Palisades or at an alternate site is considered MODERATE.

- **Waste**

  There will be spent SCR catalyst from NO_x emissions control and small amounts of solid-waste products (i.e., ash) from burning natural gas fuel. In the GEIS, the NRC staff concluded that waste generation from gas-fired technology would be minimal (NRC 1996). 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 Palisades or at an alternate site.

- **Human Health**

  In Table 8-2 of the GEIS, the NRC 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 contribute to health risks. NO_x emissions from any gas-fired plant would be regulated. For a plant sited in Michigan, NO_x emissions would be regulated by the Michigan Department of Environmental Quality (MDEQ). Human health effects would not be detectable or would be sufficiently minor that they would neither destabilize nor noticeably alter any important attribute of the resource. Overall, the impacts on human health of the natural-gas-fired alternative sited at Palisades or at an alternate site are considered SMALL.

- **Socioeconomics**

  Construction of a natural-gas-fired plant would take approximately 3 years. Peak employment would be approximately 420 workers (NMC 2005). The NRC staff assumed that construction would take place while Palisades continues operation and would be completed by the time it permanently ceases operations. During construction, the communities surrounding the Palisades 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 parts of Van Buren and Berrien Counties or from other counties. After construction, the communities would be impacted by the loss of jobs. The current Palisades workforce (approximately 644 workers) would decline through a decommissioning period to a minimal maintenance size. The gas-fired plant would introduce a replacement tax base at Palisades or at an alternate site and approximately 30 new permanent jobs. This would represent a net loss of 614 jobs at the Palisades site.

In the GEIS (NRC 1996), the NRC 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 with 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. The loss of 614 permanent jobs (up to 644 jobs if an alternate site is not located in Van Buren County) may be partially tempered by the projected economic growth of the Kalamazoo area. For these reasons, gas-fired generation socioeconomic impacts associated with construction and operation of a natural-gas-fired power plant would be SMALL to MODERATE for siting at Palisades 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 and operating personnel commuting to the plant site would depend on the population density and transportation infrastructure in the vicinity of the site. The impacts can be classified as SMALL to MODERATE for siting at Palisades or at an alternate site.

- **Aesthetics**

  The turbine buildings (approximately 100 ft tall) and exhaust stacks (approximately 125 ft tall) would be visible during daylight hours from offsite. The gas pipeline compressors would also be visible. Noise and light from the plant would be detectable offsite. Intermittent noise from construction and continuous noise from cooling towers and mechanical equipment would result in MODERATE impacts. Noise impacts would be similar to those described for the Palisades site. Overall, the aesthetic impacts associated with construction and operation of a gas-fired plant at the Palisades site are categorized as MODERATE to LARGE.

  At an alternate site, the buildings, cooling towers, cooling-tower plumes, and the associated transmission line and gas pipeline compressors would be visible offsite. There would also be a visual impact from a new 345-kV transmission line. Aesthetic impacts would be mitigated if the plant were located in an industrial area adjacent to other power plants. Noise impacts would be similar to those described for the Palisades site. Overall, the aesthetic impacts associated with an alternate site are categorized as MODERATE to LARGE. Depending on the site chosen, the greatest contributor to aesthetic impact would be the new transmission line.

- **Historic and Archaeological Resources**

  Before construction or any ground disturbance at Palisades or at an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on historic and archaeological 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 and pipeline corridors, or other rights-of-way). Other lands, if any, that are acquired to support the plant would also likely need an inventory of cultural resources to identify and evaluate existing historic and archaeological resources and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

  Historic and archaeological resources must be evaluated on a site-specific basis. The impacts can generally be effectively managed under current laws and regulations, and as such, the categorization of impacts ranges from SMALL to MODERATE, depending on what resources are 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 natural-gas-fired plant were built at the Palisades site. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect minority and low-income populations. Closure of Palisades would result in a decrease in employment of approximately 644 operating employees, possibly offset by general growth in the Kalamazoo 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 are expected to be SMALL to MODERATE. Projected economic growth in the Kalamazoo area and the ability of minority and low-income populations to commute to other jobs outside the area could mitigate any adverse effects.

  Impacts at an alternate site would depend upon the site chosen and the nearby population distribution; therefore, impacts could range from 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 an alternate 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. However, the design and operation of the intake would need to comply with Phase II

performance standards of EPA's 316(b) regulations to minimize adverse impacts associated with water withdrawal, and heated discharges would need to comply with 316(a) regulations.

8.2.3 Nuclear Power Generation

Since 1997, the NRC has certified four 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), the 600-MW(e) AP600 Design (10 CFR Part 52, Appendix C), and the advanced 1117- to 1154-MW(e) AP1000 design (10 CFR Part 52, Appendix D). All these plants are light-water reactors. Although no applications for a construction permit or a combined license

Table 8-5. Summary of Environmental Impacts of Natural-Gas-Fired Generation Using Once-Through Cooling at an Alternate Site

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land use	Impacts may be less (e.g., through elimination of cooling towers) or greater (e.g., if a reservoir is required).
Ecology	Impacts would depend on the ecology at the site. Potential impacts associated with entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock. No impact on terrestrial ecology from cooling-tower drift.
Water use and quality – surface water	Increased water withdrawal leading to possible water-use conflicts, thermal load higher on receiving body of water than with closed-cycle cooling; no discharge of cooling-tower blowdown.
Water use and quality – groundwater	No change
Air quality	No change
Waste	No change
Human health	No change
Socioeconomics	No change
Transportation	No change
Aesthetics	Less aesthetic impact because cooling towers would not be used.
Historic and archaeological resources	No change
Environmental justice	No change

based on these certified designs have been submitted to the NRC, the submission of the design certification applications indicates continuing interest in the possibility of licensing new nuclear power plants. In addition, recent escalation in prices of natural gas and electricity have made new nuclear power plant construction more attractive from a cost standpoint. In addition, System Energy Resources, Inc., Exelon Generations 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; Exelon 2003; Dominion 2003). Consequently, construction of a new nuclear power plant at either the Palisades site or at an alternate site is considered in this section. The NRC staff assumed that the new nuclear plant would have a 40-year lifetime. Consideration of a new nuclear generating plant to replace Palisades was not included in the NMC ER (NMC 2005).

The 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 Palisades or at an alternate site. The impacts shown in Table S-3 are for a 1000-MW(e) reactor and would need to be adjusted to reflect the replacement of 786 MW(e) generated by Palisades. 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 the 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 using open-cycle cooling is presented in Section 8.2.3.2.

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.

In addition to the impacts discussed below, impacts would occur offsite as a result of uranium mining. Impacts of mining would 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

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

	Palisades Site		Alternate Site	
Impact Category	**Impact**	**Comments**	**Impact**	**Comments**
Land use	MODERATE to LARGE	Requires approximately 500 to 1000 ac for the plant; would likely require the acquisition of additional land.	MODERATE to LARGE	Same as Palisades site plus additional land for transmission line.
Ecology	MODERATE to LARGE	Uses undeveloped areas at current Palisades site and additional undeveloped land adjacent to the site. Impacts dependent on specific location and ecology of the site. Impacts on terrestrial ecology from cooling-tower drift are expected. Use of cooling makeup water could affect aquatic resources.	MODERATE to LARGE	Impacts would depend on location and ecology of the site, surface-water body used for intake and discharge, and transmission line route; potential habitat loss and fragmentation; reduced productivity and biological diversity. Impacts on terrestrial ecology from cooling-tower drift are expected.
Water use and quality – surface water	SMALL	Discharge of cooling-tower blowdown containing increased dissolved solids and intermittent low concentrations of biocides would be released to Lake Michigan.	SMALL to MODERATE	Impacts would depend on the volume of water withdrawn and discharged and the characteristics of the surface-water body. Discharge of cooling-tower blowdown containing increased dissolved solids and intermittent low concentrations of biocides would be released to surface water.
Water use and quality – groundwater	SMALL	Use of groundwater is unlikely because the Palisades site has adequate surface water available from Lake Michigan.	SMALL to MODERATE	Impacts would depend on the volume of water withdrawn and discharged and the characteristics of the aquifer.
Air quality	SMALL to MODERATE	Fugitive emissions and emissions from vehicles and equipment during construction would be MODERATE. Small amount of emissions from diesel generators and possibly other sources during operation would be similar to current operation of Palisades.	SMALL to MODERATE	Same impacts as Palisades site.

Table 8-6. (contd)

Impact Category	Palisades Site Impact	Palisades Site Comments	Alternate Site Impact	Alternate Site Comments
Waste	SMALL	Waste impacts for an operating nuclear power plant are presented in 10 CFR Part 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Same impacts as Palisades site.
Human health	SMALL	Human health impacts for an operating nuclear power plant are presented in 10 CFR Part 51, Appendix B, Table B-1.	SMALL	Same impacts as Palisades site.
Socioeconomics	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 2500 workers during peak period of the 6-year construction period. Operating workforce assumed to be similar to Palisades; tax base preserved. Impacts during operation would be SMALL.	SMALL to LARGE	Construction impacts would depend on location. Impacts at a rural location could be LARGE. Van Buren County would experience a loss in its tax base and employment if the chosen site is located outside of the county, possibly offset by economic growth in the area.
Transportation	SMALL to LARGE	Transportation impacts associated with 2500 construction workers in addition to 644 Palisades workers would be LARGE. Transportation impacts of commuting plant personnel would be SMALL.	SMALL to LARGE	Impacts would depend on the location of the site. Transportation impacts of 2500 construction workers could be MODERATE to LARGE. Transportation impacts of 644 commuting plant personnel could be SMALL to MODERATE.
Aesthetics	SMALL to MODERATE	Aesthetic impacts due to addition of containment and other associated buildings would be SMALL. No exhaust stacks would be needed, and existing cooling towers would be used, if possible. Intermittent noise from construction and commuter traffic and continuous noise from cooling towers and mechanical equipment could result in impacts ranging from SMALL to MODERATE.	MODERATE to LARGE	Impacts would depend on the characteristics of the alternate site but would be similar to those at the Palisades site. Impacts would be less if the site selected is next to an industrial area. Impacts would be greater if a non-industrial site is selected. Additional visual impacts would occur from the new transmission line that would be needed.

Table 8-6. (contd)

Impact Category	Palisades Site Impact	Palisades Site Comments	Alternate Site Impact	Alternate Site Comments
Historic and archaeological resources	SMALL to MODERATE	Some construction would affect previously developed parts of the Palisades site; a cultural resource inventory would be needed to identify, evaluate, and mitigate potential impacts of new plant construction on cultural resources in undeveloped areas.	SMALL to MODERATE	Cultural resource studies would be needed to identify, evaluate, and mitigate potential impacts of new plant construction at developed and undeveloped sites.
Environmental justice	SMALL to MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. MODERATE impacts on housing may occur during construction. Employment impacts would be similar to the current operation of Palisades.	SMALL to LARGE	Impacts would vary depending on population distribution and makeup at the site.

because land needed for the new nuclear plant would offset land needed to supply uranium for fuel at Palisades.

- **Land Use**

  The existing facilities and infrastructure at the Palisades site would be used to the extent practicable, limiting the amount of new construction that would be required. Specifically, the NRC staff assumed that a replacement nuclear power plant would use the existing cooling towers, switchyard, offices, and transmission line rights-of-way. Much of the land that would be used has been previously disturbed. A replacement nuclear power plant at the Palisades site would alter approximately 500 to 1000 ac of land, excluding power lines (NRC 1996).

  The impact of a replacement nuclear generating plant on land use at the existing Palisades site is best characterized as MODERATE to LARGE, because the existing site is not large enough to accept the additional land requirements for construction. Additional land would have to be obtained outside of the existing boundaries, or Palisades would have to be dismantled before new construction began. The impact would be greater than the OL renewal alternative.

  Land-use impacts at an alternate site would be similar to siting at Palisades except for the land needed for a 345-kV transmission line to connect to existing lines to transmit power to NMC's customers in Michigan. The amount of land needed for the transmission line is dependent upon the location of the alternate site. In addition, it may be necessary to

construct a rail spur to an alternate site to bring in equipment during construction. 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 Palisades site would alter ecological resources because of the need to convert roughly 500 to 1000 ac of land to industrial use. Some of this land, however, would have been previously disturbed.

Siting at Palisades would have a MODERATE to LARGE ecological impact that would be greater than renewal of the Palisades OL.

At an alternate site, there would be construction impacts and new incremental operational impacts. Even assuming siting at a previously disturbed area, the impacts would affect ecological resources. 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. Impacts on terrestrial ecology could result from cooling-tower drift. 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 and would depend on the ecological conditions at the site.

- **Water Use and Quality**

Surface water. The replacement nuclear plant alternative at the Palisades site is assumed to use the existing closed-cycle cooling tower system, which would minimize incremental water-use and quality impacts. Plant discharge would consist mostly of cooling-tower blowdown, with the discharge having a higher temperature and increased concentration of dissolved solids relative to the receiving body of water and intermittent low concentrations of biocides (e.g., chlorine). In addition to the cooling-tower blowdown, treated process waste streams and sanitary wastewater might also be discharged. All discharges would be regulated by the State of Michigan through a permit. Surface-water impacts are expected to remain SMALL; the impacts would be sufficiently minor that they would not noticeably alter any important attribute of the resource.

Cooling towers would likely be used at an alternate site. For an alternate site, 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 of Michigan. The impacts would be SMALL to MODERATE.

Groundwater. The NRC staff assumed that a new nuclear power plant located at Palisades would obtain potable, process, and fire-protection water from the South Haven Municipal Water Authority, similar to the current practice for Palisades (see Section 2.2.2).

No groundwater is currently used for operation of Palisades other than for maintenance of the grounds. It is unlikely that groundwater would be used for an alternative nuclear power plant sited at Palisades. Use of groundwater for a nuclear power plant sited at an alternate site is a possibility. Any groundwater withdrawal would require a permit from the local permitting authority.

Overall, the impacts on groundwater use and quality from a closed-cycle new nuclear alternative at the Palisades site is considered SMALL. Impacts from a similar plant at an alternate site are considered to be SMALL to MODERATE, depending on the volume of groundwater used and characteristics of the aquifer.

- **Air Quality**

  Construction of a new nuclear plant sited at Palisades or at an alternate site would result in fugitive emissions during the 6-year construction period. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process. Air quality impacts from construction could be MODERATE. An operating nuclear plant would have minor air emissions associated with diesel generators and other minor intermittent sources and would be similar to the current impacts associated with operation of Palisades (i.e., SMALL). These emissions are not regulated. Emissions for a plant sited in Michigan would be regulated by the MDEQ. Overall, emissions and associated impacts are considered SMALL to MODERATE.

- **Waste**

  The waste impacts associated with operation of a nuclear power plant are presented in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B. Construction-related debris would be generated during construction activities and removed to an appropriate disposal site. Overall, waste impacts are considered SMALL.

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

- **Human Health**

  Human health impacts for an operating nuclear power plant are presented in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. Overall, human health impacts are considered SMALL.

Siting the replacement nuclear power plant at a site other than Palisades 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, NRC staff assumed a construction period of 6 years and a peak workforce of 2500. Additional land would have to be acquired to construct a new nuclear plant at the Palisades site, or Palisades would have to be decommissioned and dismantled before construction began. During construction, the communities surrounding the Palisades 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 parts of Van Buren and Berrien Counties or from other counties.

The replacement nuclear unit is assumed to have an operating workforce comparable to the 644 workers currently working at Palisades. The replacement nuclear unit would provide a new tax base to offset the loss of tax base associated with decommissioning of Palisades. For all of these reasons, the appropriate characterization of nontransportation socioeconomic impacts for replacement nuclear units constructed at Palisades would be SMALL to MODERATE; the socioeconomic impacts would be noticeable, but would be unlikely to destabilize the area.

If a new nuclear power plant were constructed at an alternate site, the communities around the Palisades site would experience the impact of Palisades' operational job loss (although potentially tempered by projected economic growth in the area). 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 644 workers. In the GEIS (NRC 1996), the NRC 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. Alternate sites would need to be analyzed on a case-by-case basis, and impacts could range from SMALL to LARGE.

- **Transportation**

During the 6-year construction period, up to 2500 construction workers and 644 Palisades workers would be commuting to the Palisades site. The addition of the construction workers could place significant traffic loads on existing highways. 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 Palisades and are considered 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 Palisades and other associated buildings would likely be visible in daylight hours over many miles. Natural draft towers could be up to 500 ft high. Mechanical-draft towers could be up to 100 ft high and would also have an associated noise impact and condensate plumes. 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. Existing cooling towers would be used, if possible.

Intermittent noise impacts from construction and commuter traffic is likely. More continuous noise from a new nuclear plant would potentially be audible offsite in calm wind conditions or when the wind is blowing in the direction of the listener. Noise impacts from a new nuclear plant would be similar to those from the existing Palisades unit. Mitigation measures, such as reduced or no use of outside loudspeakers, can be employed to reduce noise impacts to levels that would ranges from SMALL to MODERATE.

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 a significant aesthetic impact associated with construction of a new transmission line. The length of the transmission line would be dependent upon the location of the plant. Noise and light from the plant would be detectable offsite. The impact of noise and light would be less if the plant were located in an industrial area adjacent to other power plants. Overall, the aesthetic impacts associated with locating at an alternative site can be categorized as MODERATE to LARGE. Depending on the location chosen, the greatest contributor to this categorization could be the aesthetic impact of the new transmission line.

- **Historic and Archaeological Resources**

Before construction or any ground disturbance at Palisades or at an alternate site, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on historic and archaeological 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 and pipeline corridors, or other rights-of-way). Other lands, if any, that are acquired to support the plant would also likely need an inventory of cultural resources to identify and evaluate

existing historic and archaeological resources and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Historic and archaeological resources must be evaluated on a site-specific basis. The impacts can generally be effectively managed under current laws and regulations, and as such, the categorization of impacts ranges from SMALL to MODERATE, depending on what resources are 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 nuclear plant were built at the Palisades site. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect the minority and low-income populations. After completion of construction, it is possible that the ability of the local government to maintain social services could be reduced at the same time as diminished economic conditions reduce employment prospects for the minority and low-income populations. Overall, impacts are expected to be SMALL to MODERATE. Projected economic growth in the Kalamazoo area and the ability of minority and low-income populations to commute to other jobs outside the Van Buren County area could mitigate any adverse effects.

Impacts at an alternate site would depend upon the site chosen and the nearby population distribution and are likely to vary from SMALL to LARGE.

8.2.3.2 Once-Through Cooling System

This section discusses the environmental impacts of constructing a nuclear power plant at an alternate 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. However, the design and operation of the intake would need to comply with Phase II performance standards of the EPA's 316(b) regulations to minimize adverse impacts associated with water withdrawal, and heated discharges would need to comply with 316(a) regulations.

Table 8-7. Summary of Environmental Impacts of a New Nuclear Power Plant Using Once-Through Cooling at an Alternate Site

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land use	Impacts may be less (e.g., through elimination of cooling towers) or greater (e.g., if a reservoir is required).
Ecology	Impacts would depend on the ecology at the site. Possible impacts associated with entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock. No impact on terrestrial ecology from cooling-tower drift.
Water use and quality – surface water	Increased water withdrawal leading to possible water-use conflicts, thermal load higher on receiving body of water than with closed-cycle cooling; no discharge of cooling-tower blowdown.
Water use and quality – groundwater	No change
Air quality	No change
Waste	No change
Human health	No change
Socioeconomics	No change
Transportation	No change
Aesthetics	Less aesthetic impact because cooling towers are not used.
Historic and archaeological resources	No change
Environmental justice	No change

8.2.4 Purchased Electrical Power

If available, purchased power from other sources could potentially obviate the need to renew the Palisades OL. It is unlikely, however, that sufficient baseload, firm power supply would be available to replace the Palisades capacity.

Imported power from Canada or Mexico is unlikely to be available for replacement of Palisades capacity. In Canada, 60 percent of the country's electrical generation capacity is derived from renewable energy sources, principally hydropower (EIA 2004). Canada plans to expand hydroelectric capacity, including large-scale projects (EIA 2004). Canada's nuclear generation is projected to increase from 10,000 MW in 2001 to 15,200 MW in 2020 before reaching a forecasted decline to 12,400 MW in 2025 (EIA 2004). The EIA projected that total gross U.S. imports of electricity from Canada and Mexico will gradually increase from 38.4 billion kWh in 2001 to 47.2 billion kWh in 2010 and then gradually decrease to 15.2 billion kWh in 2025 (EIA 2004). Consequently, it is unlikely that electricity imported from Canada or Mexico would be able to replace the capacity of Palisades.

If power to replace the capacity of Palisades 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 Palisades OL. 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 the NRC are discussed in the following paragraphs.

8.2.5.1 Oil-Fired Generation

EIA projects that oil-fired plants will account for very little of the new generation capacity in the United States during the 2004 to 2025 time period because of higher fuel costs and lower efficiencies (EIA 2004). Nevertheless, an oil-fired generating alternative at the Palisades site for replacement of power generated by Palisades is considered in this section.

Consumers Energy has two oil/gas coal-fired units. These units produce about 1 percent of Consumers Energy's total power (NMC 2005). Oil-fired operation is more expensive than nuclear or coal-fired operation. In addition, future increases in oil prices are expected to make oil-fired generation increasingly more expensive than coal-fired generation. The high cost of oil has prompted a steady decline in its use for electricity generation. For these reasons, oil-fired generation is not an economically feasible alternative to license renewal for Palisades.

Construction and operation of an oil-fired plant would have environmental impacts. For example, in Section 8.3.11 of the GEIS, the NRC staff estimated that construction of a 1000-MWe oil-fired plant would require about 120 acres (NRC 1996). In addition, operation of oil-fired

plants would have environmental impacts (including impacts on the aquatic environment and air) that would be similar to those from a coal-fired plant.

8.2.5.2 Wind Power

Wind power, by itself, is not a suitable alternative to replace the large baseload electrical generating capacity of Palisades. 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 (on the order of 30 percent) (NRC 1996). 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.

The Lake Michigan shoreline region in the State of Michigan, including Van Buren County, has good wind power potential. The annual average wind power for this part of the state is rated as Class 3. Areas designated Class 3 or greater are suitable for most wind energy applications (DOE 2004a). However, the wind power class attenuates rapidly to Class 2 inland from the lake's coastline. Michigan also has good wind resources in the northern part of the Lower Peninsula. These areas, however, are confined to exposed hilltops and ridge crests, which makes them unsuitable for utility-scale wind energy applications. Further, land-use conflicts, such as urban development and environmentally sensitive areas, minimize the amount of land suitable for wind energy applications (PNL 1986).

DOE's National Renewable Energy Laboratory (NREL) estimates that the footprint of a 1.5-MW wind turbine is between 0.25 and 0.5 ac. In addition, a spacing interval of 5 to 10 turbine rotor diameters between wind turbines is typically maintained to prevent interferences between turbines (NREL 2006). Five turbine rotor diameters would be suitable for optimal wind conditions, increasing to 10 depending on the amount of wind turbulence and other potential topographic disturbances. Land disturbance during construction to install the turbine is estimated to be between 1 to 3 ac per turbine related to grading the site for installation, laydown areas for equipment and materials, and staging areas for construction equipment used to hoist the turbines and their towers into place. The area surrounding the turbine is then reclaimed after construction is completed. These estimates do not include land used for substations, control buildings, access roads, and other related facilities. Assuming the largest available land-based turbine is used (currently, 1.5 MW), 524 turbines are estimated to be needed in land areas with a wind class of Class 3 or greater to produce 786 MW(e), using the NREL's Wind Farm Area Calculator (NREL 2006). Assuming a rotor diameter of roughly 200 ft for a 1.5-MW turbine, the total acreage for a wind farm with 524 turbines in optimal wind conditions could require more than 2,000 ac; 262 ac would be dedicated to the turbine footprint (assuming a spacing interval of five turbine rotor diameters and approximately 0.5 ac per turbine base), and the remaining land between turbines could be available for other uses, such as grazing or agricultural land. These numbers do not take into account the low annual capacity factor of approximately 30 percent that is associated with wind energy.

Consequently, the NRC staff concludes that the current Palisades site is too small to support a baseload level of wind generation capacity. At an alternate site, this large amount of land required along the coastline could result in a LARGE environmental impact. Larger turbines could be used for offshore wind development where the wind class is greater, but even a 4-MW turbine (the largest currently available turbine for offshore use is 3.6 MW) would require about 196 turbines, with greater spacing required between turbines because of the greater rotor lengths, to produce 786 MW(e). Although impacts would depend on the site chosen, common issues of concern include visual impacts, noise, potential interferences with aircraft operations, and bird and bat collisions.

8.2.5.3 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 NRC 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 Palisades. The average capacity factor of photovoltaic cells is about 25 percent, and the capacity factor for solar thermal systems is about 25 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 on natural resources (wildlife habitat, land-use, and aesthetic impacts) from construction of solar-generating facilities. As stated in the GEIS, land requirements are high – 35,000 ac per 1000 MW(e) for photovoltaic and approximately 14,000 ac per 1000 MW(e) for solar thermal systems. Neither type of solar electric system would fit at the Palisades site, and both would have large environmental impacts at an alternate site.

Michigan receives between approximately 2.5 to 3.5 kWh of solar radiation per square meter per day, compared with 6 to 8 kWh of solar radiation per square meter per day in areas of the southwestern United States, such as Arizona and California, which are most promising for solar technologies (DOE 2005). 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 Palisades OL. Some solar power may substitute for electric power in rooftop and building applications. Implementation of non-rooftop solar generation on a scale large enough to replace Palisades would likely result in LARGE environmental impacts.

8.2.5.4 Hydropower

There are no remaining sites in Michigan that would be environmentally suitable for a hydroelectric facility (INEEL 1998). In Section 8.3.4 of the GEIS, the NRC staff points out that hydropower's percentage of U.S. 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 NRC staff estimated in the GEIS that land requirements for hydroelectric power are approximately 1 million ac per 1000 MW(e). Replacement of Palisades generating capacity would require flooding more than this amount of land. Because of the lack of suitable sites in Michigan and the large land-use and related environmental and ecological resource impacts associated with siting hydroelectric facilities large enough to replace Palisades, the NRC staff concludes that local hydropower is not a feasible alternative to renewal of the Palisades OL on its own. Any attempts to site hydroelectric facilities large enough to replace Palisades would result in LARGE environmental impacts.

8.2.5.5 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 location in Michigan for geothermal capacity to serve as an alternative to Palisades. The NRC staff concludes that geothermal energy is not a feasible alternative to renewal of the Palisades OL.

8.2.5.6 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.

DOE estimates that Michigan has good resources for wood fuels consisting of urban, mill, and forest residues; at least 3,720,000 dry tons/yr are available in Michigan (Walsh et al. 2000). NREL has estimated that 1100 kWh of electricity can be produced by one dry ton of wood residue. Therefore, 1.9 TWh of electricity can be generated from wood residue in Michigan (NREL 2004).

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.

While wood resources in Michigan are adequate, wood energy is not considered as a reasonable alternative to renewal of the Palisades OL because of the disadvantages of low heat content, handling difficulties, and high transportation costs. There is also no significant environmental advantage.

8.2.5.7 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 (EPA 2004b). Municipal waste combustors use three basic types of technologies: mass burn, modular, and refuse-derived fuel (EIA 2001). Mass-burning technologies are most commonly used in the United States. This group of technologies processes 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, 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 (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 electricity prices declining in real terms. U.S. electricity prices in 2002 dollars are expected to

decline by 8 percent between 2002 and 2008 and remain stable until 2011 (EIA 2004). Prices are expected to increase by 0.3 percent per year from 2011 until 2025, following the trend of the generation component of electricity price (EIA 2004).

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 or scrubbers (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), a much smaller capacity than that needed to replace the 786 MW(e) of Palisades.

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. In addition, 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 Palisades. Therefore, municipal solid waste would not be a feasible alternative to renewal of the Palisades OL, particularly at the scale required.

8.2.5.8 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 NRC 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 Palisades. For these reasons, such fuels do not offer a feasible alternative to renewal of the Palisades OL.

8.2.5.9 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 a cost of approximately $4000 to $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.

It is unlikely that the costs of existing fuel cell systems will drop below $1000/kW; therefore, the DOE has formed the Solid State Energy Conversion Alliance (SECA), with the goal of producing new fuel cell technologies at a cost of $400/kW or lower by 2010 (DOE 2004c). Fuel cells have the potential to become economically competitive if SECA can reach its goal. For comparison, the installed capacity cost for a natural-gas-fired, combined-cycle plant is about $500 to $600/kW (Northwest Power Planning Council 2000). At the present time, fuel cells are not economically or technologically competitive with other alternatives for baseload electricity generation. Consequently, fuel cells are not a feasible alternative to renewal of the Palisades OL.

8.2.5.10 Delayed Retirement

NMC has no current plans to retire any existing generating units. For this reason, delayed retirement of other NMC generating units would not be a feasible alternative to renewal of the Palisades OL. NMC concluded in its ER (NMC 2005) that the environmental impacts of delayed retirement are similar to those of the coal- and gas-fired alternatives.

8.2.5.11 Utility-Sponsored Conservation

Market conditions that initially favored utility-sponsored conservation programs (i.e., DSM), including educational programs, energy efficiency programs, and load management programs, have changed significantly and are no longer cost-effective. The viability of new or expanded DSM programs has decreased in recent years because of increased competition in the electric utility industry, mandated energy efficiency standards, and years of customer education programs that have made efficiency the normal practice. The implementation of deregulation resulted in the discontinuation of many of the DSM programs that Consumers Energy once implemented (NMC 2005). A peak load management program is still in effect, but it serves a broader purpose of maintaining system reliability. The environmental impacts of implementing a DSM program would be SMALL, but implementation would not be able to realistically replace the 786 MW(e) of net generating capacity of Palisades. Therefore, the conservation alternative by itself is not considered a reasonable alternative to renewing the Palisades OL.

8.2.6 Combination of Alternatives

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

As discussed previously, Palisades has a combined net summer rating of 786 MW(e). For the coal- and natural gas-fired alternatives, the NMC ER (NMC 2005) assumes the use of standard-sized units as potential replacements for Palisades. This approach is followed in this SEIS.

There are many possible combinations of alternatives. Table 8-8 contains a summary of the environmental impacts of one assumed combination of alternatives consisting of 530 MW(e) of combined-cycle natural gas-fired generation using closed-cycle cooling, a 40-MW wind power facility, and 216 MW in purchased power. The NRC staff considered a natural-gas-fired plant over a coal-fired plant because a comparison of the impacts indicates that a coal-fired plant would have greater impacts than a similar-sized gas-fired plant (see Tables 8-2 and 8-4). Also, the footprint of the natural-gas-fired plant is smaller and could be accommodated within the Palisades site. Consumers Energy does not anticipate any new or expanded DSM programs (Section 8.2.5.11); therefore, DSM is not considered part of the combination of alternatives. Although Michigan was identified in Section 8.2.5.6 as a state with significant wood resources, the use of wood waste was not considered in a combination of alternatives because a wood-burning facility is not as efficient as the other electrical generation plants considered by the NRC, and the cost of transporting the fuel would be very high. The impacts are based on the gas-fired generation impact assumptions discussed in Section 8.2.2, adjusted for the reduced generating capacity.

Operation of a new natural-gas-fired plant would result in increased emissions (compared with the OL alternative) and other environmental impacts. Installation of new wind power facilities would have land-use, ecology, and aesthetic impacts. The environmental impacts of power generation associated with power purchased from other generators would still occur, but would be located elsewhere in the region, nation, or another country (Canada) as discussed in Section 8.2.4. The environmental impacts associated with purchased power are not shown in Table 8-8.

Table 8-8. Summary of Environmental Impacts of Combination of Alternatives at the Palisades Site and at an Alternate Site

Impact Category	Palisades Site		Alternate Site	
	Impact	Comments	Impact	Comments
Land use	MODERATE to LARGE	Uses 20 ac for power block, offices, roads, and parking areas. Additional impact of up to approximately 120 ac for construction of a 5-mi underground gas pipeline. Approximately 175 ac of additional land offsite for wind farm.	MODERATE to LARGE	Uses 58 ac for power-block, offices, roads, and parking areas. Approximately 175 ac for wind farm. Additional land needed for transmission line (amount dependent on site chosen) and for construction and/or upgrade of an underground gas pipeline.
Ecology	MODERATE to LARGE	Uses developed and undeveloped areas at current Palisades site, plus construction of a gas pipeline. Impacts dependent on the specific location and ecology of the site. See Table 8-4 for impacts on terrestrial and aquatic ecology for a gas-fired plant. Impacts on ecological resources from wind power development would include the potential for bird and bat collisions with turbines.	MODERATE to LARGE	Impacts depend on location and ecology of the site, surface-water body used for intake and discharge, and transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity. Likely plant sites already have power generation facilities.
Water use and quality – surface water	SMALL to MODERATE	Discharge of cooling-tower blowdown containing dissolved solids and intermittent low concentrations of biocides would be released to Lake Michigan. Temporary erosion and sedimentation could occur in streams during pipeline and wind farm construction.	SMALL to MODERATE	Impacts depend on volume of water withdrawn and discharged and characteristics of surface-water body. Discharge of cooling-tower blowdown containing dissolved solids and intermittent low concentrations of biocides would be released to surface water. Temporary erosion and sedimentation could occur in streams during pipeline and wind farm construction.

Table 8-8. (contd)

Impact Category	Palisades Site		Alternate Site	
	Impact	Comments	Impact	Comments
Water use and quality – groundwater	SMALL	Use of groundwater very unlikely because the Palisades site has adequate surface water available from Lake Michigan.	SMALL to MODERATE	Impacts depend on volume of water withdrawn and discharged and the characteristics of the aquifer.
Air quality	MODERATE	Natural-gas-fired units Sulfur oxides • 8 tons/yr Nitrogen oxides • 127 tons/yr Carbon monoxide • 195 tons/yr PM_{10} particulates • 25 tons/yr Some hazardous air pollutants. For wind power, fugitive emissions and emissions from vehicles and equipment during construction.	MODERATE	Same as siting at Palisades, although pollution control standards may vary depending on location.
Waste	SMALL	Minimal waste product from fuel production. Debris would be generated and removed during construction.	SMALL	Same waste produced as if produced at Palisades site. Waste disposal constraints may vary.
Human health	SMALL	Human health risks associated with gas-fired plants may be attributable to NO_x emissions, which are regulated. Impacts considered SMALL.	SMALL	Same impacts as Palisades site.
Socioeconomics	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 420 additional workers during the peak of the 3-year construction period, followed by reduction in the current Palisades workforce of 644 to 30. Impacts during operation would be SMALL.	SMALL to MODERATE	Construction impacts depend on location, but could be significant if location is in a more rural area than Palisades. Van Buren County would experience a loss in its tax base and employment, potentially offset by projected economic growth.

Table 8-8. (contd)

Impact Category	Palisades Site		Alternate Site	
	Impact	Comments	Impact	Comments
Transportation	SMALL to MODERATE	Transportation impacts associated with construction workers would be MODERATE. Impacts during operation would be SMALL.	SMALL to MODERATE	Transportation impacts associated with construction workers would be SMALL to MODERATE, depending on the site chosen.
Aesthetics	MODERATE to LARGE	MODERATE aesthetic impacts due to impacts of plant units, cooling towers, plume stacks, gas pipeline compressors, and wind turbines and ancillary facilities.	MODERATE to LARGE	Impacts would be similar to the Palisades site with additional impact from the new transmission line that would be needed.
Historic and archaeological resources	SMALL to MODERATE	Some construction would affect previously developed parts of the Palisades site; a cultural resource inventory would be needed to identify, evaluate, and mitigate potential impacts of new plant construction on cultural resources in undeveloped areas.	SMALL to MODERATE	Cultural resource studies needed to identify, evaluate, and mitigate potential impacts of new plant construction at developed and undeveloped sites.
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; loss of 644 operating jobs at Palisades could reduce employment prospects for minority and low-income populations. Impacts could be offset by projected economic growth and the ability of affected workers to commute to other jobs.	SMALL to MODERATE	Impacts would vary, depending on population distribution and makeup at site.

The NRC 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 Palisades OL.

8.3 Summary of Alternatives Considered

The environmental impacts of the proposed action, renewal of the Palisades OL, would be SMALL for all impact categories, except for collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal. Collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal were not assigned a single significance level but were determined by the Commission to be Category 1 issues nonetheless. The alternative actions, that is, 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 Palisades, 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 Palisades. 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 Palisades OL.

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

8.4 References

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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 50. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 50, "National Primary and Secondary Ambient Air Quality Standards."

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."

40 CFR Part 81. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 81, "Designation of Areas for Air Quality Planning Purposes."

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9.0 Summary and Conclusions

By letter dated March 22, 2005, Nuclear Management Company, LLC (NMC), submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license (OL) for the Palisades Nuclear Plant (Palisades) for an additional 20-year period (NMC 2005a). If the OL is renewed, State regulatory agencies and NMC 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 OL is not renewed, then the plant must be shut down at or before the expiration of the current OL, which expires on March 24, 2011.

Section 102 of the National Environmental Policy Act (NEPA) 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 Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51). Part 51 of 10 CFR 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 Plant*s (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 (*Federal Register*, Volume 70, page 36967 (70 FR 36967) (NRC 2005a)) on June 27, 2005. The NRC staff visited the Palisades site in July 2005 and held public scoping meetings on July 28, 2005, in South Haven, Michigan (NRC 2005b). The NRC staff reviewed the NMC Environmental Report (ER) (NMC 2005b) and compared it with 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 NRC staff also considered the public comments received during the scoping process for preparation of this Supplemental Environmental Impact Statement (SEIS) for Palisades. 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 NRC staff held two public meetings in South Haven, Michigan, on April 5, 2006, to describe the preliminary results of the NRC environmental review and to answer questions to provide

(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.

members of the public with information to assist them in formulating their comments on this SEIS. The comment period ended May 18, 2006. All the comments received on the draft SEIS were considered by the NRC staff in developing this final SEIS and are presented in Appendix A, Part II.

This SEIS includes the NRC staff's analysis that considers and weighs the environmental effects 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 NRC 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) decision makers.

The evaluation criterion for the NRC 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 decision makers 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 impacts 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 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 NRC 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. The staff also determined that information provided during the public comment period did not identify any new issue that requires site-specific assessment.

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 NRC staff's consideration of all 92 environmental issues identified in the GEIS. The NRC 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 OL for Palisades) and alternative methods of power generation. These alternatives were evaluated assuming that the replacement power-generation plant is located at either the Palisades site or at some other unspecified location.

9.1 Environmental Impacts of the Proposed Action – License Renewal

NMC and the NRC 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 NRC 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, the NRC staff did not identify, during the scoping process, any new issue applicable to Palisades that had a significant environmental impact. Therefore, the NRC staff relies upon the conclusions of the GEIS for all Category 1 issues that are applicable to Palisades.

NMC's license renewal application presents an analysis of the Category 2 issues that are applicable to Palisades. The NRC 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. Nine Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at Palisades. Four Category 2 issues are not discussed in this SEIS because they are specifically related to refurbishment. NMC (NMC 2005a) 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 Palisades for the license renewal period. 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 Operation of Palisades Nuclear Plant (AEC 1972).

Eight 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. Four of the Category 2 issues and environmental justice apply to both refurbishment and operation during the renewal term and are discussed in this SEIS only in relation to operation during the renewal term. For all eight of the Category 2 issues and environmental justice, the NRC staff concludes that the potential environmental effects would be of SMALL significance in the context of the standards set forth in the GEIS. In addition, the NRC 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 NRC staff concurs with NMC's identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of all or a subset of the identified, potentially cost-beneficial SAMAs. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that further evaluation of these SAMAs by NMC is warranted. However, none of the potentially cost-beneficial SAMAs directly relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

Cumulative impacts of past, present, and reasonably foreseeable future actions were considered, regardless of any other actions taken by agencies or persons. For purposes of this analysis, the overall conclusion of the NRC staff is that these impacts would not result in significant cumulative impacts on potentially affected resources.

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 plant 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 overall adverse impacts of continued operation identified are considered to be of SMALL significance. The adverse impacts of likely alternatives if Palisades ceases operation at or before the expiration of the current OL would not be smaller than those associated with continued operation of this unit, and they 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 Palisades during the current license period was made when the plant was built. The resource commitments to be considered in this SEIS are associated with continued operation of the plant 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 storage space. Palisades replaces a portion of the fuel assemblies in its unit during every refueling outage, which occurs on an 18-month cycle.

The likely power generation alternatives if Palisades ceases operation on or before the expiration of the current OL would require a commitment of resources for construction of the replacement plant as well as for fuel to run the plant.

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 Palisades site was set when the unit was approved and construction began. That balance is now well-established. Renewal of the OL for Palisades and continued operation of the plant would not alter the existing balance, but may postpone the availability of the site for other uses. Denial of the application to renew the OL would lead to shutdown of the plant and would alter the balance in a manner that depends on subsequent uses of the site. For example, the environmental consequences of turning the Palisades site into a park or an industrial facility would be quite different.

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

The proposed action is renewal of the OL for Palisades. Chapter 2 describes the site, the plant, and interactions of the plant with the environment. As noted in Chapter 3, no refurbishment and no refurbishment impacts are expected at Palisades. Chapters 4 through 7 discuss environmental issues associated with renewal of the OL. 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 OL); the no-action alternative (denial of the application); alternatives involving nuclear, coal, or gas generation of power at the Palisades site and an unspecified alternate site; and a combination of alternatives are compared in Table 9-1. Closed-cycle cooling systems are assumed for all alternatives.

Table 9-1 shows that the significance of the environmental impacts of the proposed action would be SMALL, except in one instance: 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 NRC Staff Conclusions and Recommendations

Based on (1) the analysis and findings in the GEIS (NRC 1996, 1999), (2) the ER submitted by NMC (NMC 2005b), (3) consultation with Federal, State, and local agencies, (4) the NRC staff's own independent review, and (5) the NRC staff's consideration of public comments received during the scoping process, the recommendation of the NRC staff is that the Commission determine that the adverse environmental impacts of license renewal for Palisades would not be so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable.

Table 9-1. Summary of Environmental Significance of License Renewal, the No-Action Alternative, and Alternative Methods of Generation Using Closed-Cycle Cooling

	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**	**Alternate Site**	**Palisades Site**	**Alternate Site**	**Palisades Site**	**Alternate Site**	**Palisades Site**	**Alternate Site**
Land use	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Ecology	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Water use and quality–surface water	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Water use and quality–groundwater	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Air quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	SMALL to MODERATE	SMALL to MODERATE	MODERATE	MODERATE
Waste	SMALL	SMALL	MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Human health	SMALL[(a)]	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socio-economics	SMALL	SMALL to LARGE	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE
Transportation	SMALL	SMALL	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE
Aesthetics	SMALL	SMALL	MODERATE to LARGE	MODERATE	MODERATE to LARGE	SMALL to MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
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
Environmental justice	SMALL	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE	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."

Nuclear Management Company, LLC (NMC). 2005a. *Palisades Nuclear Plant*. *Application for Renewed Operating License.* Covert, Michigan. (March 22, 2005).

Nuclear Management Company (NMC). 2005b. *Applicant's Environmental Report – Operating License Renewal Stage, Palisades Nuclear Plant*. Docket No. 50-255. Covert, Michigan. March, 2005).

National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et seq.

U.S. Atomic Energy Commission (AEC). 1972. *Final Environmental Statement Related to Operation of Palisades Nuclear Plant, Nuclear Management Company*. Docket No. 50-255. Washington, D.C.

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

U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal.* NUREG-1555, Supplement 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2005a. "Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." *Federal Register,* Vol. 70, No. 122, pp. 36967-36968. Washington, D.C. (June 27, 2005).

U.S. Nuclear Regulatory Commission (NRC). 2005b. *Environmental Impact Statement Scoping Process: Summary Report – Palisades Nuclear Plant, Van Buren County, Michigan*. Washington, D.C.

Appendix A

Comments Received on the Environmental Review

Appendix A

Comments Received on the Environmental Review

Part I – Comments Received During Scoping

On June 27, 2005, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the *Federal Register* (Volume 70, page 36967) to notify the public of the NRC 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 review the renewal application for the Palisades operating license and to conduct scoping. The plant-specific supplement to the GEIS has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, Council on Environmental Quality (CEQ) guidance, and Part 51 of Title 10 of the *Code of Federal Regulations* (10 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, and local government agencies; Native American tribal organizations; local organizations; and individuals to participate in the scoping process by providing comments at the scheduled public meetings and/or by submitting written suggestions and comments no later than August 22, 2005.

The scoping process included two public scoping meetings that were held at Lake Michigan College, South Haven, Michigan, on July 28, 2005. Approximately 65 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. Nineteen attendees provided oral statements that were recorded and transcribed by a certified court reporter and written statements that were appended to the transcript. The meeting transcripts are attached to the October, 2005, Scoping Meeting Summary and supplement dated September 21, 2005. In addition to the comments received during the public meetings, eight comment letters and copies of two news articles 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 materials to identify specific comments and issues. Each set of comments from a given commenter was given a unique identifier (Commenter ID), so that each set of comments from a commenter could be traced back to the transcript or letter by which the comments were submitted. Specific comments were numbered sequentially within each comment set. Several commenters submitted comments through multiple sources (e.g., afternoon and evening scoping meetings). All comments received and NRC staff responses are included in the Palisades Scoping Summary Report dated December 14, 2005.

Table A-1 identifies the individuals who provided comments applicable to the environmental review and the Commenter ID 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 Palisades Scoping Summary Report, the unique identifier used in that report for each set of comments is retained in this appendix.

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 Palisades 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.

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

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source[(a)]
PS-A	Ken Richards		Afternoon Scoping Meeting
PS-B	Kevin Kamps	Nuclear Information and Resource Service	Afternoon Scoping Meeting
PS-C	Barbara Geisler		Afternoon Scoping Meeting
PS-D	Corinne Carey	Don't Waste Michigan	Afternoon Scoping Meeting
PS-E	Dale Lewis	Mayor, South Haven	Afternoon Scoping Meeting
PS-F	Tom Tanzlos	County Commissioner, First District of Van Buren County	Afternoon Scoping Meeting
PS-G	Paul Harden	Site Vice President of Palisades	Afternoon Scoping Meeting
PS-H	Nancy Whaley		Afternoon Scoping Meeting
PS-I	Leroy Wolins		Afternoon Scoping Meeting
PS-J	Chuck Jordan		Afternoon Scoping Meeting
PS-K	Michael Keegan		Evening Scoping Meeting
PS-L	Gary Karch		Evening Scoping Meeting
PS-M	Kathy Barnes		Evening Scoping Meeting
PS-N	Corinne Carey	Don't Waste Michigan	Evening Scoping Meeting
PS-O	Maynard Kaufman		Evening Scoping Meeting
PS-P	Ken Richards		Evening Scoping Meeting
PS-Q	Kevin Kamps	Nuclear Information and Resource Service	Evening Scoping Meeting
PS-R	Ross Stein	Supervisor, South Haven Charter Township	Evening Scoping Meeting
PS-S	Paul Harden	Site Vice President of Palisades	Evening Scoping Meeting
PS-T	Larry King	Greater South Haven Chamber of Commerce	Evening Scoping Meeting
PS-U	Elizabeth Anderson		Evening Scoping Meeting
PS-V	Marilyn Miller		Evening Scoping Meeting
PS-W	Wayne Rendell	Supervisor, Covert Township	Evening Scoping Meeting
PS-X	Tonya Schuitmaker		Letter (ML052420495)
PS-Y	Nancy Ann Whaley	Supervisor, Geneva Township	Letter (ML052420497)
PS-Z	Wayne Rendell	Supervisor, Covert Township	Letter (ML052420503)
PS-AA	Swami Tapasanarda		Letter (ML052420506)
PS-BB	Murielle and John Clark		Letter (ML052510389)
PS-CC	Gary Karch		Letter (ML052510391)
PS-DD	Kathryn Barnes		Letter (ML052510393)
PS-EE	Kevin Kamps	Nuclear Information and Resource Service	Letter (ML052510468)
PS-FF	Kevin Kamps	Nuclear Information and Resource Service	Letter (ML052420502)
PS-GG	Kenneth Richards		Letter (ML052420501)

(a) The afternoon and evening transcripts can be found under accession numbers ML052630432 and ML052630449, respectively.

Comments applicable to this environmental review and the NRC staff's responses are summarized in this appendix. The parenthetical alphanumeric identifier after each comment refers to the comment set (Commenter ID) and the comment number. This information, which was extracted from the Palisades 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 Palisades are not included here. More detail regarding the disposition of general or inapplicable comments can be found in the Summary Report. The Agencywide Document Access and Management System (ADAMS) accession number for the Scoping Summary Report is ML053490390.

This accession number is provided to facilitate access to the document through the Public Electronic Reading Room (ADAMS) (http://www.nrc.gov/reading-rm.html).

Comments in this section are grouped in the following categories:

A.1.1 License Renewal Process
A.1.2 Support of License Renewal at Palisades Nuclear Plant
A.1.3 Opposition to License Renewal at Palisades Nuclear Plant
A.1.4 Opposition to Nuclear Power
A.1.5 Aquatic Ecology
A.1.6 Threatened and Endangered Species
A.1.7 Surface-Water Quality, Hydrology, and Use
A.1.8 Human Health
A.1.9 Socioeconomics
A.1.10 Postulated Accidents
A.1.11 Uranium Fuel Cycle and Waste Management
A.1.12 Alternative Energy Sources

A.1 Comments and Responses

A.1.1 Comments Concerning License Renewal and Its Processes

Comment: I'm glad you are asking for public input. And it may be that NRC meetings are of a different sort. Maybe hearings that I have attended in the past have needed to seem almost closed. But I'm reading from someone in your system who says, I am truly embarrassed by the way the public is systematically excluded from the regulatory process. It reminds me of the old Soviet bloc countries when they conducted elections with only one name on the ballot. The nuclear industry is carrying a sign in one hand proclaiming that nuclear power is a solution to the global warming problem. It's other hand is locking the door on public participation in the regulatory process. Now today so far that doesn't seem to be true. So I'm hoping that there's

been a change within the NRC and those plants that it is in a sense responsible for, and that, not just at this meeting, but at all meetings, comments will be taken seriously as a part of a democratic planning process. (PS-C-8)

Comment: I'd like to commend the NRC for having these meetings at times that people could come whether during the day or in the evening. I think that is a change that's very good. (PS-J-1)

Comment: I really can't truly say that I feel NRC or the company representatives are truly advocates of the public. And, I understand there are some areas that do have such a commission or an individual, I think Wisconsin has something close to that, if anybody can correct me. I understand that Nevada has something in that line, where the public truly feels that, that they are truly represented. And, I just don't think that that's our feeling here. Even though you're nice guys; I don't, I'm not questioning that you're nice guys. I'm just feeling that the system needs more to be viable. (PS-—18)

Comment: A process that appears designed to intentionally disenfranchise a population with which it is supposed to promote dialogue can only be looked at with skepticism and must be considered a ruse and a sham. Although the model as presented for public comment regarding the request for a 20-year license extension for the Palisades Nuclear Plant in Van Buren County, Michigan, meets guidelines as established by the NRC, it provides little opportunity and draconian deadlines for true citizen participation to exist. Such restrictions may have been dismissed by communities in which other license renewals have been requested and approved, but I submit that Southwest Michigan holds itself to higher standards and wishes to challenge the industry paradigm and demand a more reasonable and humane response to this license renewal process than the flawed one that has been foisted upon us.

Current standards only allow for easy participation from persons living within the industry-designated 10-mile radius emergency planning zone. Obviously radiation travels far greater distances than that, and even the extended 50-mile radius does not realistically encompass the distance a radiation release can travel. Meetings have been scheduled only in the South Haven area with limited publicity and at times that impede a working public's ability to attend. These dates and locations may be convenient for Palisades representatives and NRC staff but not to residents in the greater area affected by the plant's existence. For example, the next public meeting in which these and other comments submitted by today's deadline will be discussed is scheduled for the Friday before Labor Day. This insults the public, inhibits participation by interested citizens, and denigrates the integrity of the process.

Materials pertinent to the license currently available only at the South Haven library should be made available in a majority of libraries located within the 50-mile radius. The whole process needs to be expanded to include public meetings and comment opportunities in all communities

within the entire 50-mile radius who wish to request them. If the plant owners and managers have nothing to hide and take pride in their operation, then they should have no reservations about taking their meetings on the road and extending the process to a more reasoned pace. And if the NRC believes in the integrity of their process, they should likewise be up to this challenge. It is 6 years before the current license expires. There is no need to rush through the process. In fact, a more lengthy approach that is truly inclusive of citizen participation from affected communities should be encouraged. (PS-CC-1)

Response: *The comments are in regard to license renewal and its processes in general. The Commission has established a process, by rule, for the environmental and safety reviews to be conducted to review a license renewal application. The development of the Commission's regulations governing the license renewal process was subject to public review and comment. The comments will not be evaluated further.*

Comment: On this August 22nd deadline. When does the clock start ticking on that, and I guess why such a short deadline given that today is July 27th? (PS-B-2)

Comment: And I would ask that the August 22nd deadline for comments be extended because this really is the first opportunity for people to learn about this environmental review process. So that doesn't leave much time for people to get up to speed to read these very thick documents and to submit comments. And I guess I'd just like to end by saying that there's a growing coalition of individuals and organizations in this area who fully intend on intervening against the license extension at Palisades. And we would, perhaps this isn't the exact correct forum, but we would express a request for an extension to that August 8th deadline as well, given the limited resources of these nonprofit groups and individuals. (PS-B-19)

Comment: And, the last thing that I'll bring up is, I have to choose here. I would again reemphasize the importance of extending the deadlines, because we're 5 years out right now from the year 2011 when this license expires. So, the question is, what's the rush? Why are these deadlines so rushed? And, also, it's a 20-year license extension. So, we should have more than just 60 days to comment on 20 years of impacts. But, of course, as Mr. Karch said, it's a lot longer than 20 years. The waste is going to be here forever. (PS-Q-13)

Comment: The public is not given enough notification about the meetings, and the meetings are few and poorly scheduled for times most cannot attend. The public is expected to offer comments on the EIS and scope and screening, etcetera, without adequate preparation. Although the current license is valid through 2011, at this time, 2005, an extension is being sought and the time allotted for public comment, debate, and even awareness is under pressure and time constraints. What is the rush? I would like to request an extension beyond August 22 for public comment on the scope of the Palisades-specific supplement to the generic environmental impact statement for a much later date after the public is aware of such documentation and such is offered. (PS-DD-4)

Comment: There are a multitude of environmental concerns in addition to those raised above that we will like to address but, lacking adequate time to digest and respond to voluminous NRC documents, have been unable to do so. By letter dated August 19, 2005, to Andrew L. Bates, Acting Secretary, Office of the Secretary, U.S. Nuclear Regulatory Commission, Washington, D.C., 20555-0001, a request was made for a 60-day extension. Again, we respectfully request that NRC grant an additional 60 days to the concerned citizens of Michigan, Indiana, and Illinois, and the organizations which represent them, in which to file scoping comments on NRC's Environmental Review of the Palisades nuclear power plant 20-year license extension proposal. (PS-EE-40)

Response: *The comments request an extension to the scoping comment period. The U.S. Nuclear Regulatory Commission (NRC) established the time period for comments on the scope of the environmental review for license renewal to balance the Commission's goal of ensuring openness in the regulatory processes, with its goal of ensuring that the NRC's actions are effective, efficient, realistic, and timely. The requests did not provide a sufficient basis for an extension to the established comment period. The comments will not be evaluated further.*

The regulations permit a nuclear power plant licensee to apply to the NRC to renew a license as early as 20 years before expiration of the current license. The NRC staff has determined that 20 years of operating experience is sufficient to assess aging and environmental issues at the site. A major consideration for seeking license renewal so far in advance of the expiration date of the current license is that it can take up to about 10 years to design and construct major new generating facilities, and long lead times are required by energy-planning decision makers.

Comment: I'd also like to point out that this entire licensing or license extension proceeding is premature because the Nuclear Regulatory Commission is reevaluating its pressurized thermal shock rule. And this revision is not complete. So, this proceeding should be postponed until after that proceeding is complete. And, I need clarification from the NRC as to whether the old rule applies at Palisades or the new rule is going to apply at Palisades. And, for that reason alone, this entire proceeding should be postponed. That's another reason for the deadlines to be extended. (PS-Q-5)

Response: *Nuclear plant licensees are required to comply with all applicable currently effective NRC regulations, including the Pressurized Thermal Shock (PTS) Rule. In the event that the PTS Rule is revised, Nuclear Management Company, LLC (NMC), the Palisades licensee, will be expected to comply with the new rule in accordance with the effective date and any implementation date provided for in the revised rule. The comment will not be evaluated further.*

Comment: Further, I would ask as I have at public meetings, that certain essential elements not be excluded from evaluation.

4. The actual and complete analysis of the plant by a scientific and independent agency, and not by Palisades or its subsidiaries, and an analysis not dependent on documentation by Palisades, but based on the actual scientific evaluation of the current status of the facility, including, but not limited to, embrittlement. (PS-DD-7)

Response: *NRC is an independent agency established by the Energy Reorganization Act of 1974 to regulate civilian use of nuclear materials. The NRC's mission is to regulate the nation's civilian use of by-product, source, and special nuclear materials to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. As part of this mission, the NRC is responsible for the reviewing and issuance of initial licenses and renewed licenses for nuclear power facilities.*

The Advisory Committee on Reactor Safeguards (ACRS) is an advisory committee mandated by the Atomic Energy Act of 1954, as amended, under the Federal Advisory Committee Act (FACA). The ACRS is independent of the NRC staff and reports directly to the Commission, which appoints its members. The operational practices of the ACRS are governed by the provisions of the FACA. The ACRS is composed of recognized technical experts in their fields. It is structured so that experts representing many technical perspectives can provide independent advice, which can be factored into the Commission's decision-making process. Most ACRS meetings are open to the public, and any member of the public may request an opportunity to make an oral statement during a committee meeting.

During the license renewal process, the ACRS acts as an independent third-party oversight group that reviews and makes recommendations to the Commission on the safety aspects of renewal applications. The ACRS mandate does not include National Environmental Policy Act (NEPA) reviews. The comment will not be evaluated further.

Comment: I'm looking forward to intervening. But, on the schedule that you put up with all the dates, perfunctory meetings and niceties, I didn't see a scheduling for the ASLB in there. And, what happens once we intervene? And, what happens to this process then? (PS-K-5)

Response: *The Atomic Safety and Licensing Board establishes schedules for its proceedings independently of the NRC staff's safety and environmental reviews. The schedule established by the board is dependent upon the filing of petitions and motions by interested parties.*

The schedule initially established by the NRC staff for the safety and environmental reviews presumes that a hearing will be held. This schedule will be revised as appropriate during the review based on the board's decisions on the admissibility of any contentions filed. The comment will not be evaluated further.

Comment: Relating to the EIS, is an Environmental Impact Statement required, or are you going to be looking at an environmental assessment with a FONSI [Finding of No Significant Impact], or are we going to have a full EIS? (PS-K-2)

Response: *The Commission has decided that the NRC will prepare a site-specific supplement (SEIS) to the generic environmental impact statement on license renewal (GEIS; NUREG-1437) for each license renewal application. This decision was made to ensure that the public had the highest level of participation in and confidence about the NRC's action on a license renewal application. The NRC will be issuing a supplement to the GEIS for the renewal of the operating license (OL) of Palisades Nuclear Plant. The comment will not be evaluated further.*

A.1.2 Comments in Support of License Renewal at Palisades Nuclear Plant

Comment: Our City Council passed a resolution favoring the renewal of the Palisades license agreement or renewal. Palisades has been a very good neighbor to South Haven. We kind of wish though that it was in the city so we get more taxes. Palisades has provided many good paying jobs and that's what we're looking for. And Palisades is probably the biggest single employer of our citizens of South Haven. It would be very detrimental to the economy of South Haven, you know, if Palisades were to close. (PS-E-1)

Comment: The plant was built in 1971 and began operation about that time. But I think the track record over the last 35 years has indicated that the plant has operated in an environmentally safe manner. It has been closed down from time to time for refurbishing and changes that come along. (PS-F-1)

Comment: The Mayor is right, it is a large employer to the community. A large part of our tax base. But if it wasn't for the safe operation of that plant we would not support its continued operation. (PS-F-2)

Comment: On March 22nd, we unanimously passed a resolution in support of the continuing operation of the plant and the extension of the license. (PS-F-3)

Comment: Palisades has received letters and resolutions of support from 13 different local government bodies, including the City of South Haven; the townships of Covert, South Haven, Geneva, Antwerp, Columbia, Decatur, and Pine Grove; the Greater South Haven Area Chamber of Commerce; U.S. Representative Fred Upton; and the concurrent resolution from the Michigan State House and Senate. These bodies wouldn't have supported our license renewal if they also didn't feel that we could continue to be a safe provider for another 20 years. (PS-G-3; PS-S-2)

Comment: At our April 12th, 2005, board meeting, the Geneva Township Board unanimously voted to support the license renewal by resolution which was presented to Mark Savage at this meeting. It is my strong belief that the negative personal and economic impact that all of us will feel if the operating license for Palisades is not extended. The loss would be a great magnitude to this community. (PS-H-2)

Comment: Earlier in the year, we passed a motion at a township board meeting supporting the licensing process for Palisades Nuclear Plant. Palisades has been an excellent neighbor for the community. The people that work there are civic minded. We have people that are Boy Scout leaders, have served on township boards. Palisades has been very community oriented. They've helped the, I'm chairman of the emergency services. They've helped the fire department, the emergency services. They help community functions also, so, it's a very welcome aspect to this community. The people there provide, buy homes, have children for the schools. (PS-R-1)

Comment: As probably everybody in this room knows, for every dollar that's spent in the community, that dollar's circulated six or seven times, so it's a good economic asset to the community. (PS-R-2)

Comment: And, you can see in that involvement their commitment to safety out at the plant. I do know a number of folks that work out there, and they are very safety conscious, and they bring that home with them and into the work that they do in the community and in their social lives. So, we're very pleased to have the plant here, and encourage the relicensing and reinvestment here in the South Haven Area. (PS-T-2)

Comment: I really didn't come prepared to speak, but, I wanted to correct, Gary Karch said Covert hasn't benefitted from this power plant. That's very far from the truth. We have a wonderful fire department, we have a full time police department. We have water throughout the township. Without Consumers help with this, that wouldn’t happen. Covert is very much in favor of this renewal. (PS-W-1)

Comment: Attached is a copy of House Concurrent Resolution 8 sponsored by myself supporting the relicensure of Consumer Energy’s Palisades Nuclear Power Plant. This resolution was adopted unanimously by the Michigan Legislature demonstrating our position that the State of Michigan fully supports the relicensure and long-term support of this facility. (PS-X-1)

Comment: As the Representative of Covert, home of Palisades, I can assure you of their outstanding and expletory record throughout the community as an employer, neighbor, and communicator with the entire Southwest Michigan area. Consumers Energy works tirelessly to keep the public informed and give surety to individuals with questions or concerns. (PS-X-2)

Comment: At the April 12, 2005, board meeting, the Geneva Township Board unanimously voted to support the license renewal by resolution which was presented to Mark Savage at that meeting. (PS-Y-5)

Comment: It is my strong belief that the negative personal and economic impact that all of us will feel if the operating license for Palisades is not extended would be of great magnitude to this community. I am asking your full support for the 20-year renewal of the licensing of Palisades. (PS-Y-6)

Comment: Throughout the years, Consumers Energy (now managed by Nuclear Management Company) and the Palisades Nuclear Plant have been good neighbors. Covert Township is very much in support of their efforts to get their operating license renewal. (PS-W-5)

Response: *The comments are supportive of license renewal at Palisades and are general in nature. The comments will not be evaluated further.*

A.1.3 Comments in Opposition to License Renewal at Palisades Nuclear Plant

Comment: I understand that many people are employed by Palisades and it's a part of the economy here and that makes it difficult to criticize. However, if we look ahead to the seventh generation, as Native Americans say, there are some problems. (PS-C-3)

Comment: We do not need it, and we should stop making it as fast as we can. And the quickest way to do that in this area; we have a chance, we don't have to do anything. We just have to get the NRC to not renew the license of these people out here who are producing all this death potential waiting for that clunk, clunk, clunk, clunk for somebody to drill a hole and open up Pandora's Box and kill God knows how many millions of people. Because that is the ultimate result of nuclear power. Whether, how safe it is now it's like jumping off the Empire State Building. As you go by the fifty-second story, see I haven't been hurt a bit. (PS-I-8)

Comment: But this is very important, and I hope people will listen that death is coming if we stay with these nuclear power plants, and this is one chance to get rid of one of them. (PS-I-9)

Comment: We are opposed to renewing the Palisades license for two main reasons. (PS-J-3)

Comment: So we as Greens oppose the renewal of the Palisades Plant because of its age, because it's old, and because there are no solutions to what to do with the waste. (PS-J-7)

Comment: It's all public risk, private profit. And, I have a problem with that. And, this is an aging plant...This plant should have been shut down in 1981. (PS-K-12)

Comment: I also have a problem with them, Consumers having a fire where trailers of documentation were burnt on the casks; the documentation about the cask was burnt in a fire that was suspect and is still under, I don't know if it's still under investigation, but, I don't believe arson was ever ruled out. A caveat to that was that Consumers Power did provide the local fire department, about 5, 6 years previously, with about an $800,000 piece of fire equipment. So, if it looks like a duck, walks like a duck, smells like a duck, it's a duck. And this is a rotten eggs here. So, don't bring us 20 more years of this. (PS-K-15)

Comment: So, I would just point that out. Let's not make 20 more years, because there certainly is no place for that. There's no place for the first 40 years of waste. (PS-K-16)

Comment: So, I have a lot of concerns about this [Palisades] and I think that it needs to be shut down. (PS-—16)

Comment: And, I think that another 20 years of this nuclear power plant in operation is risking a meltdown and I don't want it. And, I think anybody in this room does not want that to happen here. And, honestly, I think from studying everything, especially because it's too much of the fox in the hen house doing the reporting, it just cannot be guaranteed. (PS-—19)

Comment: We need to not sell our souls for jobs or for a “solution” that creates eons of poisonous aftermath. (PS-–12)

Comment: You know, I know I'm being sold a bill of goods here. I know we're got this 40-year old reactor out there that we're going to just, we're going to run it for another 20 years. I'm nervous about that. It gives me great cause for concern, and I just don't think it's a good idea. (PS-P-2)

Comment: We can turn this greenhouse effect around. We can fix these problems, but right now, we want most of our resources going to what's making the right people a lot of money. And, they're just trapped there. And, we're just getting this continual PR [expletive] that that's all going to be okay. And, I just don't want South Haven, I don't want my hometown to be the place where this really goes wrong, when the world gets taught a lesson it'll never forget, like they had to do over in Russia. Not here. (PS-P-5)

Comment: I just think that maybe it's good, we've got a new power plant right across the way. And, maybe that could just, you know, ease this one [Palisades Nuclear Plant] out and pump this one up. (PS-U-3)

Comment: Relicensing Palisades Nuclear Plant in Michigan is a bad idea. (PS-AA-1)

Comment: I support saving nuclear power. Put money into Pebble Bed Reactors. We don't need another meltdown like Chernobyl! I live nearby! If you do give it another 20 years at least send iodine tablets to everyone in a 50-mile radius! (PS-AA-2)

Comment: The United States decided to put nuclear on hold for a lot of reasons; nothing has changed with respect to those concerns, to fire up nuclear generation again. The Great Lakes are far to valuable a water resource to have it ringed by nuclear power plants and nuclear waste storage. (PS-BB-3)

Comment: We vote NO. (PS-BB-4)

Response: *The comments oppose license renewal at Palisades Nuclear Plant and are general in nature. The comments will not be evaluated further.*

Comment: I feel that to relicense a dangerous, embrittled, and aged plant on the shores of Lake Michigan is pure folly as is the storage of the spent fuel rods which many of us tried through an organization called Palisades Watch to stop a few years ago. We were unsuccessful. I feel this plant should be shut down and retired for service as I believe was originally planned. I may be confused about that but I thought in all of these plants in the beginning it was said, you know, they won't operate forever. They'll last a certain amount of time then they'll be retired because they're not going to be safe after that. So I'm confused as to why relicense, relicense, relicense, how long would this go on? I need more information. I do not feel that it is socially or fiscally prudent to relicense Palisades. I feel it is unacceptable to put local residents at such grave risk. (PS-C-10)

Comment: I say, our psychological body burden, we've had enough psychological body burden in Michigan, here, especially in southwestern Michigan. We've got [DC] Cook and it's probably a done deal that they're going to get another 20 years. But, we don't need this little Palisades with all its history of safety infractions in the hundreds that made headlines over the years. We don't need this anymore. (PS-L-4)

Comment: I believe because of the embrittlement of Palisades, and because of the history of problems with the plant, including staff/management problems and repair backlogs, and after speaking with local residents and finding that there is a cancer pocket in the beach community, and that Palisades has repeatedly asked for safety exceptions to keep operating, one can only conclude that this is a nuclear reactor that is past due and should not be relicensed. (PS-DD-1)

Comment: Since the water of the Great Lakes is being bottled and sold as drinking water, it is an invaluable resource to the citizens of the region and the world. It is not enough to repair problems as they occur, but it is imperative to put an end to the premise that such repairs will

always be possible, and in acknowledging that with a cracked and aging nuclear facility, that is, Palisades, it is not worth the risk to keep it running. (PS-DD-8)

Response: *The NRC makes the decision to grant or deny a license renewal based on whether the applicant has demonstrated that the environmental and safety requirements in the NRC's regulations can be met during the renewal term. The NRC's ongoing reactor licensing and oversight programs focus on prevention of safety problems so that potential issues such as aging and reactor vessel embrittlement do not lead to accidents and subsequent environmental impacts. The intent of the NRC's safety review is to determine if the licensee has adequately demonstrated that the effects of aging will not adversely affect any systems, structures, or components identified in Part 54.4 of Title 10 of the Code of Federal Regulations (10 CFR 54.4). The safety review process includes site inspections to assess whether the applicant has implemented and complied with the regulations for license renewal. The review results in a publicly available Safety Evaluation Report (SER) available online at http://www.nrc.gov/. The comments oppose license renewal and are general in nature. The comments will not be evaluated further.*

Comment: It is time to close it. It should have been closed a long time ago. We would have had less waste lying out on the shores of Lake Michigan ready for terrorists to make possible use of. (PS-I-5)

Response: *The NRC and other Federal agencies have heightened vigilance and implemented initiatives to evaluate and respond to possible threats posed by terrorists, including the use of aircraft against commercial nuclear power plants and independent spent fuel storage installations (ISFSIs). Malevolent acts remain speculative and beyond the scope of a NEPA review. The NRC routinely assesses threats and other information provided to it by other Federal agencies and sources. The NRC also ensures that licensees meet appropriate security levels. The NRC will continue to focus on prevention of terrorist acts for all nuclear facilities and will not focus on site-specific evaluations of speculative environmental impacts. While these are legitimate matters of concern, they should continue to be addressed through the ongoing regulatory process as a current and generic regulatory issue that affects all nuclear facilities. The NRC has taken a number of actions to respond to the events of September 11, 2001, and plans to take additional measures. However, the issue of security and risk from malevolent acts at nuclear power plants is not unique to facilities that have requested a renewal to their license and, therefore, will not be addressed within the scope of this SEIS. The comment opposes license renewal at Palisades and will not be evaluated further.*

A.1.4 Comments in Opposition to Nuclear Power

Comment: Anyway I was very interested in atomic power and along came my *Scientific American* and my *Popular Mechanics* and so on. We're going to have electricity for one cent a

kilowatt hour I was told on the cover of one of those magazines. This is atomic energy. And I believed it all. I have since come to believe otherwise. (PS-I-1)

Comment: It is false pride, and it is not worth it, because, you talk about kids. What are you going to do if there is a meltdown? How are you ever going to get your kids back? You won't. You will give everything you have to get your life back and get your kids back. You might have kids that have cancer. You might have kids that are killed instantly. You could have kids that will have kids like at Chernobyl, your grandkids might be mutated. I mean, I've met the kids of Chernobyl. And, if you saw those kids, how wounded they were. They were blind, they were handicapped, it was so sad. And, there was American kids who were healthy and playing and vibrant and alive and here are these poor kids. And, the only difference is, a meltdown. (PS-—18)

Comment: Now, I have the impression after 20 years of Don't Waste Michigan, that the public really doesn't know very much about nuclear issues although I think that, at least I find there are people scattered everywhere I go that are very much interested because they realize that energy is one of the major issues that is part of our world today and our future, my grandkids' time. And, that, yes, we need to do something about these energy issues. But, I still, I'm very much, I'm sorry, my e-mail address is [auntynuke]. And, so you can contact me, [auntynuke] AOL.com. (PS-–3)

Comment: I think, I agree with him, that the only place for a nuclear reactor is on the sun and obviously we're not going to shoot the waste or do our nuclear stuff on the sun because getting up there is the other part of the problem. (PS-–4)

Comment: One more comment about clean. Nuclear power is clean in that you cannot taste, or you cannot smell it. You can't see it, you can't write your name on it on the windshield of the car. The particulates are so very very fine that when they use it in depleted uranium ammunition, etcetera, which is involved quite directly with the whole power situation, that the very very fine particulate is very incendiary, and anytime it's, a metal piercing ammunition is, I understand is depleted uranium whether it's done by plane or some ground firing or whatever. But, it's very very fine and it burns and it invades the environment. Now, how much of that very fine particulate is also part of the picture of a nuclear power plant? How much does it invade the environment, in comparison to the heavy particulates of fossil fuels? Oh, and clean, I mentioned this morning that I understand that yes, you can taste a radioactive exposure. It gives a metallic taste on the tongue, you taste a penny. So, I'm not a scientist, obviously, but I am very concerned that we need all forms of science and the emotion that comes from human beings in order to take good care of my five grandkids. (PS-–13)

Comment: We can't really call it clean when we look at the results of the DU ammo. Depleted uranium ammunition that is being used has been used in every war the United States has been in since Bosnia including Afghanistan, including two now in the Iraq area etcetera. (PS-D-7)

Comment: I don't want to see anybody lose their jobs. But, I must admit, I was raised by people who were against nuclear power. (PS-U-1)

Response: *The comments oppose nuclear power, in general, and will not be evaluated further*.

A.1.5 Comments Concerning Aquatic Ecology Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 aquatic ecology issues for plants with cooling-tower heat dissipation systems include:

Category 1

- Accumulation of contaminants in sediments or biota
- Entrainment of phytoplankton and zooplankton
- Cold shock
- Thermal plume barrier to migrating fish
- Distribution of aquatic organisms
- Premature emergence of aquatic insects
- Gas supersaturation (gas bubble disease)
- Low dissolved oxygen in the discharge
- Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses
- Stimulation of nuisance organisms (e.g., shipworms)
- Entrainment of fish and shellfish in early life stages
- Impingement of fish and shellfish
- Heat shock

Comment: Consumers Energy and Nuclear Management Company admit, in Section 3.1.3.3 “Biofouling Control” on Page 3-7 of their Environmental Report that NMC uses biocides such as chlorination, bromination, and amine formulations. The IJC [International Joint Commission] also called for virtual elimination of toxic discharges into the Great Lakes, and identified radionuclides as persistent toxins that also needed to be virtually eliminated from the Great Lakes. The IJC commissioned two reports, the first on the radionuclide inventory in the Great Lakes, and the second on the bioaccumulation of radionuclides in Great Lakes biota. (PS-EE-14)

Response: *The accumulation of contaminants is a Category 1 issue that has been evaluated in the GEIS. All effluent discharges are regulated under the provisions of the Clean Water Act*

and the implementing effluent guidelines, limitations, and standards established by the U.S. Environmental Protection Agency (EPA) and the delegated State authorities. Conditions of discharge for each plant are specified in its National Pollutant Discharge Elimination System (NPDES) permit issued by the State or the EPA. [In its response to the Ninth Biennial International Joint Commission (IJC) Report, the EPA concluded that "The U.S. will continue to monitor nuclear generating stations to insure that toxic chemicals are not being used in large quantities and that radioactive forms of toxic chemicals are not being generated in sufficient amounts to cause significant impact on the Great Lakes ecosystem" (EPA 2006).] The comment does not provide new and significant information, and therefore, will not be further evaluated.

Comment: What has been the impact of zebra mussels and quagga mussels on the Palisades plant? How have these species been controlled at Palisades and how have the use of toxics such as Betz Clam-Trol impacted the water quality on which the public relies? What would be the consequences at Palisades if these toxics were not used? What has the been the history and mitigation attempts regarding fish kills at Palisades? What game fish have been impacted by the operation of the Palisades reactor? What has been the bioaccumulation and bioconcentration of persistent toxics both radiological and nonradiological contamination in recreational and commercial game fish? (PS-EE-38)

Response: *Zebra mussel control is discussed in Sections 2.2.3 and 2.2.5 of the SEIS. Quagga mussels are not present at the Palisades site. Aquatic ecology impacts are Category 1 issues that were analyzed in the GEIS. The comment does not provide new and significant information in these areas; therefore, it will not be evaluated further.*

A.1.6 Comments Concerning Threatened and Endangered Species

Comment: NMC/Consumers Environmental Report identifies numerous federal and State of Michigan endangered, threatened, candidate, or species of special concern – such as eastern box turtle, lake sturgeon, lake herring, creek chubsucker, Pitcher's thistle, prairie warbler, prairie vole, eastern massasauga rattlesnake, spotted turtle, Indiana bat, globe-fruited seedbox, scirpus-like rush, bald rush, Carey's smartweed, and sedge that either already live at or near the Palisades reactor, or very likely could in the future. Twenty more years of reactor operations threatens these already threatened, endangered, or candidate species, including daily "routine" radiation releases and/or potential large-scale radiation releases' harmful impact on the threatened, endangered, or candidate genetics of these species. In addition, the dunes upon which Palisades is built and operates are recognized as Critical Dune Areas under Michigan's Natural Resources and Environmental Protection Act and are recognized by Covert Township as an Environmentally Sensitive Area, and thus should be protected against 20 more years of daily "routine" and potential large-scale accidental radioactive contamination. Likewise, the Mesic southern forest on the south end of the Palisades site is recognized as a prime

example of this ecosystem type by the Michigan National Features Inventory and should be protected against ongoing radioactive contamination for another two decades past 2011. (PS-EE-31)

Response: *The NRC conducts an independent analysis of the impacts of license renewal on threatened and endangered species. Federally listed and State-listed threatened and endangered species that have the potential to occur in the vicinity of Palisades are discussed in Sections 2.2.5 and 2.2.6 of the SEIS. The potential impacts of renewing the Palisades OL on Federally listed threatened and endangered species are discussed in Section 4.6 of the SEIS.*

A.1.7 Comments Concerning Surface-Water Quality, Hydrology, and Use Issues

Comment: Over the years I've been watching this thing among the issues that first came up is there was a 7-mile cooling tube that went out into the lake from the plant to cool this. That's why eventually they had to build the steam, they had to build the cooling towers because there was a lot of complaint about this, what effect this cooling tube would have on the lake, on the environment, and under the snail garter thing and all of that. And as I understand it, they are using that cooling tube from time to time. So is it really correct to say that, you know, we don't have a pond, we have a fuel pool that we store the old assemblies until they started taking them out and putting them on the beach? But are they still using the cooling tube out there then? (PS-A-1)

Response: *A description of the Palisades Nuclear Plant cooling-water systems will be provided in Chapter 2 of the SEIS.*

Comment: And I'd ask you to look at the impacts of the recently built water intake for the drinking water supply of South Haven, just a few years ago, which I was shocked to see was located so very close to the Palisades reactor. So I'd ask you to look at the outflow, the discharge of radioactive particles as well as toxic chemicals from the Palisades Nuclear Plant being drawn into that water intake. What kind of impact that's having on South Haven residents and tourists who are visiting? (PS-B-12)

Comment: The National Discharge Permit, is this part of the consideration? I'm talking about the biocides, the slimicides, the – size, the heavy metals, the petrochemicals that are put out of this plant on a daily, routine basis. Are those going to be part of the EIS? (PS-K-1)

Comment: There are so many things going on in this community. There's a high cancer rate. I have got, you know, different things have happened to me. Swimming, etcetera. When I was a kid, I came here and swam. And, the water was clean, I could drink it. Now, it's full, it's scummy, it's full of algae. It's a huge change in the quality. The water's still cold. That does not explain the algae. So, there's a lot of things in the environment I think that are happening that are unexplained. (PS-M-6)

Comment: The impact of 20 additional years of pollution by toxics disclosed but not adequately controlled under requirements of the National Pollutant Discharge Elimination System (NPDES) will directly affect water quality of nearby sources, including Lake Michigan. In 2000, for example, Palisades was found to be in "continuing noncompliance" for its apparent multiple misuses of Betz Clam-Trol in Lake Michigan for the dispersion of mussels and clams affecting the reactor's water intakes. See http://www.epa.gov/region5/water/weca/reports/mi4qtr01.txt. NPDES violations also contradict the spirit, intention, and explicit recommendation of the International Joint Commission (IJC). In its "Ninth Biennial Report on Great Lakes Water Quality," the Commission's Recommendation #16 (at p. 42) urges that "[g]overnments monitor toxic chemicals used in large quantities at nuclear power plants, identify radioactive forms of the toxic chemicals and analyze their impact on the Great Lakes ecosystem." (PS-EE-13)

Comment: The radioactive and toxic chemical emissions from the Palisades nuclear power plant into the waters of Lake Michigan contaminate the recently installed drinking water supply intake for the City of South Haven, built just offshore from Van Buren State Park and just downstream from the Palisades reactor, due to the direction of the flow of Lake Michigan's waters and the very close proximity of the Palisades reactor to the South Haven drinking water supply intake. U.S. National Oceanographic and Atmospheric Administration models confirm the direction of water flow in Lake Michigan toward the intake. (PS-EE-2)

Response: *The comments are related to Category 1 surface-water quality, hydrology, and use issues evaluated in the GEIS. Consumers Energy Company Palisades Nuclear Plant's compliance with NPDES requirements and the operations of the South Haven water treatment system will be discussed in Chapter 2 of the SEIS.*

The EPA reviewed the Ninth Biennial IJC Report and concluded that "The U.S. will continue to monitor nuclear generating stations to insure that toxic chemicals are not being used in large quantities and that radioactive forms of toxic chemicals are not being generated in sufficient amounts to cause significant impact on the Great Lakes ecosystem" (EPA 2006). The comments do not provide new and significant information; therefore, they will not be evaluated further.

Comment: Global warming could also alter the water levels and water temperatures in Lake Michigan over the course of the 20-year license extension, impacting Palisades nuclear reactor operations. Similarly, large-scale water diversion from Lake Michigan or inland groundwater that feeds into the Great Lakes – proposed by southwestern states, for example, to address their drinking water and other needs in current drought conditions (perhaps also attributable to global warming) and water bottling companies – could also impact water levels in Lake Michigan over the next 20 years. (PS-EE-30)

Response: *While climate change is a legitimate concern, the specific impacts of climate change within a particular region or watershed are still highly speculative, and are therefore beyond the scope of a NEPA review for reactor license renewal. Furthermore, any changes in watershed characteristics would likely be gradual, allowing water-use conflicts to be resolved as needed. The comment does not provide new and significant information; therefore, it will not be evaluated further.*

A.1.8 Comments Concerning Human Health Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 and 2 human health issues include:

Category 1

- Microbiological organisms (occupational health)
- Noise
- Radiation exposures to public (license renewal term)
- Occupational radiation exposures (license renewal term)

Category 2

- Electromagnetic fields, acute effects (electric shock)

Comment: In other words you said air, water, and health. But, you know, what are some of the, what's some of the specific monitoring that you're doing which would include these questions of mine? (PS-C-2)

Comment: There is no independent verifiable monitoring of Palisades. The community of Covert and surrounding communities are dependent upon the operators of Palisades to provide notification of radiological releases. There is an implicit public relations and financial incentive for the operators not to be forthcoming regarding radiological events and accidents. Therefore, these communities must be equipped with independent verifiable radiological monitoring to protect themselves. (PS-EE-33)

Response: *The radiological monitoring program at Palisades will be discussed in Chapter 2 of the SEIS.*

Comment: The same thing has happened in Lake Michigan, that the fallout that occurred during the aboveground testing before 1963 turned out to be fallout like all over everywhere. There are some books, one called *Under the Cloud*, where it'll say Sparta, Michigan, and name several of the other towns in succession where the plumes had gone. In the case of Lake Michigan, there was a Michigan State professor who, a few years back but quite a while back, had mapped the hot spots in Lake Michigan because the fallout occurred in successive

sedimentary layers. And then the storm times come, that's November isn't it, and, you know, the Edward Fitzgerald time etcetera. And the waters rile up and then settle down and rile up and settle down. So there are unexpected hot spots that have been mapped in Lake Michigan. (PS-D-5)

Comment: Oh, the hot spots issue. I would like to see a map of the hot spots in Lake Michigan. Is there one somewhere near our plant here. What has our plant fed into it? When I talk hot spots, around Chernobyl the fallout settled down and the winds came along and picked it up and moved it someplace else. And the winds came along and picked it up and moved it someplace else, creating hot spots in very unexpected locations. The same thing has happened to Lake Michigan. Ever since the fallout time stopped in 1963 from the aboveground testing, which laid down layers of sediments of radioactivity, those have done the same thing in storm time, November. And, it gets it up and it settles down. It gets up and it settles down. And, I feel that a map of that needs to be part of this relicensing process. That's environmental. And, how much of it would our plant here add to it? (PS-N-12)

Response: *It is likely that there is some variation in radionuclide concentrations in lake bed sediments either due to variability in natural background radiation or due to resettlement of radionuclides resulting from weapon program fallout or effluents from Palisades. However, such concentrations, or variations thereof, are expected to fall within the range of natural background radiation found in the area. The doses resulting from radionuclides originating in the Palisades Nuclear Plant are expected to be well below any applicable regulatory limits.*

The comments relate to Category 1 human health issues that were evaluated in the GEIS. The comments provide no new and significant information; therefore, they will not be evaluated further in this SEIS.

Comment: I hear from the NRC that natural radiation is no more dangerous than the radiation produced out here. (PS-A-4)

Comment: There's like you said, there's not that much nuclear energy being, or radiation out there. The problem is we don't know how much is too much. And any addition is more than enough. (PS-J-2)

Comment: So I would ask you to look at the, the health impacts on African-American workers at the facility. I'd ask you to look at health impacts on Latin Americans who work in the agricultural industry in this area. (PS-B-8)

Response: *The comments relate to Category 1 human health issues that were evaluated and discussed in the GEIS. The comments provide no new and significant information; therefore, they will not be evaluated further in the SEIS.*

Comment: I mean we've got to have a better way than putting this stuff out on the beach 150 yards from the lake. I mean that's, yes, I realize in 20 years I haven't seen where this industry has killed anybody. I've heard some things, you know, of people getting cancer, suing the place, the company quickly settling out of court with them. Well, maybe there's something there, maybe not. I really don't know. But I'm not particularly scared of being, of radiation coming my way just living 3 miles from the plant. But I am concerned about those people on the plant and what happens if one of those casks break. I'm concerned about, you say well, we don't, the NRC aren't going to monitor this thing we'll let the plant people do it. Well, that's a requirement for the plant people. When they put on the first VSC24 cask they didn't have internal monitors in those darn things. They didn't want to put on external monitors until the public outcry made them. (PS-A-7)

Comment: And I'd ask along those same lines that you look at the impacts on the Palisades Park community which I visited for the first time recently and was shocked to see how close it actually is to the Palisades reactor. Actually, the Palisades reactor was built in the Palisades Park community. So I'd ask you to look at the health impacts on that population there. (PS-B-11)

Comment: I was wondering also if you were gathering information from public agencies? Have you gathered information from the Public Health Department on the cancer rate in South Haven and Covert? (PS-M-3)

Comment: Do you have any plans to contact the Public Health Department for, you know, reports about the high incidence of cancer in this area? (PS-M-5)

Comment: The last two meetings I mentioned, you know, let's get the public health reports. This should be included. But, no. The public health was not contacted. Do we have to get an FOIA [Freedom of Information Act] to find out the statistics? As I understand it, there was a cancer study that was done and should be able to be procured. (PS-M-15)

Comment: Do you in your monitoring even the DEQ [Department of Environmental Quality] or NRC, do you look at things such as increased cancer rates in the area? Do you look at the soil and see if it's contaminated in any way? (PS-C-1)

Comment: The study that you just mentioned, I've heard studies that are just the opposite. And we have talked with people in this area that up to 8 out of 10 people are saying oh, yes, I know someone with cancer or I have cancer. So I don't know what current studies are showing but are any of these studies available on those tables back there? (PS-D-1)

Comment: So, these are such huge issues. Embrittlement, the cancer rate, I've talked to people in this community who've said different horror stories about workers that have had cancers and terrible things have happened to them. People that are cancer survivors, people

that have deaths in the family from cancer. Someone said that 8 out of 10 people in this area either have cancer or know someone with cancer in their family or know someone who has died from cancer. (PS-M-14)

Comment: And, I'd like you to meet my girlfriend..., a cancer survivor, born and raised here. Her mother, cancer survivor, born and raised here. Her sister, cancer survivor born and raised here. Her sister used to swim down by the nuclear power plant, but, in '95 they had to remove a seven and half-pound tumor from her abdomen. Now, I don't know if that has to do with nuclear power, but, you know, they are born and raised here. And, her sister-in-law, her stepfather worked at the nuclear power plant. And, one day, his lungs filled up with blood and he died at the age of 39. I don't know what that was from. (PS-U-2)

Comment: I also ask that public health data regarding cancer rates in surrounding communities of the Palisades Nuclear Plant be included in the discussion, and participation by Michigan Department of Community Health epidemiologists be present at future hearings. (PS-CC-4)

Comment: Further, I would ask as I have at public meetings, that certain essential elements not be excluded from evaluation.

1. The public health records of the surrounding counties and downwind regions of Palisades. Also, the correlation between the cancer and infant mortality rate as it parallels the plant in operational mode versus shutdown status. (PS-DD-5)

Comment: Does your environmental review, will it include the recent National Academy of Sciences' report on biological effects of iodizing radiation? The Number 7 report, including the finding that low-level radiation does indeed have an adverse health impact? Will that comment on that? (PS-B-3)

Comment: And I'd also challenge something that was brought up by the health physicist from NRC. Depending on the United Nations Scientific Committee on the Effects of Ionizing [Atomic] Radiation [UNSCEAR] is problematic because just to give you one example in their review of the Chernobyl aftermath on human health, they failed to look at the consequences of internal doses of radioactivity. All that they were looking at was external doses of radioactivity. But of course, the people there are eating radiation in their food, drinking it in their water, perhaps even breathing it in. So that's problematic. So I challenge you to look at internal doses especially in light of the Biological Effects of Ionizing Radiation report which recently came out which actually found that at lower levels of radiation the impact may be higher than previously thought, approaching a direct relationship as you mentioned, the no threshold theory was retained. So at low levels of radiation which we're talking about here in terms of routine radiation releases, there is health damage associated with that. (PS-B-18)

Comment: The third report in the series, on radioactivity's impact on human health, was never completed. This study on radiation's impact on human health in the Great Lakes Basin should be completed prior to granting Palisades an additional 20 years of operations, especially in light of the National Academy of Sciences Biological Effect of Ionizing Radiation Panel's recent report (BEIR VII), which found that no amount of radiation is too small to not have an adverse impact on human health. Baseline health studies are necessary before NRC grants Palisades a license extension, especially considering that the National Cancer Institute's report on cancer near nuclear reactors, published in 1990, is now 15 years old. It does not account for cancers occurring over the past 15 years, and is in addition methodologically flawed. Independent baseline health studies must be performed before NRC grants Palisades a 20-year license extension. (PS-EE-15)

Comment: The BEIR VII report has recently been published. The recent BEIR scientific conclusion that there is no "safe" level of radiation – no matter how low the exposure – requires reconsideration of the "legal" operation of Palisades at all. Palisades acknowledges routine "lawful" radiation releases. The new scientific conclusion compels reconsideration of the feasibility of continuing to allow Palisades to operate at all, especially given the related issues of drinking water pollution via radiation. (PS-EE-32)

Comment: And I would challenge the NRC environmental reviewers to look at the lack of information about cancer rates in the vicinity of nuclear plants like was raised earlier. This 15-year-old study would not include the latency period for certain cancers that have perhaps happened in the last 15 years. And I would also challenge you to, to look for flaws in the methodology of that study. A mother in Morris, Illinois, named Cynthia Sauer whose daughter contracted brain cancer at age 10, age 7 I'm sorry, who is now 10 and in remission, has looked into that study very carefully and has found flaws in the methodology. And of course, Morris, Illinois, is the site of three reactors as well as a large waste storage pool. (PS-B-17)

Comment: And another question is this 1990 study that's 15 years ago and my understanding is latency periods for cancers would not necessarily be included, you know, unless you were to do a review, an update. So do you plan to do an update on that 1990 study in addition to the recent findings by the National Academy that low-level radiation does cause adverse health impacts? (PS-Q-4)

Comment: There is a current need for a baseline public health study to establish cancer and other disease rates prior to consideration of the proposal for a 20-year license extension. The NRC has relied on the National Cancer Institute (NCI) Study of 1990 to address cancer rates near nuclear power plants. However, the only data considered by the NCI was the county that the reactor is located in, not other downwind and downstream counties. Thus, that study is methodologically flawed. It is also 15 years old, and thus does not include data on occurrences of cancer over the past 15 years, rendering it outdated. In addition to studying cancer, other diseases associated with radiation exposure must also be studied. (PS-EE-26)

Response: *The comments are noted. Radiation exposure to the public during the license renewal term is a Category 1 issue that was evaluated in the GEIS. Health effects from radiation are a well-studied environmental hazard according to the General Accounting Office. More than 86,000 studies have been performed on the biological effects of radiation, and none of the scientifically valid studies shows any radiation effects at doses less than 10,000 millirem. According to the Health Physics Society (www.hps.com), "below the dose of 10,000 millirem, estimation of adverse health effects is speculative. Collective dose remains a useful index for quantifying dose in large populations and in comparing the magnitude of exposure from different radiation sources. However, for a population in which all individuals receive lifetime doses of less than 10,000 millirem above background, collective dose is a highly speculative and uncertain measure of risk and should not be quantified for the purposes of estimating population health risks."*

The NRC evaluated the recently issued Biological Effects of Ionizing Radiation (BEIR) VII report and discussed its findings in a report to the Commission (SECY.05-0202; Accession Number ML052640532). The NRC staff found that the BEIR VII report does not support the need for fundamental revision to International Commission on Radiological Protection (ICRP) recommendations. However, it will provide additional technical basis for the ICRP to consider as it revises its draft 2005 recommendations on radiological protection. The NRC staff will continue to monitor the ICRP's activities, review documents when they become available, and provide comments directly to the ICRP. The NRC staff also will participate in other forums, such as the Expert Group of the Nuclear Energy Agency or the National Academies Board on Nuclear and Radiation Sciences, to express the NRC's views.

The comments provide no new and significant information; therefore, they will not be evaluated further in the SEIS.

A.1.9 Comments Concerning Socioeconomic Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 and 2 socioeconomic issues include:

Category 1

- Public services: public safety, social services, and tourism and recreation
- Public services: education (license renewal term)
- Aesthetic impacts (refurbishment)
- Aesthetic impacts (license renewal term)
- Aesthetic impacts of transmission lines (license renewal term)

Category 2

- Public services: housing impacts
- Public services: public utilities
- Public services: education (refurbishment)
- Offsite land use (refurbishment)
- Offsite land use (license renewal term)
- Public services: transportation
- Historic and archaeological resources

Comment: I appreciate the comments that preceded me and some of the benefits that the plant provides in the community through the employees, the tax base and the economy from the payroll that we pay out to our employees. But I also want to mention that all of our employees live here in the local communities surrounding the plant and the counties, the cities that surround it. And everyone of those employees also has a vested interest in ensuring that this plant continues to operate in a safe environmentally sound manner or we wouldn't stand here in front of you today to support our license renewal process. (PS-G-1)

Comment: Some of the benefits include the support for the local units of government, the tax-sharing entities, the community schools, the district libraries, hospital authorities. But, there's also other things. We support the emergency management activities in the area for the counties of Alleghan, Berrien, and Van Buren. That's also a very important function. (PS-G-2; PS-S-1)

Comment: Many Palisades personnel live in Geneva Township and are taxpayers, which benefits Geneva Township, South Haven area emergency services, Lake Michigan College, South Haven and Bangor Public Schools, Van Buren Intermediate School District, South Haven Hospital, South Haven Senior Services, and Van Buren County. Being a South Haven area emergency services authority board member I have watched as Palisades has contributed much to our fire and ambulance service in the ways of training, equipment, and support. This joint effort for the safety of our citizens and Palisades personnel is a tribute to working together to make our community what it is today. Over the years we have been privileged to reports by Palisades personnel at our township board meetings keeping us informed on happenings, new procedures, updating of the siren warning system, and just being available to answer questions that arise in our public settings.

The seminars presented by Palisades personnel to provide exposure for the local municipalities and businesses and industries to review the plant and safety procedures that are in place as well as having contact personnel for our comments and questions is indeed beneficial. (PS-H-1)

Comment: What I want to speak to, briefly, is the socioeconomic impact and to reiterate some of the things that were in our statement from the Chamber board of directors over to the NRC and the Palisades plant and Nuclear Management Corporation. The plant has a significant economic impact on the area. Six hundred plus employees, not to mention the contractors in the area. At least one-third of those folks live right here in the immediate South Haven vicinity. That's a lot of payroll dollars being spent right here in our community. A couple of folks I know that work out there said you could bump the payroll anytime you want. And, the other side of it is the contractors when you go into an outage. Lots of the small businesses that sit on the Chamber board and made the decision to support it, look at those outages and those opportunities when the plant is back reinvesting, cleaning things up, doing a lot of maintenance, that's a lot of extra folks in town spending money, doing and making things happen. There's also an element beyond the financial impact from that payroll. That's the involvement of those men and women that work out there. They are involved in the community. You'll find them serving on different public boards and commissions. Boy Scouts, Girl Scouts, 4-H, coaching basketball, baseball, softball. Just a tremendous social impact from their involvement. (PS-T-1)

Comment: I never realized until I became a board member of Geneva Township in 1987 and became acquainted with the operations and effect of Palisades Nuclear Plant on the structure and economic well-being of Geneva Township as well as the surrounding area. Palisades Plant and people continuing to support of our communities, organizations, and businesses through usage, involvement, and monetary support, enhancing the overall Community Health and welfare. (PS-Y-1)

Comment: Many Palisades personnel live in Geneva Township and are tax payers which benefits Geneva Township, South Haven Area Emergency Services, Lake Michigan College, South Haven & Bangor Public Schools, V.B. Intermediate School District, South Haven Hospital, South Haven Senior Citizens and Van Buren County. (PS-Y-2)

Comment: Being a South Haven Area Emergency Services Authority Board Member, I have watched as Palisades has contributed much to our Fire and Ambulance Service in the way of training, equipment, and support. This joint effort for the safety of our citizens and Palisades personnel is a tribute to working together to make our community what it is today. (PS-Y-3)

Comment: Funding for the Covert Township Ambulance/Fire Department and Police Department is through a voted millage for each Department. Currently, the tax revenue from Consumers Energy's Palisades Nuclear Plant is roughly 60 percent of the total taxes collected. If Covert Township were to lose this tax revenue today, they would have to shut down or drastically reduce the services that they provide to the community. (PS-Z-2)

Comment: If Palisades Nuclear Plant does not get a license renewal and Covert Township were to lose their tax base, it would have a very negative effect on the Economic Environment of a very poor diverse community. (PS-Z-4)

Response: *The comments relate to Category 1 socioeconomic issues and are supportive of license renewal for Palisades. The comments provide no new and significant information; therefore, they will not be evaluated further.*

Comment: I understand, you know, it's about the jobs here. I mean our town here in South Haven or Covert where they've put the plant officially, I mean we need jobs. But one thing I don't fear with, if Palisades does not get its license to continue to operate is that we're going to get a loss of jobs here. (PS-A-2)

Comment: And perhaps we would then say we need to gradually move toward other sources of employment. Certainly not just one company for our area. And to look to something that can continue on into the future for many generations. (PS-C-6)

Comment: The tax revenue from the Palisades Nuclear Plant also helps fund the Townships' water system as well as the Township General Fund. The revenue loss to either of these would also mean either reduced services or a raise in taxes. (PS-Z-3)

Response: *The comments relate to Category 2 socioeconomic issues and will be considered in the preparation of the SEIS. Socioeconomic issues will be discussed in Chapters 2 and 4 of the SEIS.*

Cultural Resources

Comment: I'd also ask you to look at not only health impacts but cultural impacts and related socioeconomic impacts on the Native American tribes of this area whose land we stand on and whose land Palisades is located on if the treaties were honored. (PS-B-9)

Comment: Palisades' license extension application also has inadequately addressed the adverse impacts that 20 additional years of operations and waste generation would have on the traditional land uses, spiritual, cultural, and religious practices, and treaty rights of various Federally recognized tribes in the vicinity of the plant and beyond, as well as effects upon nonfederally recognized tribes governed by international law. Only three tribes were contacted by the NRC by August 8, 2005, and invited to participate in the license extension proceedings, which effectively excluded a number of tribes within the 50-mile zone around the reactor, as well as additional tribes beyond the 50-mile zone which have historic and traditional ties to the Palisades site and sites along the electric transmission line connected to Palisades. Despite the Michigan State Historic Preservation Office's concern pertaining to possible unreported archaeological properties present on, or with the vicinity of, the Palisades site (see Page C-2,

Cultural Resources Correspondence of the Environmental Report), NMC and Consumers persist in opposing a survey of the project area as unnecessary. But, if unreported Native American archaeological sites are present at or near the Palisades nuclear power plant (which is very possible, given the very close proximity of a large creek in Van Buren State Park just to the north of the power plant, as well as the very close proximity of Brandywine Creek just to the south of the power plant in Palisades Park, rivers and creeks being common sites for encampments and villages amongst the indigenous peoples of Michigan since time immemorial), then 20 additional years of nuclear operations, radioactive waste generation, and daily radiation emissions would have a significant and severe adverse impact on Native American cultural and religious values at those sites, values which strive to protect sacred areas from such degradation. The fact that NRC contacted only the Nottawaseppi Huron Potawatomi, the Little Traverse Bay Band of Odawa Indians, and the Match-E-Be-Nash-She-Wish Band of Potawatomi, but did not contact the Pokagon Potawatomi (just 30 miles or so from the Palisades site), the Little River Band of Odawa Indians, the Grand River Band of Ottawa Indians, the Saginaw Chippewa Tribe, and the Grand Traverse Band of Ottawa and Chippewa Indians, means that this Environmental Scoping proceeding should be suspended until all stakeholder Native American tribes and bands are contacted and alerted to the opportunity to not only comment on the Environmental Scoping, but to intervene against the Palisades 20-year license extension. Given the sovereignty of these tribes and bands, and the treaty rights that exist between them and the United States Federal government, the NRC has a government-to-government responsibility to consult with these tribes and bands on such significant federal actions as granting the Palisades reactor an additional 20 years of operations. An archaeological survey must be conducted before NRC grants a 20-year license extension to assure that Native American archaeological sites are not negatively impacted by future Palisades reactor operations. (PS-EE-18)

Response: *The comments relate to Category 2 socioeconomic issues and will be considered in the preparation of the SEIS. The NRC sent letters to 11 potentially affected American Indian Tribes, including the Pokagon Band of Potawatomi Indians (Accession Number ML051960173), on July 13, 2005, inviting them to participate in the environmental scoping process related to NMC's application for the license renewal of Palisades. The potential impact of renewing the OL of Palisades on cultural resources will be discussed in Chapter 4 of the SEIS.*

Environmental Justice

Comment: Another issue, I was surprised when environmental justice was brought up because my understanding was that the NRC a couple or 3 years ago had largely gutted its environmental justice policy under pressure from the nuclear industry. So I'm glad to hear that you're going to look at that and I would request that you look at impacts on the African-American populations specifically in Covert Township where the facility is located. (PS-B-6)

Comment: And I'd ask that you look at impacts on the low-income community of this area as well. (PS-B-10)

Comment: As for the tax base, and the loss of tax base, that we had members of the Chambers of Commerce and Covert Township say is important, that every dollar generated is circulated seven times or what have you. Coming here, I drove through Covert. First time I drove through Covert was about 24 years ago. And, I've driven through it since particularly coming up here when, being involved in the Palisades plant before they even put out one dry cask. I was involved in some of the organizing against the dry cask. And, I don't see where Covert has, you know, benefitted anywhere. Maybe, you know, South Haven has, but, talk about environmental justice. Covert looks just as deprived as it has ever been. (PS-L-1)

Comment: Do you consider Covert as an environmental, what do you call that, what was that term you used? Yeah, the justice issue? (PS-M-4)

Comment: Covert Township is a very diverse community. The year 2000 U.S. Census report shows that Covert Township has a 35 percent Black and 15 percent Hispanic population. This report also shows that Covert Township is one of the poorest Townships in the State with a Median Household Income of only $22,829. (PS-W-1)

Comment: Palisades nuclear generating station is the source of environmental justice violations. Located within a predominantly African-American and low-income township, Palisades provides woefully inadequate tax revenues to the host community, considering the large adverse impacts and risks the reactor inflicts. Palisades' African-American employees have traditionally been stuck in the dirtiest and most dangerous jobs at the reactor, with little to no prospects for promotion. Some of Palisades' African American employees have also experienced death threats at the workplace, including nooses hung in their lockers or in public places to symbolize lynching, an apparent attempt to silence their public statements for workplace justice. (PS-EE-17)

Comment: A potential flaw in the NMC/Consumers Environmental Report is its exclusion of census block groups with greater than 50 percent of their area outside the 50- and 20-mile radii from Palisades. Not including these groups in calculating total population, minority or low-income estimates effectively excludes significant minority and low-income populations in Grand Rapids and Battle Creek, particularly African-American and Latin American communities living in these major urban centers. (PS-EE-21)

Comment: In addition, it is odd that NMC/Consumers writes in the Environmental Report (page 2-32) that “Berrien and Van Buren Counties host moderate numbers of migrant workers,” when 3,677 and 6,733 temporary farm laborers (many of them Latino) were employed in Berrien and Van Buren Counties, respectively, according to the U.S. Department of Agriculture in 2004. These numbers represent populations as large as the county seats and even the biggest towns

in these counties. It is also not clear in the Environmental Report whether those numbers include the families which very often accompany the migrant farm laborers, which would boost the Latino population even higher.

It is ironic that NMC/Consumers acknowledges on page 2-36 of the Environmental Report that "Only one block group with a low-income population is located in Van Buren County. This block group is located in the western portion of Covert Township, which is a largely rural area." Why is it that the largely African-American population of Covert Township is still low-income after 38 years of Palisades nuclear power plant's presence in the township? Wasn't the presence of the reactor supposed to help its hometown to thrive economically? What are the environmental justice implications of such an ironic history?

The fact that "The amount of future property tax payments for Palisades...are dependent on future market value of the plant" seems ripe for manipulation and abuse – such as artificially lowering the market value of the plant in order to lower future property tax payments -- by the politically and economically powerful Palisades nuclear power plant on its host township, county, and region, yet another environmental justice violation. (PS-EE-22)

Comment: Such impacts as harm to lake sturgeon – sacred to some Great Lakes tribes – must also be evaluated. It is interesting and telling that NMC's Environmental Report assigns no "importance" to lake sturgeon (in Table 2.3-1, Page 2-47), despite its State of Michigan Threatened Status, and its sacred status in the cultures and traditions of various Great Lakes Native American tribes, not to mention its importance to the natural history of Lake Michigan as an ancient indigenous species in the ecosystem. This is an indication that NMC/Consumers is not acknowledging or addressing environmental justice impacts of 20 more years of operations at Palisades on Native Americans. (PS-EE-19)

Comment: How has the operation of Palisades impacted Native American fishing rights in the Great Lakes? (PS-EE-39)

Response: *In order to perform a review of environmental justice in the vicinity of a nuclear power plant, the NRC staff examines the geographic distribution of minority and low-income populations within 80 kilometers (50 miles) of the site. The NRC staff uses the most recent census data available. The NRC staff also supplements its analysis by field inquiries to such groups as county planning departments, social service agencies, agricultural extension personnel, and private social service agencies. Once the locations of minority and low-income populations are identified, the staff evaluates whether any of the environmental impacts of the proposed action could affect these populations in a disproportionately high and adverse manner.*

The comments relate to environmental justice issues and will be considered in the preparation of the SEIS. The NRC conducts an independent analysis of the impacts of license renewal with regard to environmental justice; potential impacts will be discussed in Chapter 4 of the SEIS.

A.1.10 Comments Concerning Postulated Accidents

Comment: Farmers downwind of Chernobyl, which melted down as we all know, are out of business because of contaminated soil. That's, that's our livelihood. We do not want to face that possible perhaps probable scenario here at home. Human error contributed to the Chernobyl meltdown and in spite of all the safeguards that you may have in place at Palisades when you factor that in what will the future bring us? (PS-C-12)

Comment: I live in Grand Rapids, 70 miles away. We are definitely downwind. One of the maps in the big books shows I believe the 50-mile radius, and as you know Chernobyl has a 19-mile interdiction area but they also find that the fallout that happens when a nuclear catastrophe does occur, settles down and then the winds pick it up and swirls it around again and the next windy day or windy season it settles it down again and it goes on and you end up with unusual, unexpected hot spots in places that people didn't expect. Where they no longer can go out and collect mushrooms and grow their own apples and so on. (PS-D-4)

Comment: Please don't say that it can't happen here. It can happen here. The chances of it happening we don't know just like we don't know how much radiation is too much because it's different for each individual. Okay. It is a possibility. I'd hate to see the year that South Haven was a town that used to be a great little tourist town. (PS-J-5)

Comment: You know, you can, every nuclear power plant that ever had an accident they said it wouldn't happen. You know, they didn't think Chernobyl would happen, they didn't think Three Mile Island would happen. There have been so many nuclear accidents and spills all along the trail of the nuclear industry from mining on up to transportation. (PS-M-11)

Comment: And, something also that Mr. Keegan mentioned was the environmental review has to look at the socioeconomic impact of a full-scale catastrophe at Palisades. Tourism was mentioned. I would also specifically request that casualties be looked at. The number of deaths, the number of injuries, the number of latent cancer fatalities. The number of genetic damaged children in future generations. (PS-Q-3)

Comment: Palisades' license extension application inadequately addresses the disproportionate adverse socioeconomic impacts of a catastrophic radiation release, such as due to reactor core embrittlement leading to core rupture, to the low-income Latin American agricultural workforce of the Palisades area. Synergistic effects of such chronic and catastrophic radiation releases combined with the toxic chemical exposures these low-income Latin-American agricultural workers already suffer on their jobs have not been evaluated.

Finally, there is an unacceptable lack of Spanish language emergency evacuation instructions and notifications to serve the Spanish-speaking Latino population within 50 miles of the Palisades reactor, especially migrant agricultural workers. (PS-EE-20)

Response: *The comments relate to Category 1 design-basis and severe accidents issues. The comments do not provide new and significant information; therefore, they will not be evaluated further. Environmental justice issues will be discussed in Chapters 2 and 4 of the SEIS. Issues pertaining to emergency planning are outside the scope of license renewal and will not be evaluated in the SEIS (see Out of Scope: Emergency Response and Preparedness).*

Comment: It has been recently confirmed by the National Academy of Sciences that there is no safe level of exposure to radiation and that even very low doses can cause cancer. I am therefore disturbed by nuclear industry corporate culture that has a ubiquitous record of dismissing legitimate concerns about radiation exposures. In the case of Three Mile Island, it has been found by a more recent independent analysis of the 1979 accident that placement and frequency of monitoring devices were highly inadequate and unable to establish accurate data from which to establish radiation release patterns. For residents of Harrisburg and the surrounding area, that meant their reported symptoms of metallic taste, erythema, nausea, vomiting, diarrhea, hair loss, and deaths of pets and farm animals were attributed to stress brought on by the accident, not radiation releases from the accident. Apparently, if no monitors were present in any given neighborhood and therefore no radiation data could be collected, then no radiation had been released. People were treated as though they had psychological problems, not legitimate symptoms of radiation exposure. Exactly how will the citizens of Michigan be treated should a similar accident occur at Palisades? I simply refuse to accept my community being treated in such an insulting and degrading manner. I therefore ask that a complete map showing existing radiation detection locations for Palisades be provided and frank discussion on this monitoring methodology be initiated. (PS-CC-3)

Response: *The comments relate to Category 1 design-basis and severe accidents issues. The comments do not provide new and significant information; therefore, they will not be evaluated further. Radiological monitoring and sampling locations are identified in the 2004 Radiological Environmental Operating Report (Accession Number ML051390307). Issues pertaining to emergency planning are outside the scope of license renewal and will not be evaluated in the SEIS (see Out of Scope: Emergency Response and Preparedness).*

A.1.11 Comments Concerning Uranium Fuel Cycle and Waste Management

As stated in 10 CFR Part 51, Table B-1, Category 1 uranium fuel cycle and waste management issues include:

- Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high-level waste)
- Offsite radiological impacts (collective effects)
- Offsite radiological impacts (spent fuel and high-level waste disposal)
- Nonradiological impacts of the uranium fuel cycle
- Low-level waste storage and disposal
- Mixed waste storage and disposal
- Onsite spent fuel
- Nonradiological waste
- Transportation

Comment: Someone has said that radioactive waste is the product of a nuclear power process. The power is a sideline of it. Of course, nuclear power originated because somebody that was working out at Hanford area realized they were wasting an awful lot of heat in the making of the original atomic bombs. And so, what can we do with the heat? Uh, we will boil water, make steam, make power. And so, you know, in a roundabout way we have ended up with nuclear plants all over the country, all over the world. But we have by far the largest number. But radioactive waste is definitely the product of it. (PS-D-6)

Comment: Second, we cannot keep producing nuclear waste without a way to protect us from the nuclear waste. I think enough has been said about that. I won't say a lot more but there is, there is no good permanent solution. My suggestion is that we send it to Washington, D.C. But I think some of our people here live in Washington, D.C. and like, like everybody else they do not want it in their backyard. Nobody wants it in their backyard. I wonder why? (PS-J-6)

Comment: Electricity is but the fleeting by-product of the Palisades nuclear reactor. The actual product is forever deadly radioactive waste. This cannot be excluded from the EIS because if there is no license extension there will not be an additional 20 years of high level nuclear waste generated by Palisades. The indoor irradiated fuel storage pool reached capacity in 1993, thus necessitating the utilization of a shoddy technology of outdoor dry cask storage pads at Palisades. (PS-EE-3)

Comment: I've got a lot of questions. One is, are you going to, in the environmental assessment, take into consideration the creation, storage, and transportation of nuclear waste? (PS-M-1)

Comment: We have a high-level nuclear waste dump 3 miles from my home that's going to be continually decontaminated. Somebody is going to have to be in there taking care of this thing for thousands of years to come. This is going to be not just my problem it's going to be my daughter's problem, her children's problem, her children's children's problem. They're all going to have to pay for that as life goes on. Because this stuff is just going to be around forever and there's no place. I've looked at Rocky Flats. I have looked at all of these different places that are producing all this nuclear material, and this country is just teeming with this stuff and we've got no place to put it. We can't find a safe place. Not Yucca Mountain, they've had earthquakes, starting to find aquifer down there, Christ, they've been testing bombs underground there for years and just shattered everything. It's not going to fly. I really wish it was. I really wish all that stuff could just disappear and we could maybe get on with producing electricity this way. (PS-A-3)

Comment: If anything, it is the half-life of the waste materials that not only are produced by the Palisades Plant, 125,000, 150,000 somebody told me today, 150 million years. The half-life for this deadly poison to reduce itself by natural processes after man has intervened to gather it together by unnatural processes. When they have that Yucca Mountain thing if they ever get it organized, which I have some doubts about, to bury all this stuff somebody is going to decide to build a bridge or a mine or something and they're going to go clunk, clunk, clunk, clunk, clunk, and they're going to bust it open having forgotten 100 or 150 or a 100,000 years. And they're going to kill a few hundred million people. That is what the net result of nuclear power is. It is poison. The worst poison, the most long-lasting poison in the history of the world. (PS-I-2)

Comment: If Yucca Mountain were to open in Nevada, there's enough waste in the United States by the year 2010 to completely fill it to its legal capacity. It won't be open by 2010, if ever. And so, I just point out the irony of Consumers license expiring in the year 2011 and if Yucca were to open, it possibly could take all the waste generated at Palisades up to that point. But, everything made after that point, after the year 2010, is excess to Yucca. And, the second repository in the United States by law would have to be located in the eastern part of the country. Perhaps Michigan? Who knows? Wisconsin? (PS-K-15)

Comment: But, the professionals in the nuclear industry are being very capricious with the fact that, you know, they're generating a lethal waste here. How much more waste will be generated in 24 more years. It is my understanding that if Yucca Mountain were to open tomorrow, which it's not going to happen because they're still having even more problems there, it already is not capable of handling all the waste that is already generated and sitting in storage across the United States. It already could not hold everything that's generated. So, and also I remember reading not too long ago in the Herald Palladium that there was an article about a new transportable dry cask that Palisades will be using from now on. And that's all well and good, but, where is that waste going to go if there is no place for it. This is the most serious environmental, blatant problem that needs to be addressed. The electricity is fleeting. It's

created and it's gone, it's used. What's left is the waste. So, the truth of the matter here is the real product is lethal nuclear waste. Electricity is just a by-product. The waste is what is still here and will be here for hundreds of thousands of years and it is lethal and it is deadly. And then, we have to go through the process of finding how to keep it safe. This industry is holding us psychologically hostage. They're creating a waste, and then patting us on the head, and saying, oh, don't worry, we know what to do with it, it'll be safe, blah, blah, blah. (PS-L-3)

Comment: The nuclear waste issue is a huge issue that isn't being addressed. Twenty more years of nuclear waste buildup, where is it going to go? Are we going dump it on the Indians? I mean, that is not right. It is not right to take nuclear waste and track it across country and dump it on native lands. (PS-M-12)

Comment: The accumulation of nuclear waste along the shore of Lake Michigan is not only a potential terrorist target, as is the reactor itself, but there are also problems with the casks themselves, and the geological strata of the area, which includes the unstable sands which the cask pad sets on. Nuclear waste that is headed for dump sites built on native lands is "environmental racism," and more operation and creation of wastes should be considered as such. (PS-DD-2)

Comment: In its Environmental Impact Statement, NRC should also consider another environmental impact concerning high-level radioactive waste ignored by NMC/Consumers in its Environmental Report: the proposed shipment by barge of 125 or more rail-cask sized containers of irradiated nuclear fuel from Palisades to the Port of Muskegon as part of the Yucca Mountain, Nevada nuclear waste dump proposal. The U.S. Department of Energy describes and documents this proposal on page J-83 of its *Final Environmental Impact Statement for Yucca Mountain*, in Table J-27 ("Barge shipments and ports"). One hundred and twenty-five barge shipments may very well be an underestimate, for DOE assumes only 10-year license extensions, whereas NMC/Consumers is requesting a 20-year extension from NRC. (PS-EE-7)

Comment: What if a barge shipment goes down in the Lake, whether due to accident or attack? What about the potential for a nuclear chain reaction inside the cask involving the still fissile U-235, Pu-239, and other fissile radionuclides present in the waste? What about radioactive contamination of 20 percent of the world's surface freshwater, the drinking water supply for 35 million people downstream? (PS-EE-8)

Comment: Property rights of home owners on the shoreline and inland from Palisades have been compromised by the "de facto" permanent high-level waste site created. This amounts to implementation of eminent domain without any compensation to property owners. The constant threat of a nuclear accident or act of sabotage has violated property owners' rights. (PS-EE-9)

Comment: When I helped build these plants these fuel containments, these high-level containments, we weren't told anything, only low-level radioactive material would be brought in to those for refueling the plant. Once it goes through the reactor cycle it becomes really radioactive. It was going to be sitting in a fuel pool until there would be a national depository to ship it to. That never happened. Now we got it piling up out in these concrete casks, metal casks sitting on the beach out of the high-level containment. (PS-A-6)

Comment: We already have contaminated steam generators and such buried on the site along with contamination of the plant to deal with. Enough. (PS-A-10)

Comment: What happens with the waste? (PS-C-5)

Comment: One of the questions that hasn't come up enough, I think is, what are the plans for the rad waste? Now, old Frank Kelly said a long time back, that nobody knows what to do with a teaspoon full of the stuff. And, we still don't. Sixty years into the nuclear age and we still don't know. So, I think that has to be a very important environmental component of the issue of whether this plant is relicensed. To keep on making this stuff doesn't make sense. There's a whole bunch of questions. There's comments about the dry casks, but, I won't say too much about that except that there they sit. And, I'm wondering how they're going to get to wherever they're going to go on site. And, how they're going to get beyond that, because they're 28 tons each, I understand. And, they're, they can't be moved, transported on the highways at all, or any other commercial fashion. (PS-N-5)

Comment: Let us not forget that we are discussing the continued production for another 20 years of a lethal waste that requires extreme safety control measures. We are not talking about a tootsie roll factory here. The waste product is being stored on the shores of a body of water that constitutes one-fifth of the earth's surface freshwater and which provides potable water to millions of people. Another 20 years of accumulated waste added to the already existing lineup of outdoor dry cask storage situated on unstable sand dunes is a major concern. (PS-CC-2)

Comment: And, oh, I understand, too, that each dry cask holds the equivalent of 250 Hiroshima bombs. Am I outrageous on that statement? Anybody correct me please? The other thing is, I understand the last I knew anyway there are 16 dry casks. Are there more? What's the current quantity? (PS-N-7)

Comment: What about these 29 casks that are loaded? And, it's my understanding they weigh 132 tons each. This is a defacto high level of a nuclear waste dump on the shore of Lake Michigan. And there are no plans to get it out. And, you're going to make more, give them a 20-year extension to make more of this. I have a problem with that. (PS-K-14)

Response: *The comments are related to Category 1 uranium fuel cycle and waste management issues. The comments do not provide new and significant information; therefore, they will not be evaluated further. Issues pertaining to Yucca Mountain and malevolent acts are outside the scope of license renewal and will not be evaluated in the SEIS (see Out of Scope: Separate Proceedings, and Out of Scope: Safeguards and Security).*

Licensees storing spent fuel in an ISFSI under a general license for storage of spent fuel (10 CFR Part 72, Subpart K), as at Palisades, are required to submit documentation registering the use of each cask at their facility in accordance with 10 CFR 72.212(b)(1)(ii). As of October 31, 2005, the NRC has received documentation registering the use of 18 VSC-24 casks and 4 NUHOMS-32PT casks at Palisades.

A.1.12 Comments Concerning Alternative Energy Sources

Comment: You know, it's using kind of an old nuclear technology. There are new technologies coming along that are clean and my hope all along, what I can clearly see that immediate nuclear decommission, cleanup and conversion of the Palisades Nuclear Power Plant and running it on natural gas like the one they do up in Midland. Or hydrogen fuel is the way it must go rather than allowing these nuclear fuel rods storage casks to be piled up onsite. (PS-A-9)

Comment: The time to convert Palisades Nuclear Power Plant is now. I mean this, rather than relicense this and keep running this poor old reactor that's been going for 40 years that was really embrittled, that they're taking old fuel rod assemblies because they're made out of stainless steel that have already been through the cycles and sitting for years in the fuel pool, stuffing them back in the reactor to sop up radiation away from the critical parts that are already embrittled on the reactor vessel, so if I'm getting a little technical here, but you know, I don't really lose sleep at night over thinking I'm living next to this dangerous reaction about to go but, you know, the thing is 40 years old. It's embrittled, folks. If we're going to keep generating power here we need, what they promised us back when we built the thing in the first place, in 40 years a new plant would come along. It didn't happen. (PS-A-11)

Comment: But what we have learned in 40 years is that there's a heck of a lot of ways to make electricity. And if we quit putting all our effort and all our rate payers' money in keeping this dead horse alive and start pursuing some of these new ones and we can do it right out there at that plant because they got a fine turbine that produces a lot of electricity. And as Ralph Nader says they're only boiling water. We just got to boil water to 700 degrees and we've got this electricity. There's a lot of different ways to do it. And I hope everybody here will start pursuing those different ways than keep going this very dangerous way, which for thousands of years to come people are going to have to answer for and pay for, just for a little electricity now. (PS-A-12)

Comment: My husband cannot be here today because he's hosting a class from the math and science center in Kalamazoo. This center serves the brightest students in that area. The class is visiting to learn about our off-the-grid house. Our personal energy needs are met with solar and wind power and we have a very comfortable life there. This can be done. And we hope that our model will become a model for this alternative to be embraced by more people in our area. The utilities themselves have said they want to include more of this. We have a friend, Art Toy, who has run for office many times in our area who put up a really big wind generator because he understood that Palisades was mandated to take that energy by law. But they have put so many barriers in the way of his doing this that it hasn't worked yet. So I would certainly ask that you reconsider putting barriers in the way of citizens who are trying to help with selling excess power to you. It, this State is not doing what some other States more intelligently are doing with this. (PS-C-9)

Comment: Nuclear energy is clean air energy. In that I mean nuclear power plants produce no controlled air pollutants such as sulfur particulates, green house gases. The use of nuclear energy in place of other sources does help to keep our air clean. To put it in equivalent terms, to replace the electricity that Palisades provides it would require approximately 12 million barrels of oil per year or three million tons of coal per year or the equivalent of about 65 million cubic feet of natural gas per year. Those are some of the fossil fuels that having Palisades in the community displaces that would otherwise be needed to meet Michigan's needs. Something that some may not be aware of is nuclear power produces approximately 25 percent of electricity in Michigan, not just the Palisades plant but other nuclear plants as well. (PS-G-4)

Comment: There are ways of making electricity.... We could use solar power. (PS-I-6)

Comment: But that's what happening to solar power. It's coming. And a lot of other good forms of power are coming. And we don't have to depend on the infinitely prolonged death that is represented by nuclear power. (PS-I-7)

Comment: Up north, Consumers Energy has been combining with Mackinaw Wind Power and they're putting up wind generators. It is possible. Wind generator is a clean energy source and it is like Maynard was saying, it's quick. It takes over quick. It doesn't, it's not like building another monster. It's just, you put it up and it starts working. Combination of wind and other systems, and we've got it made here in Michigan and we can keep our water clean. But, if you take that chance and you relicense this facility thinking well, the next issue we will deal with it, we can analyze it. (PS-M-17)

Comment: The second question has to do with the notion that there might be renewable sources of energy as alternatives and I don't know why that wasn't mentioned among the possibilities that you just reviewed. Because, in fact, wind power is a fantastic source of energy

and it would come online a lot faster than additional nuclear power plants, which I know are present at a loss. (PS-O-2)

Comment: I just want to reiterate a word about renewable sources of energy. And, I want to do this in the context of something that all you energy folks are very well aware of which is that within 5 years or so, we will have reached a global peak in oil production. And, geologists have been telling us this for 30 years. But, it seems that they were on target and that indeed, that is going to be happening. And, that means production will decrease as demand, globally, increases, and that means prices for the fossil fuels will go up and up and up. And, at this point in time, therefore, it is so important that we do everything we can to not only conserve which we haven't started yet, but also to use more renewables. And, I'm not here to say that it may not be possible, after lengthy public participation in this issue of what the proper mix of energy sources is. It may be possible that nuclear is part of that. Especially in the post-fossil-fuel era. I want this discussion to be a public discussion. (PS-O-3)

Comment: I think we can have a really good public discussion about what the proper mix of energy sources is. And, it may be, because nuclear is clean in some ways, that that may be part of it. I'm not the one to be able to decide. But, in the mean time, there is much that can be done for renewable energy and incidentally, the argument that you only get it 35 percent of the time, doesn't really apply too much, because the grid is all over the country, and if you use that same grid for distribution, there's going to be wind blowing and sun shining someplace in the country. So, that way we'd have a reasonable source of energy to that as well as whatever other options exist, but, there'll be a lot less of it than we enjoy now. (PS-O-4)

Comment: Let's see. Oh, one of things that I think most of us haven't recognized is that when nuclear power came in, the whole electric thing, energy thing became centralized. The little dam up at Newago, and the other one at Big Rapids. All those little energy producers for their area, even though they had a few environmental problems where the silt filled in and it may have destroyed some of the environment, but, still some of those things could have been handled, but, now they're out. They're gone. So, the de-centralization is what needs to reoccur. And, it might even be that we will have solar power, solar panels on our buildings, our church roofs, in the places where it's possible. And, more and more, we're finding it is. (PS-N-10)

Comment: I wish there was another brand new nuclear power plant to take over, like we were all thinking back in the 70s. Three Mile Island happened, none of that's ever happened. (PS-P-3)

Comment: I'd like to say a little bit about alternatives. I thought it was telling when Bob spoke that renewables were mentioned last and very briefly. And, I think Maynard, and earlier in the day, Barb Geisler pointed out the reality of renewables like wind and solar. They're ready to go. They're viable. And I would add in there efficiency and conservation as alternatives to nuclear power. And, something that Mr. Keegan brought up, at a 44 percent rate of operation at

Palisades because of all the breakdowns and violations over the years, how does that compare to the wind not blowing? I mean, the last time I checked the sun comes up every day. So, that's pretty reliable source of energy, I would say. (PS-Q-10)

Comment: You know, it's just that there are new technologies coming along all the time and if we just put half the investment that we put into these old dead industries, that are dying like the nuclear industry. You know, we could have new stuff here that doesn't pollute. (PS-S-4)

Comment: Other sources of energy are available to ths country and we are failing to maximize this value and their sustainability, such as wind power doing valuable service in other countries. (PS-BB-2)

Comment: The plant can be replaced by wind turbines which will not be a public liability and which will not endanger the environment and which will produce a profit and not need taxpayer subsidies to maintain. (PS-DD-10)

Comment: In Section 7.0, "Alternatives to the Proposed Action," renewable energy sources such as wind power and solar power, as well as alternatives to Palisades, such as energy efficiency and conservation, are given remarkably short shrift by NMC/Consumers. In fact, polluting electricity sources such as fossil fuels are given by NMC/Consumers as the only realistic alternatives to a 20 year license extension at Palisades. This is self-serving in that Consumers owns and operates fossil-fuel-fired facilities. In fact, in 2002 nearly three-quarters of Consumers' electricity generation came from fossil fuel facilities. Such reports as *Repowering the Midwest* by the Union of Concerned Scientists and Environmental Law and Policy Center; a recent analysis by Amory Lovins at the Rocky Mountain Institute published in the organization's summer 2005 newsletter (see www.rmi.org); cutting edge research and development conducted by the Midwest Renewable Energy Association; deployment by Mackinaw Power of modern, large capacity wind turbines on the northern tip of Michigan's lower peninsula, and plans to deploy more wind turbines on the Lake Michigan shoreline of west Michigan; long-established Lake Michigan shoreline wind power operation by the Traverse City, Michigan, municipal power company; advances in solar electricity by Solar Ovonics in Troy, Michigan (which manufactures solar electricity generating roofing shingles, which could be installed unobtrusively over huge surface areas atop families' homes); advances in solar power technology documented by Steve Strong at Solar Design Associates; and a recent report commissioned by the U.S. Public Interest Research Group (*Redirecting America's Energy: The Economic and Consumer Benefits of Clean Energy Policies*, February 2005) all clearly show that renewables, efficiency and conservation not only are ready to go, reliable, safe, clean and affordable options for electricity generation and savings, but also the source for tremendous job growth and cost savings. Whereas NMC/Consumers may have a business agenda to ignore and downplay the potential for such promising alternatives to polluting sources of electricity

such as fossil fuels and nuclear power, the NRC should fully examine such alternatives in its environmental impact statement. (PS-EE-28)

Comment: The other night a man named J. Herman, I think that was his last name, who approached, he's a bioneer. If you get a chance to look up bioneers in the Internet or something. And he was talking about his and others' discovery that nature's major source of action, energy, has to do with a spiral type of motion that water flows in a spiral. And there is the answer to our energy problems in the not too distance future. (PS-D-11)

Comment: But I once thought that the hydrogen car was going to be the successor. Now I find out that yes, the hydrogen car leaks at the back end only water, marvelous. What we are not being told is the front end, that you need massive electricity to crack the water and make it into hydrogen so you've got fuel cells. (PS-D-8)

Comment: So there are at least six nuclear plants that are in process, some of them simply were started and not completed earlier. I think the Watts in the TVA [Tennessee Valley Authority] system is one of them. And there are others that are being worked up to provide the extensive amount of electric power needed to make a hydrogen H. So watch it when you talk hydrogen. (PS-D-9)

Comment: I would strongly suggest that you get a chance to listen to Amory Lovens. He has been talking best power energy solutions for years now. One of the last times I heard him personally was talking to the manufactures association over in Lansing. Another time was up at a renewable resources pageant up in Treavor City. (PS-D-10)

Response: *The GEIS includes an extensive discussion of alternative energy sources. Environmental impacts associated with various reasonable alternatives to renewal of the OL for Palisades will be discussed in Chapter 8 of the SEIS.*

Comment: And, I would like to point out in terms of renewables, the job potential. Tremendous job potential. A lot was said about jobs. There's a recent report that the NRC reviewers need to include in this review which is by Amory Lovens of the Rocky Mountain Institute, where he points out that renewables already are leaving nuclear power in the dust in terms of marketplace reality. And, another report by the U.S. Public Research Group shows that hundreds of thousands of jobs could be created through renewables like wind and solar and efficiency measures. And, that could, the Kyoto, the Kyoto global warming quotas could be met in the United States with nuclear power being rolled back 50 percent, we could still meet the Kyoto standards in this country. And so, nuclear power is not the solution to global warming. It would cost too much. It would take too long to build new reactors. (PS-Q-11)

Response: *The socioeconomic impacts associated with reasonable alternatives to renewal of the OL for Palisades will be discussed in Chapter 8 of the SEIS.*

Part II - Comments Received on the Draft SEIS

Pursuant to 10 CFR Part 51, the NRC staff transmitted the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Palisades Nuclear Plant, Draft Report for Comment* (NUREG-1437, Supplement 27, referred to as the draft Supplemental Environmental Impact Statement [SEIS]) to Federal, State, and local government agencies; certain Indian tribes; and interested members of the public. As part of the process to solicit public comments on the draft SEIS, the NRC staff:

- Placed a copy of the draft SEIS into the NRC's Public Electronic Reading Room, its license renewal website, and at the South Haven Memorial Library;
- Sent copies of the draft SEIS to the applicant; members of the public who requested copies; representatives of certain Indian tribes; and certain Federal, State, and local agencies;
- Published a Notice of Availability of the draft SEIS in the *Federal Register* on February 23, 2006 (71 FR 9383);
- 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 at Lake Michigan College in South Haven, Michigan, on April 5, 2006, 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 e-mail address to receive comments on the draft SEIS through the Internet.

During the comment period, the NRC staff received a total of 16 comment letters in addition to the comments received during the public meetings.

The NRC staff has reviewed the public meeting transcripts and the 16 comment letters that are part of the docket file for the application, all of which are available in the NRC's Public Document Room. Appendix A, Part II, Section A.2, contains a summary of the comments and the NRC staff's responses. Related issues are grouped together. Appendix A, Part II, Section A.3, contains references cited in the NRC staff's responses. Appendix A, Part II,

Section A.4, contains excerpts of the April 5, 2006, public meeting transcripts, and Section A.5 contains the comment letters.

Each comment identified by the NRC staff was assigned a specific alphanumeric identifier (marker). That identifier is typed in the transcript at the end of the discussion of the comment or in the margin at the beginning of the discussion of the comment in a letter. The speakers at the meetings are listed in speaking order. Table A-2 gives the commenter's ID and affiliation (if stated) and the source of the comment (i.e., public meeting transcript or comment letter).

Table A-2. Comments Received on the Draft SEIS

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source[(a)]
A	Kevin Kamps	Nuclear Information and Resource Service	Afternoon Meeting Transcript
B	Kenneth Richards	Palisades Conversion Group	Afternoon Meeting Transcript
C	Kathryn Barnes		Afternoon Meeting Transcript
D	Ruben Dal Monte		Afternoon Meeting Transcript
E	Don Henkel		Afternoon Meeting Transcript
F	Corrine Carey	Don't Waste Michigan	Afternoon Meeting Transcript
G	Alice Hirt		Afternoon Meeting Transcript
H	Mary Ann Middaugh		Afternoon Meeting Transcript
I	John Tapper	County Board of Commissioners	Afternoon Meeting Transcript
J	Nancy Ann Whaley	Supervisor, Geneva Township	Afternoon Meeting Transcript
K	Lewis Mitchell		Afternoon Meeting Transcript
L	Michael Martin		Afternoon Meeting Transcript
M	Norm Knight		Afternoon Meeting Transcript
N	Paul Harden	Site Vice President of Palisades	Afternoon Meeting Transcript
O	Kenneth Richards	Palisades Conversion Group	Evening Meeting Transcript
P	Maynard Kauffman	Michigan Land Trustees	Evening Meeting Transcript
Q	Sandra Adams		Evening Meeting Transcript
R	Wade Adams		Evening Meeting Transcript
S	Unidentified member of the audience		Evening Meeting Transcript
T	Liz Overheiser		Evening Meeting Transcript
U	Tom Tanlzos	County Commissioner, First District of Van Buren County	Evening Meeting Transcript
V	Richard Freestone	County Commissioner, First District of Van Buren County	Evening Meeting Transcript
W	Wayne Rendell	Supervisor, Covert Township	Evening Meeting Transcript
X	Dale Lewis	Mayor, South Haven	Evening Meeting Transcript
Y	Ryan McCoy		Evening Meeting Transcript
Z	Robert Hannan		Evening Meeting Transcript
AA	Gary Karch		Evening Meeting Transcript

Table A-2. (contd)

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source[a]
BB	Barbara Geisler		Evening Meeting Transcript
CC	Kevin Kamps	Nuclear Information and Resource Service	Evening Meeting Transcript
DD	Kathryn Barnes	Don't Waste Michigan	Evening Meeting Transcript
EE	Paul Harden	Site Vice President of Palisades	Evening Meeting Transcript
FF	Diane Byrne		Letter (ML0613705090)
GG	Tanya Cabala et al.	Don't Waste Michigan; Coalition for a Nuclear Free Great Lakes; Nuclear Information and Resource Service; Tanya Cabala, Great Lakes Consulting; Citizens Action Coalition of Indiana; Canadian Coalition for Nuclear Responsibility/ Regroupement pour la surveillance du nucléaire; Citizens for Alternatives to Chemical Contamination; Citizens Resistance at Fermi Two (CRAFT); Citizens for Renewable Energy; Huron Environmental Activist League; Clean Water Action; Home for Peace and Justice; Great Lakes United; IHM Justice, Peace and Sustainability Office; Indigenous Environmental Network (IEN; International Institute of Concern for Public Health; Lone Tree Council; Kalamazoo River Protection Association; Michigan Citizens for Water Conservation; Michigan Land Trustees; Michigan Environmental Council; Michigan Interfaith Climate and Energy Campaign/Voices for Earth Justice; National Environmental Trust; Nuclear Energy Information Service (NEIS); Nuclear-Free Great Lakes Campaign; Nuclear Policy Research Institute; Nukewatch; Radiological Evaluation & Action Project, Great Lakes; Sierra Club, Mackinac (Michigan) Chapter; Van Buren County Greens	Letter (ML061570042)
HH	Marguerite Callaghan		Letter (ML0612402061)
II	Michael T. Chezik	U.S. Department of the Interior, Office of Environmental Policy and Compliance	Letter (ML061570025)
JJ	Ruben Dal Monte		Letter (ML060900043)
KK	Morgan Dill		Letter (ML0614601460)
LL	Paul French		Letter (ML0612100510)
MM	Art Hanson		Letter (ML0612100430)
NN	Natalie Hanson		Letter (ML0612100440)
OO	Paul Harden	Site Vice President of Palisades	Letter (ML0613705090)

Table A-2. (contd)

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source[a]
PP	Kevin Kamps	Nuclear Information and Resource Service	Letter (ML0615700220)
QQ	Connie and Jim McAllister		Letter (ML061650257)
RR	Terry O'Brien		Letter (ML0615700200)
SS	George Richards		Letter (ML0611103500)
TT	Kenneth Richards (attachment to transcript)	Palisades Conversion Group	Letter (ML061110045)
UU	Kenneth A. Westlake	U.S. Environmental Protection Agency, Region 5	Letter (ML061640114)

(a) The afternoon and evening transcripts can be found under accession numbers ML061090128 and ML061080579, respectively.

The NRC 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, Palisades) or that makes a general statement about the licensing renewal process. It may make only a general statement regarding Category 1 and/or Category 2 issues. In addition, it provides no new information and does not pertain to 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 significant new 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.2.17), similar comments are grouped together for ease of reference, and a summary description of the comments is given, followed by the NRC 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.

A.2 Comments and Responses

Comments in this section are grouped in the following categories:

A.2.1 Comments Concerning the License Renewal Process, p. A-49

A.2.2 Comments in Support of License Renewal at Palisades Nuclear Plant, p. A-52

A.2.3 Comments in Support of Nuclear Power, p. A-59

A.2.4 Comments in Opposition to License Renewal at Palisades Nuclear Plant, p. A-60

A.2.5 Comments in Opposition to Nuclear Power, p. A-63

A.2.6 Comments Concerning Aquatic Ecology, Terrestrial Ecology, and Threatened and Endangered Species Issues, p. A-66

A.2.7 Comments Concerning Surface-Water Quality, Hydrology, and Use Issues, p. A-69

A.2.8 Comments Concerning Human Health Issues, p. A-71

A.2.9 Comments Concerning Socioeconomic Issues, p. A-77

A.2.10 Comments Concerning Postulated Accidents, p. A-89

A.2.11 Comments Concerning Uranium Fuel Cycle and Waste Management Issues, p. A-92

A.2.12 Comments Concerning Alternative Energy Sources, p. A-96

A.2.13 Comments Concerning Monitoring Issues, p. A-104

A.2.14 Comments Concerning Decomissioning Issues, p. A-107

A.2.15 Comments Concerning Global Warming, p. A-108

A.2.16 Comments Concerning Editorial Issues, p. A-109

A.2.17 Issues Outside the Scope of the Environmental Review for License Renewal: Safeguards and Security; Cask Incident; Dry Cask Storage, Waste Confidence Rule, Spent Fuel; Aging Management; Allegations Process; Cost-Benefit Analysis; Energy Policy; and Emergency Response and Preparedness, p. A-115

A.2.1 Comments Concerning the License Renewal Process

Comment: And my question has to do with the schedule that you went through. My question is what is the breakneck speed up there all about? I mean, back in July 28th, we requested an extension to the scoping period and I don't even think we got an answer on that. We sure didn't get an extension, but we didn't get an answer even. And so my question is if you really want public input on this stuff, then, and I know you're going to say, well, the Commission told us to and maybe even, well, Congress told us to beyond that but, this, this breakneck speed, this sprint is just, you know, kind of, the writing's on the wall, I would have to say. I would like to make that request. I'd like to ask for another three months on the comment period ---- for meaningful public input. (A-1)

Response: *The comment requests an extension to the draft comment period. By letter dated September 7, 2005, the NRC responded to an August 19, 2005, request for an extension. By letter dated May 22, 2006, the NRC also responded to a May 10, 2006, request. In both cases, the NRC stated that its established time period for comments on the draft SEIS for license renewal balances the Commission's goal for ensuring openness in the regulatory processes with its goal of ensuring that the NRC's actions are effective, efficient, realistic, and timely. The requests did not provide a sufficient basis for an extension to the established comment period. The comment will not be evaluated further.*

Comment: Well, just to respond to that. I mean, our efforts as local concerned citizens regarding this very dangerously deteriorated plant have involved the NRC licensing process, performed pro bono by us through completely volunteer efforts on a grass roots level. And so this thing is going on at the same time as that licensing process, which we're still engaged in because we've appealed the licensing board's ruling against us. So I think the Commission's regulations are unreasonable. (A-2)

Comment: And also, this whole summation. It's all, you're all under the premise on this whole review that there's, nothing's going to happen. That there's no accidents. But there's things that happen all the time. So this, you're, you're, you're process, I think it is defective. (C-2)

Comment: Number two because of all this and because of the nature of this dangerous industry that has to be closed, it has to be secret, it has to be top down, it has to be authoritarian. This isn't a real democratic meeting here. It couldn't possibly be, you see. This is so we think we have some input. (BB-3)

Comment: I would like to see with your rules, a rule be made if, if this nuclear power plant is relicensed that everybody that is in on the decision to relicense it be obligated with their families to live within five miles of Palisades until the plant is shut down. (DD-13)

Comment: NRC's comment framework unnecessarily restricts public involvement. The NRC has established a framework for this application process that unfairly and arbitrarily eliminates a huge array of issues from consideration, discussion and comment by individuals, organizations, and Native American tribes that provides an effective obstacle to meaningful public participation. Because of this, some of these comments will fall "outside" of the scope of this process. Regardless, these comments are provided on issues that we believe are germane, and we vigorously object to the arbitrary and overly strict limitations on the scope of public input. (GG-1)

Comment: Given what is at stake with consideration of extending an operating license for Palisades, a nuclear power plant and waste storage facility unwisely situated within the heart of Great Lakes, it is imperative to examine the pertinent issues exhaustively as well as encourage the full and meaningful participation of the large constituency of citizens and stakeholders who will be affected by the license decision. (GG-3)

Comment: Unfortunately, the NRC's implicit mission has been more one of protecting the nuclear power industry's interests rather than the interests of the public. (GG-15)

Comment: For the reasons laid out in this document, the coalition of aforementioned environmental, social justice, and public interest organizations oppose the application by Palisades nuclear power plant to operate for an additional 20 years beyond its original 40 year license. The decision to sanction approval of the 20-year license extension appears to have been predetermined and the invitation to members of the public and citizens of this region to participate in this decision making process has been merely perfunctory. This coalition of organizations protests the severe limitations of the process and advocates for a decision-making framework that allows for an unbiased, deliberative, participatory discussion as to whether or not to allow 20 more years of operation by the Palisades nuclear power plant. With a fair and just Environmental Impact Statement – the conclusion reached in the EIS would not have been the continued operation of a potentially catastrophic accident risk and terrorist target on our beloved Lake Michigan shoreline. These risks are exacerbated by the already regrettable high-level radioactive waste storage -- or de facto high-level nuclear dump -- in the heart of the Great Lakes.

There are too many explicit threats to the region's environment and people that have been ignored in order to promote the use of an energy that is far too costly, exceedingly hazardous, increasingly risky and highly irresponsible, as the question of a solution to the waste problem is passed down as a regrettable legacy to future generations.

For these reasons we urge that the proposed 20-year license extension be denied until all environmental impact concerns raised here and by other stakeholders are addressed in an objective process that is deemed acceptable by the public as prescribed by the 1969 National Environmental Policy Act (NEPA). (GG-51)

Comment: Much of the same thing can be said of the NRC during these current rounds of scoping meetings concerning the re-licensing endeavor. Long time followers of this issue have seen it all from a very different NRC under past presidential administrations. The difference between now and say, the early 90s, cannot be denied. This is a very business friendly NRC, not public or environmentally friendly. (B-5) (TT-5)

Comment: The NRC presented their fact findings and it seemed evident that the decision to renew the Palisades license has been approved, regardless of the concerns, facts and alternatives presented by individuals attending this meeting. I question the purpose of this meeting--? To sugarcoat the problems with Palisades? And not offer the public any part in the decision making process- (QQ-1)

Response: *The comments are in regard to license renewal and its processes in general and disagree with the Commission's regulations and the NRC staff's analysis approach. The Commission has established a process, by rule, for the environmental and safety reviews to be conducted to review a license renewal application. The development of the Commission's regulations governing the license renewal process was subject to public review and comment.*

The comments provide no new and significant information and will not be evaluated further. There was no revision to the text of the SEIS.

Comment: Out of 92 issues identified that need to be addressed in an environmental impact analysis of re-licensing, the NRC has determined that 69 are already "adequately" addressed in the generic impact statement. Only 23 issues were found to require additional assessment for at least some plants at the time of the license renewal review. In other words, members of the public and those who live around Palisades are not allowed to address the 69 issues in comments to the NRC about re-licensing, only the short list of 23 identified by the NRC. At that time, over a decade ago, NRC made no meaningful or adequate public outreach in the vicinity of Palisades to alert the public and potentially interested stakeholders to the significance of the rulemaking and the opportunity to provide meaningful input into the decision. (GG-24)

Response: *Section 1.7.6 of the GEIS states: "All comments on the applicability of the analyses of impacts codified in the rule and the analysis contained in the draft supplemental EIS will be addressed by NRC in the final supplemental EIS in accordance with 40 CFR § 1503.2, regardless of whether the comment is directed to impacts in Category 1 or 2." Therefore, comments are considered for all the 92 identified issues. However, for the 69 Category 1 issues, the NRC staff must determine whether comments provide new and significant information bearing on the previous analysis in the GEIS. If so, these comments will be considered and appropriately factored into the Commission's analysis in the SEIS. If not, then the generic conclusion established by the GEIS is adopted.*

A.2.2 Comments in Support of License Renewal at Palisades Nuclear Plant

Comment: During our hearings and other deliberations, it was clear that Michigan needs nuclear energy and Michigan needs the Palisades plant as it generates enough power for 500,000 of Michigan's residents. Because Michigan is a peninsula, we're limited in the amount of energy, we can't come across where the lakes are, limited in the amount of energy we can import from contiguous areas. Our committee looked at the environmental and safety record of this plant and the record of how the Nuclear Management Company dealt with any problems that arose. The record is excellent on both counts. And we, as elected officials, were kept apprised of all activities at the plant. I've had an opportunity to review the NRC's draft environmental report and want to commend you on a very thorough job you have done. Your conclusion that Palisades has not added anything harmful to the environment, has protected the endangered Pitcher's Thistle, monitors fish, water and crops monthly in the surrounding areas, and has kept reports and permits current with Michigan Department of Environmental Quality matches our findings. Palisades employs about 600 individuals with a payroll of about $60 million. We very much need the jobs that Palisades provides to this area. These employees are not only responsible while at work, they are also a very real asset to this area of the State. They are involved in their churches, schools, families and communities. Palisades is also a good corporate neighbor. They pay a great deal of taxes to area governments, and are very supportive of the community and work together to make this area of the State a good place to live and raise a family. This is evident from the numerous letters and resolutions of support of re-licensing of this plant from area governmental bodies. I add my voice of support for re-licensure of this environmentally friendly electric generating plant. (H-1)

Comment: Report of the Administrative Affairs Committee. I'm a Board of Commissioners. I hope everybody can hear me. Okay, thanks. Whereas, Palisades has been in operation since 1971, safely providing electricity to Consumer Energy customers for those 34 years, and; Whereas, based on Palisades' continued improved performance, particularly over the past four years since Nuclear Management Company has been operating Palisades, Consumers Energy has increased confidence in the plant's safety, reliability and predictability, and; Whereas, to that end, Consumers Energy announced last summer that it would seek a license renewing for Palisades. Nuclear Management Company will apply for a 20-year license renewal on behalf of the Consumers Energy next month with the U.S. Nuclear Regulatory Commission. When approved, Palisades' license will be renewed through the year 2031, and; Whereas, this means continued employment to the residents of Van Buren County who operate and maintain the plant, continued tax revenue from the plant that are, revenues that are shared by various governments, hospitals, schools, county government, government throughout the region. And this really is continued support for the emergency management activities and continued employment paychecks that bolster your local economy. Now therefore it be resolved that the Van Buren County Board of Commissioners support Consumers Energy in their application process. This was approved March 22nd, '05 and signed by all seven commissioners. And

really our livelihood since this plant has been here, has certainly helped. Helped schools particularly, and not just the Covert region. (I-1)

Comment: I'm Nancy Ann Whaley from Geneva Township. And I, like Mr. Tapper, live on the same land that I was born and raised on. I never realized until I became a board member of Geneva Township in 1987 and became acquainted with the operations and effects at Palisades Nuclear Plant on the structure and economic well being of Geneva Township, as well as the surrounding area. Palisades plant and people continuing support of our communities, organizations and businesses through usage, involvement and monetary support enhancing the overall community health and welfare. (J-1)

Comment: Many Palisades personnel live in Geneva Township and are tax payers which benefits Geneva Township, South Haven Area Emergency Services, Lake Michigan College, South Haven and Bangor Public Schools, Van Buren County Intermediate School District, South Haven Hospital, South Haven Senior Services and Van Buren County. (J-2)

Comment: Being a South Haven Area Emergency Services Authority Board Member, I have watched as Palisades has contributed much to our fire and ambulance service in the way of training, equipment and support. This joint effort for the safety of our citizens and Palisades' personnel is a tribute to working together to make our community what it is today. (J-3)

Comment: Over the years, we have been privileged to reports by Palisades' personnel at our Township board meetings, keeping us informed on happenings, new procedures, updating of siren warning system and just being available to answer questions that arise in our public settings. The seminars presented by Palisades' personnel to provide exposure for the local municipalities, businesses and industry to review the plant and safety procedures that are in place, as well as having contact personnel for our comments and questions is indeed beneficial. Mark Savage, Palisades' employee as well as property owner in Geneva Township, is always available to review any concerns that arise. (J-4)

Comment: At the April 12th 2005 board meeting, the Geneva Township Board unanimously voted to support the license renewal by resolution which was presented to Mark Savage at that meeting. It is my strong belief that the negative personal and economic impact that all of us will feel if the operating license for Palisades is not extended will be a loss of great magnitude to this community. I'm asking your full support for the 20 year renewal of the licensing for Palisades. (J-5)

Comment: The resolution that was passed at the Geneva Township Board on April 12th, 2005 reads: Whereas, Palisades Nuclear Plant has been in operation since December of 1971 safety providing, safely providing electricity to Consumers Energy customers for those 34 years, and based on Palisades continued improved performance, particularly over the past four years since

Nuclear Management Company has been operating Palisades, Consumers Energy has increased confidence in the plant's safety, reliability and predictability, and to that end, CMS Energy announced last September that they would seek a license renewal for Palisades. Nuclear Management Company will apply for the 20 year license renewal on behalf of Consumers Energy next month with the U.S. Nuclear Regulatory Commission. When approved, Palisades license will be renewed through the year 2031, and this means that the residents of Geneva Township and surrounding areas are receiving continued employment for those who operate and maintain the plant, continued tax revenues from the plant that are shared by the various governments, hospitals and schools throughout the region, continued support for energy management activities, and continued employee paychecks that bolster local economies, and to date, the NRC has approved 30 license renewals for generating stations and is reviewing applications for 10 others, and there are 103 operating nuclear plants in the United States that generate approximately 20 percent of the nations' electricity. Therefore, be it resolved that the Geneva Township Board of Trustees supports Palisades' efforts in the application for a 20 year renewal of the operating license and their efforts to continue the enhancement of economic conditions in our area. This resolution was presented and supported by all Geneva Township board members. (J-6)

Comment: Heard a lot of ifs today. If this, if that, if the other thing, and having been in the newspaper business, I'm a little more inclined to rely on some facts. Not if this happens or if that happens. I've never been in the plant. I've heard people talk about the condition of it. I've never been out there, so I do not know anything about the condition of that plant, whether it's good, bad, brittle or whatever. I'll leave that up to the people that know, the people that are experts. I think the NRC has a whole staff of experts and I'd rather trust them than somebody that's not on the site making inspections and so forth. (K-2)

Comment: In my opinion, Palisades is safe and I want to see that license renewed. (K-5)

Comment: But I've been a proponent, and I'd like to thank Mr. Mark Savage for the wonderful job that he's done over there at Palisades. And in the winter time, I also winter out in Arizona. At that point I'm about 20 miles from the Palo Verde Nuclear Power Plant, which is the largest one in the country. It supplies most of the electricity for Phoenix. I have some pictures which I forwarded to Mark Savage, and have some of them here, which involves replacement of the steam generators. These came up, these were too large to come through the Panama Canal, so they shipped them around South America and up through Mexico, and from there they were transported by fazoli trains up to the Palo Verde Nuclear Power Plant. And I still think nuclear power is the way to go. I think today, approximately 70 percent of the power that's distributed in France is by nuclear power. Why we can't go ahead and listen to these people even if we can't speak French. But, I would like to thank everybody here. I enjoyed your program very much. And I'm a proponent of nuclear power, still. (M-1)

Comment: First, I'd like to focus my comments on the purpose of the meeting, the Draft Supplemental Environmental Impact Statement. And I'd like to commend the NRC on the scope and depth of the report. It's very comprehensive and a lot went into it. A lot of views have gone into it. Nuclear Management Company will also have comments on it. Our preliminary review showed, has come up with no issues of significance, but as we complete the review we will also submit our comments. (N-1)

Comment: Before I address a few of the facts, I'd like to talk about regarding environmental impact to operating the plant, I'd first like to state that not everyone in the public is ever going to agree on whether nuclear power is a good or bad thing. Not everyone in the public is ever going to agree whether the method that this country has chosen to store fuel is a good or bad thing. The diversity of the people, the diversity of the views, and our freedom to express them, that's part of what makes this country great. So I think it's okay that there are differing views out there. But I would like to address a few facts regarding the environmental impact of operating Palisades Nuclear Plant. Environmental responsibility is built in to the design, the operation, the management and the regulation of nuclear power plants. There are multiple redundancies. There are multiple levels of safety. There's defense in depth, and there's a regulatory agency that's very, very intrusive into how we do business to insure that environmental responsibility. The employees at the plant, they're also residents. We raise our children, my baby in the back of the room, here in South Haven and we have a vested interest in also insuring that the plant is environmentally responsible. We continuously monitor radiation levels at the plant. We continuously monitor the release paths from the plant. That's not all we do. We go on to verify it. We sample soil. We sample fruits. We sample fish. We sample water from surrounding areas as an additional validation that we are maintaining the environment safe. And there are multiple regulatory agencies, not just the Nuclear Regulatory Commission. There's Environmental Protection Agency, and there's the Michigan Department of Environmental Quality all of which enforce strict regulations and review what we do at the Palisades Nuclear Plant to insure that we are safe to the environment. Consumers Energy and Nuclear Management Company are convinced that Palisades can be operated safely with minimal impact or adverse impact to the environment. That's why we're investing millions of dollars in the plant in upgrading the plant and the equipment today as we proceed forward with our license renewal process. (N-2)

Comment: We're satisfied the continued operation of this plant is an environmentally responsible decision, and I'm also quite gratified that the Draft Supplemental Environmental Impact Statement has come to that conclusion. And we look forward to a long and prosperous operation and a very safe and environmentally sound manner at the Palisades Nuclear Plant. (N-3)

Comment: On March 22nd we did pass in 2005, we passed the unanimous resolution in support of the license renewal of the nuclear power plant and I will submit that as a certified copy to you. (U-1)

Comment: One of the things even though you might see it was an economic decision for the County, for the Township and the area, yes, these are all true benefits of having the plant in our area. (U-2)

Comment: But if there was any concern that it was harming the environment or the residents of this county or this area we would not have taken such action. So I would like to present this to you and on behalf of the Board of Commissioners that we unanimously support the license renewal application. (U-3)

Comment: I don't have anything additional to add to what Mr. Tanlzos said. I'm also a county commissioner and support the renewal license. (V-1)

Comment: Covert Township has supported Palisades Plant since its inception in 1965. The plant's very location is a direct result of the township's encouragement to construct and operate a nuclear plant in this area. (W-1)

Comment: Consumers Energy, it's predecessor, Consumers Power and the plant's current operator Nuclear Management Company have been good stewards of the environment. At no time since the plant's beginning operation in December of 1971 to the present has posed any threat or danger to the residents of Covert or the surrounding area. (W-2)

Comment: The Covert Township board has officially gone on record to support Palisades license renewal activities through a resolution of support enacted on March 8th, 2005. (W-3)

Comment: As the host township for Palisades nuclear plant Covert Township and seven other taxing entities received over $6 million annually in taxes from the plant. Over the years this tax money for the township has funded paving roads throughout the township, building water mains throughout the township, lighting intersections and increased fire and police protection for our citizens. Covert public schools receive the lion share of that tax money and provides first class school facilities and services. (W-4)

Comment: Covert Township is very much in favor of Palisades Nuclear Plant's license renewal. It has been, there has been a partnership between Covert Township and Palisades since the beginning. We look forward to that partnership continuing for another 20 years and longer. (W-5)

Comment: Palisades is a great vehicle for industrial growth and growth in South Haven. At the present time during normal operations Palisades employees 600 people from their operations.

And if you can imagine in your town, and I presume that most of you are from outside South Haven since I don't recognize too many of you, if you have something that, a plant that employed 600 people and that were to close down there would be great economic impact on the area. So the nuclear plant right now, Palisades, is in a refueling outage where 900 more people come in to South Haven to work on the outage to repair things, to improve things. You can imagine what that does to the hotels, motels in South Have. It's a great economic boost to South Haven. If you were to close Palisades down and I haven't heard a good reason tonight for doing it, it would make South Haven a ghost town almost because there just wouldn't be the jobs that are there now. (X-1)

Comment: And I have, as I say I haven't heard a word that says anything about a good reason to close Palisades down. So and we as a city council, oh by the way, I was mayor of South Haven for four years and while I was mayor we passed a resolution also endorsing the continuation of Palisades. (X-2)

Comment: My name is Paul Harden. I'm the site vice president of Palisades Plant. And I'll focus my comments on the purpose of the meeting and that's the draft supplemental environmental impact statement. And I'd like to start off by commending the Nuclear Regulatory Commission on the scope and depth of that report. It's very comprehensive and Nuclear Management Company agrees with the conclusions although we may have some comments that are minor that we'll submit as well by the date none of which will affect the conclusions of the report. (EE-1)

Comment: I'd like to spend a few minutes addressing the environmental impact of operating, continuing to operate the Palisades Nuclear Plant. But before I do that I'd like to recognize not all of us are ever going to agree whether nuclear power plants should exist. Not all of us are ever going to agree the public policy that this country has taken on how to deal with spent nuclear fuel. That's okay. That doesn't bother me. The fact that we have diverse people, diverse views and we have the freedom to speak our opinions is part of what makes this country great. (EE-2)

Comment: What I would like to do is share a few facts. Some of the facts are the environmental responsibility is built into the design of nuclear power plants. There are multiple redundancies so that no single failures of whether it's human failure or equipment failures can cause incidents that would be adverse to the environment. There's environmental responsibility built into the way the plants are operated, the way they're managed and the regulatory oversight. The nuclear industry is one of the more heavily regulated and industries that has additional oversight that there are out there. And the inspectors do a very good job of challenging everything we do. Another fact is that in addition to continuously monitoring radiation levels on the site and monitoring all the release pathways from the site we go beyond that to verify that we're not having an adverse effect to the environment or the people that

surround the plant. We regularly sample soil. We sample fish. We sample fruits. We sample cows milks to verify that there are no low or trace levels of radioactive material that could have come from the plant. And we do that on a regular basis. Another fact is that the employees that work at the Palisades Nuclear Plant over 600 employees they're also residents of the local areas. They raise their children here too and they have a deep respect and desire to keep the environment safe as well. They're just as concerned about their children as everyone else. (EE-3)

Comment: Given that Consumers Energy and Nuclear Management Company are confident that we can operate Palisades Nuclear Plant and extend the license renewal period safely and with no adverse impact to the environment. That is why we are spending hundreds of millions of dollar each year as we proceed forward through the license renewal process upgrading the plant, changing the equipment. (EE-4)

Comment: I heard some of the concerns in here with aging of equipment. In a nuclear power plant we are required to have what we call aging management programs. We do regularly change out components. Components that aren't changed out get inspected or tested to verify that they are in good condition to continue to operate. And if they start to degrade or the testing shows that there is degradation we change out those components to keep them going. (EE-5)

Comment: I'm not up here to change the mind of anyone who is against nuclear power. But I do want to get those facts out. We agree that, with the conclusions of the draft report that there are no significant or adverse impacts of operating the Palisades Nuclear Plant in the continued license renewal period. And if anyone would like to be educated on the facts or learn more about the plant I would be happy to discuss that with you. If you don't trust talking to someone who works for the plant I'd encourage you to talk to the Nuclear Regulatory Commission because nuclear power can be a safe and viable entity. Everything we do in life has risks. It's a matter of agreement whether those risks are worth endeavoring whether it's a chemical plant, a coal plant or a nuclear plant. But for the purpose of this meeting the draft environmental impact statement we agree with its conclusions and we look forward to operating the plant in a continued operating period. (EE-6)

Comment: I am in favor of continued use of the facility because:
1. It is a valuable, viable alternate energy source which, with proper use, conserves and protects the environment.
2. Manpower required for its continued use provide an economic boost in the winter months for the City of South Haven and its environs. While tourist dollars grow the local economy in summer, many local businesses benefit during the long winter months when Palisades maintenance plant workers come to the area to perform the bulk of plant maintenance during this time. (HH-1)

Comment: As a resident of Bangor (southwestern) Michigan, well writing the area of the Palisades Nuclear Generating Plant, I am writing in support of renewing the license for this plant for another 20 years. (LL-1)

Comment: The plant has been a good neighbor. They routinely test their public warning system and I have never heard of any negative complaints about the operation or safety of this plant. (LL-2)

Comment: I ask that you totally disregard the environmentalist, and other protesters, many of whom do not live in our community. Huxley, is his "brave New world, talked about "General Candle". The environmentalist have done great harm to our country and most American citizens by trying to stem the tide of change for the better. People have lost their jobs to protect to birds or fish. Millions pay exorbitant sums for gasoline, diesel, heating oil and natural Gas, because thanks to the activist, we are held hostage to foreign oil suppliers, because they have blocked drilling, refineries, pipe lines, etc. for years. Most of these protesters are misguided, liberals, with substantial assets and care very little for the public, but only for their own agenda. "General Candle sounds real good to some of them!" No source of energy is 100% safe. But Nuclear power generation has been good for our country, providing jobs and inexpensive power, which God knows we surely need more of. With your oversight, nuclear plants are not perfect, but they have an enviable safety record and the scare mongers and whiners should be ignored. (LL-3)

Comment: This is our plant in our community and we do not want to pay higher prices just to please these environmentalists, especially when most of them do not even live here. I urge you to grant the Palisade nuclear generating Plant the 20 year license that is requested. (LL-4)

Response: *The comments are supportive of license renewal at Palisades and are general in nature. The comments do not provide new and significant information and will not be evaluated further.*

A.2.3 Comments in Support of Nuclear Power

Comment: I knew about the plant when we bought the place. I wasn't concerned a bit about the plant being there, and I'm still not concerned about it. I believe that nuclear power is one of the best answers we've got to getting power in this country. With all of these other things that have been named, they either don't work fully or they're more expensive and they're harder on the environment. I personally am in favor of the nuclear power. And by the way, I'm also one that says thank god for the atomic bomb, because I was in the 77th infantry division and I saw the coast of Japan that we were supposed to hit. And the reason, one of the reasons I'm here today is because they dropped that bomb. And I'm not the least bit ashamed to say so. (K-1)

Comment: I agree that the US and the world certainly will need to continue to utilize Nuclear Power to reduce emissions and the reliance on foreign oil, and I am all for SAFE, NEW NUCLEAR PLANTS/TECHNOLOGY. (FF-1)

Comment: I'm writing to express my opinion on the use nuclear power plants the United States. I believe we are putting our head in the sand like an ostrich by not using our nuclear power for electricity for the benefit of our citizens of this country. We burn coal like our 18th century ancestors, we burn natural gas that is running out that will be needed for home heating, when we have nuclear energy that is clean, cheap and an unending supply. (SS-1)

Comment: Why do our leaders listen to activist like Kevin Kamps (who most likely got his information from the movie China Syndrome). What I am saying is every new territory our country has ventured into we have learned by doing not letting naysayers run our experts. I understand the country of Israel generates most if not all of their electricity with nuclear power. Our technology not used at home. Look at the advancement in our nuclear submarines since they were put into service. We cannot advance in this field if we don't enter into it. I believe all our electricity one day will be by nuclear power because we must, the problems of spent fuel rods will be figured out by scientists not by activist. (SS-2)

Comment: What I'm saying is build all the new nuclear power plants the electricity companies need to build as that will benefit everyone. As for the Palisades Plant, let the experts make the decisions not the nuts on the street. (SS-3)

Response: *The comments support nuclear power, in general, and will not be evaluated further*.

A.2.4 Comments in Opposition to License Renewal at Palisades Nuclear Plant

Comment: But another thing is, this coalition of ours, which is 25 group strong including Michigan Environmental Council, the biggest coalition of environmental groups in the State, 75 of them, 200,000 Michigan residents. The coalition's still growing, and we plan on fighting this at every turn and that's the factor that's going to stop this from happening. (A-13)

Comment: And I am convinced that because it's of the geology, the problematic problems, the history, the track record at Palisades, the possibility of terrorism, the probability of increased nuclear waste problems, that it's only a matter of time something's going to happen there. And I don't think the risk is worth it. Even though right now were in that, were in a crossroads. And you can take this day and live in this day forever. You could live here. But if after a disaster, you couldn't. (C-7)

Comment: And there's so much to lose. It's not just your lives, your children's lives and the possibility of grandchildren, great grandchildren, but it's a life in this area. It's the soil. It's our relationship with Canada. Do you think Canada would every forgive us for the fall out? Do you

think that we could ever restore the Great Lakes, our water table, if something happened there? And the, and the, the mounds of nuclear waste got into the Great Lakes that's stored there? I don't think you can get it back people. Not with radiation, and not with the huge contamination that an accident would cause. (C-8)

Comment: Consequently, so I will leave this point for the time being and I continue that in this situation my recommendation is that, I request that no approval of operating license renewal be given unless all existing spent fuel is removed from the site and sent to a national central depository. (D-4)

Comment: I recommend that any approval of operating license renewal of existing nuclear plants be in moratorium until the year 2015. (D-7)

Comment: I appreciate the opportunity to speak. Maynard Kauffman speaking on behalf on Michigan Land Trustees. I live on a farm about ten miles straight east of here. And my comments are about alternatives. And what I want to do first is say I am opposed to the 20-year extension of the Palisades operating license. I think it's a needless risk. And I'll try to explain why. (P-2)

Comment: So in that respect we do not have to take the chance even though it might be in your estimation small on re licensing this plant. This plant if relicensed could be in operation for 60 years. I do not believe it was engineered to last 60 years and I don't believe you can change all the components in that plant to make it really be safe for 60 years or even 50 years. (R-5)

Comment: I'm a citizen of South Haven. I'm not affiliated with anyone. I'm here mainly to be educated about it. I, I'm blessed to live close to the beach and I'm on the beach every day and I see that plant every day and I'm, frankly I'm worried so I want to know what's going on. What I've heard from our former mayor and, and some of the commissioners has all been economic based. It's all about economy and jobs. And this touches me deeply because I'm a recently unemployed worker who was selling tropical plants and I lost my job from environmental impact from hurricanes. So I'm unemployed and I still stand opposed to it. I want to know what I'm seeing here more is public relations and not a lot of truth. (Y-1)

Comment: But what I want to see happen is that economy take a backseat to ecology. If this is not ultimately safe for our citizens, if our citizens are breathing radioactive fumes, if there's a potential for a major accident that wipes us all out there's no need for an economy. I'd like to see economy take a backseat to ecology. I'd like better answers on, on the questions that are asked, a lot less lip service. I have a young child I want to see grow up in South Haven. I want him to grow up healthy. It's a beautiful community. We'll find ways to replace the economy. (Y-3)

Comment: I understand the need for economy and jobs. Let's get that behind us and let's look at the ecology. I think that's most important. (Y-5)

Comment: And just keeping this little plant open 20 more years and maybe it won't blow maybe it will but it's not looking at what we're going to need in the future. That will be very different so let's, let's think about a new way. (BB-6)

Comment: There's a lot of problems there and, these aren't being addressed. The, at one of the meetings earlier and I've been to all of these meetings now, this is before there were a lot of people here. Thank God there's more people getting involved but maybe this is the last meeting. They were talking about the experimental use of sealant. And that wasn't addressed. There was other things that the NRC themselves wanted to address. And when I came to the meeting supposedly for that, those issues they switched locations and so they kept this, the public in the dark on that one. So where's, and I, I don't know the answers to those questions or if they were ever answered to the NRC's specifications. But I know there's real issues at Palisades. (DD-9)

Comment: Well, what does a meltdown mean here. Okay, well, if you live in Covert, you know, you don't have a chance to say goodby to anyone. If you live anywhere close to Palisades you, you'll, you'll, you're gone. If you live downwind which could be in any direction but usually the wind comes from the Great Lakes. It comes from, from the west going east. (DD-11)

Comment: There is much at stake with the prospect of 20 additional years of nuclear power and radioactive waste generation and the associated risks and serious consequences associated with the Palisades plant, which is already unfortunately sited right in the heart of an exceedingly environmentally valuable and sensitive dune and shoreland on Lake Michigan. Part of the Great Lakes basin, Lake Michigan is an essential facet of a system that is invaluable from a planetary perspective, not only for its contribution to the water supply on the globe – approximately 20% of the world's fresh surface water – but also for its rich and abundant fish and wildlife and the ecosystem services it provides to people, as well as supporting a primary economic engine for the nation. (GG-2)

Comment: I oppose the license renewal because Palisades is an aging facility with a history of noncompliance, reactor pressure vessel embrittlement, radiation release, and other problems that have and will continue to affect the surrounding population beyond Covert Township, Michigan. Many of those affected in the surrounding area are of low socioeconomic status, as well as minorities, raising the issue of environmental justice. (KK-1)

Comment: I oppose the renewal of the Palisades Nuclear Power Plant license for an additional twenty years. The plant is a danger to not only our precious natural resources in Michigan, but to countless people who are affected by its daily operation, and many more who would be affected should a disaster occur. (KK-10)

Comment: NRC writes (on page Roman numeral xvi of its draft EIS) 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 [operating license]." We would agree with that. A catastrophic accident would do that in a hurry. Last October, had the 107 ton fully loaded high-level radioactive waste container dropped onto the waste storage pool floor, Palisades' operations almost certainly would have ended for good. (MM-11) (NN-11)

Comment: My wife and I grew up vacationing at Palisades Park. We recently purchased an old cottage and renovated it so our four children, 8 and under, will grow up with the same wonderful experiences at the lake. We understand nuclear power can be a viable option for clean and efficient power, but we *strongly* oppose the renewal of the Palisades Nuclear Power Plant license. (RR-1)

Comment: There are far too many identified safety, security, environmental and health issues to overcome specific to the Palisades facility to warrant a license renewal. The age-related degradation, embrittlement of the reactor vessel, radioactive generation and storage issues, as well as the sensitive socio-economic impact of the community are just a few. (RR-2)

Comment: We implore you to deny the license renewal for Palisades Nuclear Power Plant, listen to the voices of the people, and take a stand for future generations. This is an opportunity to do what is right and set a course for safe, healthy, efficient and renewable energy, rather than holding on to strings of a proven aged, unsafe and volatile facility. Please do the right thing and deny this application, for our kids and the future generations." (RR-4)

Comment: Seek alternative solutions for a safe and clean future. (QQ-4)

Response: *The comments oppose license renewal at Palisades Nuclear Plant and are general in nature. The comments do not provide new and significant information and will not be evaluated further.*

A.2.5 General Comments in Opposition to Nuclear Power

Comment: I want to say no matter where you stand on the nuclear issue, if you think Palisades is great and you like nuclear energy, or if you're opposed to it, we're all in the same boat, all of us that live here in this area. And that is that. What happens there is going to affect us. It's not only going to affect us, but it's going to affect our children's children's children. You might be the last person in your lineage if that thing blows because you'll never have any, any offspring with normal DNA, if at all, you survive it, if at all, that you can reproduce. (C-5)

Comment: What happened in Chernobyl was disastrous. Kevin Kamps, who is one of my good friends, brought children from Chernobyl over here. I worked on the U.S., U.S.S.R.

Reconciliation Project to stop the nuclearization and the cold war, and we, we were successful. And when I see these children from Chernobyl whose beautiful souls with their sunken eyes, and they're severely handicapped, and I see American kids who are bright and bouncing around and having fun, Corinne and I ran the Children's Peace Camp and we had American children and Chernobyl kids. The, the contrast between the children was so immense, yet they're all innocent beautiful little children. The only difference is Chernobyl blew and Palisades hasn't yet. (C-6)

Comment: It's just hard for me to imagine that, that we're all here in this room even talking about this. I think the humanity of, of this nuclear thing is, is not good. And if, and everyone in here is a human being and therefore we should all be able to define the meaning of humanity. And to take a risk like this in my mind I, I don't care how safe it is, you know, it's, it's still a risk and you people you're here defending yourselves from a risk, a potential risk. So therefore you're admitting that there could be a meltdown. So I, I just find this whole thing just, us being here talking about this is totally insane. (Z-1)

Comment: We shouldn't even, man should have never split the atom to begin with. It was a bad thing. It's very bad. (Z-2)

Comment: And I also concur with Mr. is it Hannan, who said these, how can we even be in this year of, of, of 2006 still being, trying to justify the manufacture of a waste that is absolutely lethal for hundreds and thousands of years. What are we going to do with it. Who, nobody wants it. This is the substance of which we are having international, you know, traumas over right now with North Korea and a few years ago it was, you know, India, Pakistan and every, every nation on earth wants nuclear and we're giving it to other nations. It's absolutely preposterous. (AA-6)

Comment: The process by which we are generating electricity is the same process that was used to make the atomic bomb that was dropped on, on Hiroshima and Nagasaki. So this is a technology of death make no mistake about it. We are made of better stuff than this. We are intelligent enough to create electricity in a manner that does not produce a waste. And to have the waste off of discussion for the environmental impact statement is absolutely scandalous. (AA-7)

Comment: In the early 80s I, I became concerned about nuclear issues in, in a broad way. And I remember a film from that era which was called The Dark Circle documentary. And it, they interviewed lots of people in the nuclear industry both the weapons industry and the power industry. And what I remember from that is how intertwined they all are. That it, that you can't really separate atoms for peace, atoms for industry from, from the weapons industry. And Gary Kartch said, you know, it's, it's about death. Do we choose death or do we choose life. It really is about that ultimately. (BB-1)

Comment: And in going to various meetings and conferences through the last 25 years I want to focus on just one thing which is I've heard a lot of whistle blowers speak. And their lives have been ruined. Now some of you may have seen the film about Karen Silkwood and maybe you thought that was over dramatized or not true or whatever. But I sat down with a women in her 70s at at least three of these events who told me what happened to her. She went, and this is I'm, I'm moving to the inside here. She was an innocent young girl. She went to work for the industry and she noticed that some figures weren't quite right. And so she thought she better tell her boss and she did and that was the beginning. Basically she was told you can either do the figures the way we want them or you can leave. And she realized either way she was a marked woman. And yes she did have to go underground. She, the, the act that protected people that came out I believe after Silkwood she, she, she literally had to go underground. This is, this a gramma tell me this. She, she was, she felt, she feels deliberately exposed. She was dying of bone cancer. Now this is just one woman speaking. I don't think she was lying but I can't prove this. But she's only one of several that I've talked to who had their lives ruined in one way or another. Ann Harris at Lockspar [Watts Bar], part of TVA, Curtis Overall eight years ordeal, same place. Finally won on appeals. Wrongful termination. I, he was in tears, divorced, everything else. Ann Harris was run off the road. Interestingly enough it was Curtis Overall whose, who pointed out the flaws Lockspar [Watts Bar] which led to Cook very near us, D.C. Cook being shut down for three years because they had the same kind of system. And I remember hearing a guy in St. Joe talk about working at Cook and becoming a whistle blower and his life was ruined too. That's very near us. People are threatened. They are called on the phone. They are run off the road. So knowing this I wonder if this isn't just a charade. How many of you within the industry would have the guts if you, if you decided it was, there were things that weren't quite right to say so in public. You'd, you'd pay a heavy price number one. (BB-2)

Comment: So I guess I want to end by saying I don't think you can have nuclear weapons and nuclear power, the Dark Circle and also have democracy. And I think that's what we're up against in this country right now if you want to look at, excuse me, the big picture. (BB-4)

Comment: The NRC and power companies thus advocate for a dangerous source of electricity, nuclear power, calling it "clean" and "green" by appearing to discourage another harmful electricity source, one, however, that they plan to continue utilizing to the fullest extent possible… Further, nuclear power is not "carbon free," as it relies heavily on the use of fossil fuels in the mining, milling, processing, transportation, management, and storage of its fuel and waste products. (GG-17)

Response: *The comments oppose nuclear power, in general, and will not be evaluated further.*

A.2.6 Concerning Aquatic Ecology, Terrestrial Ecology, and Threatened and Endangered Species Issues

Comment: I've seen frogs with ten arms. I've seen a lot of things from broken DNA. (DD-4)

Comment: What it means that there is a huge area of contamination. It could go into Canada. It could affect all of us in Michigan and Canadians. And as in the case of Chernobyl that year Meyer -- had the most insane bizarre food. I am sure in Michigan because of all our precipitation we had fallout. I had turnips, they got this big with a little narrow and then they bulged out again and they were rotten inside. I had cabbage that was huge and rotten inside. That's not normal. It's never happened since. (DD-12)

Comment: A license extension at Palisades increases the fragile status of numerous already threatened, endangered, or candidate species, from daily "routine" radiation releases and/or potential large-scale radiation releases. Species exposed to cumulative exposures from the radioactive discharges of a nuclear power plant may over time develop subtle genetic alterations that are not observable in the short term, but that could have large, subtle impacts within a population, not immediately apparent. This has significant implications for the threatened and endangered species of southwest Michigan. (GG-14)

Comment: NMC/Consumers' Environmental Report identifies numerous Federal and State of Michigan endangered, threatened, candidate or species of special concern – such as the eastern box turtle, lake sturgeon, lake herring, creek chub sucker, Pitcher's thistle, prairie warbler, prairie vole, eastern massasauga rattlesnake, spotted turtle, Indiana bat, globe-fruited seedbox, scirpus-like rush, bald rush, Carey's smartweed, and sedges that either already live at or near the Palisades reactor or along its transmission lines, or very likely could in the future.

Approving a license extension of 20 more years of reactor operations at Palisades increases the fragile status of these already threatened, endangered, or candidate species, from daily "routine" radiation releases and/or potential large-scale radiation releases. At minimum, NMC/ Consumers must be required to establish a baseline for the status of the endangered species listed above and conduct appropriate monitoring to ensure that Palisades is not further endangering their health and viability. (GG-50)

Comment: NMC/Consumers must be required to establish a baseline for the status of the endangered species and conduct appropriate monitoring to ensure that Palisades is not further endangering their health and viability. Approving a license extension of 20 more years of reactor operations at Palisades increases the fragile status of these already threatened, endangered, or candidate species, from daily "routine" radiation releases and/or potential large-scale radiation releases. (GG-65)

Response: *The International Commission on Radiological Protection (ICRP) states that if man is adequately protected, then other living things are also likely to be sufficiently protected (ICRP 1977, 1991). The International Atomic Energy Agency (IAEA 1992) and the National Council on Radiation Protection and Measurements (NCRP 1991) reported that a chronic dose rate of no greater than 10 mGy/day (1 rad/day) to the maximally exposed individual (MEI) in a population of aquatic organisms would ensure protection for the population.*

IAEA (1992) also concluded that chronic dose rates of 1 mGy/day (0.1 rad/day) or less do not appear to cause observable changes in terrestrial animal populations. Table 5-9, in the IAEA document, compares the estimated whole body dose to the biota to the IAEA chronic dose rate values for aquatic organisms and terrestrial animals. The cumulative effects of the current operating unit would result in dose rates significantly less than the NCRP and IAEA studies. The comment provides no new and significant information and will not be evaluated further.

Comment: The license renewal does not involve any major construction or physical alteration of the project area. The Generic EIS and Draft Supplement 27 adequately address the concerns of the Department regarding fish and wildlife resources, as well as species protected by the Endangered Species Act. We concur with the preliminary conclusions of the U.S. Nuclear Regulatory Commission staff with respect to the impacts of continued operations on these resources and species. We have no comment on the adequacy of other resource discussions presented in the documents. (II-1)

Response: *The comment relates to aquatic ecology, terrestrial ecology, and threatened and endangered species issues covered in the SEIS. The comment provides no new and significant information and will not be evaluated further.*

Comment: Section 4.1, *Cooling-System*, Page 4-9. We are concerned about entrainment of fish and shellfish in early life stages. Under a U.S. EPA rule, codified in 40 CFR.125 (U.S. EPA Rule), Palisades Nuclear Plant is required to reduce its entrainment of fish and shellfish in early life stages. Under the U.S. EPA Rule, Palisades Nuclear Plant is required to choose one of five compliance alternatives to reduce entrainment and the compliance alternative must meet a regulatory performance standard. We understand that Palisades will comply with the U.S. EPA rule through conditions in a NPDES permit issued by the Michigan Department of Environmental Quality. However, we believe that the project proponents should have a proposed compliance alternative and regulatory performance standard for Palisades, because the project proponents must assess the feasibility of complying with the rule. Listing information would provide a comprehensive public disclosure of plans to reduce entrainment. Therefore, we request the project proponents to determine and disclose the proposed compliance alternative and performance standard that would most likely be proposed in the NPDES permit application for Palisades in the final SEIS. (UU-17)

Response: *The final rule issued by the EPA on February 16, 2004, commonly referred to as the 316(b) Phase II regulations, establishes requirements to minimize adverse impacts on fish and shellfish from cooling-water intake structures at large power plants. Facilities have several compliance alternatives that meet the performance standards defined in the final rule. The alternatives include demonstrating that the existing cooling-water intake configuration provides adequate protection, selecting additional fish protection technologies (such as screens with fish return systems), and using restoration measures. Additional information regarding the rule can be found at http://www.epa.gov/waterscience/316b/.*

Compliance with this rule is accomplished under implementation of the NPDES program. For Palisades, this program is administered by the State of Michigan Department of Environmental Quality (MDEQ). However, because Palisades employs a closed-cycle cooling system, as described in Section 2.1.3, and since 40 CFR 125.94(a)(1)(i) states that, "you may demonstrate to the Director that you have reduced, or will reduce, your flow commensurate with a closed-cycle recirculating system. In this case, you are deemed to have met the applicable performance standards and will not be required to demonstrate further that your facility meets the impingement mortality and entrainment performance standards specified in paragraph (b) of this section," the NRC staff anticipates that Palisades would meet the performance standard of concern. Nevertheless, this final determination will be made by the MDEQ in its review of Palisades NPDES permit application. The NRC staff has determined that the impacts related to entrainment would be SMALL and no additional mitigation is warranted. However, if the MDEQ requires additional mitigation under the new regulations, the impact would be even further reduced. The comment provides no new and significant information and will not be evaluated further.

Comment: Section 4.6, *Threatened and Endangered Species*, pages 4-32 to 4-35. We are concerned because the draft SEIS does not evaluate impacts on State-listed threatened and endangered species. The draft SEIS includes an evaluation of Federal and State-listed threatened and endangered species in the study area. However, the draft SEIS only evaluates impacts to Federal-listed threatened and endangered species. We believe that the final SEIS should include a more comprehensive evaluation of threatened and endangered species, by including an evaluation of impacts to State-listed species. (UU-18)

Response: *The Endangered Species Act [10 CFR 51.53(c)(3)(ii)(E)] requires the NRC to perform an assessment of impacts of a proposed action (license renewal) on Federally-listed threatened and endangered species in its SEIS. There is no Federal statutory requirement to specifically consider State-listed species in our analysis. However, the NRC staff does evaluate the impacts on all biota and their habitats from operation of the plant cooling system (Section 4.1) and continued operation of the transmission lines (Section 4.2). Potential impacts on aquatic and terrestrial species, regardless of their status as Federally-listed or State-listed species, were considered in this assessment; the conclusion reached in this assessment was that the impacts from continued operation of the cooling system and transmission system on all*

biota and their habitats would be SMALL. Therefore, no additional actions were taken to further categorize or distinguish between Federally-listed and State-listed species. The comment provides no new and significant information and will not be evaluated further.

A.2.7 Comments Concerning Surface-Water Quality, Hydrology, and Use Issues

Comment: I'm concerned about Palisades because through the years, you know, growing up here in Michigan the last time I was in Lake Michigan was as a baby, when I was a baby my mother has a photo of me in the water. When I was growing up I went swimming quite a lot in Lake Michigan. I can remember drinking the water, swimming, enjoying it. I can remember how many people were on the beach. It was just glorious. And I can remember drinking the water and it was clean, sometimes it tasted a little fishy but, you know, it wasn't a bad taste, you could drink it. You can't drink it now. Since the, the building of the nuclear reactors the water quality has deteriorated. Last time I went swimming last year my daughter and my granddaughter, I have a little almost three-year-old granddaughter now, precious. They went swimming, and they both got stinging rashes. And I got a rash myself although I was only in the water for a couple of minutes. And we cannot drink the water; it's got a bad, foul taste and I don't know if this is because of the chlorine, bromine, and amine released or if it's from other things. (DD-1).

Response: *Sections 2.2.2 and 2.2.3 discuss water use and water quality, respectively. Section 4.1 also discusses the impacts on surface-water quality, hydrology, and use resulting from the operation of the cooling system at Palisades as a Category 1 issue. Discharges of chlorine, bromine, and amine are regulated by the EPA and implemented through the NPDES program. The NRC staff has not identified any new and significant information during its environmental review process, which includes an evaluation of the Palisades NPDES permit and discussion with the MDEQ compliance office. Therefore, the NRC staff concludes that there would be no impacts of discharge of chlorine or other biocides during the renewal term beyond those discussed in the GEIS. The comment provides no new significant information and will not be evaluated further.*

Comment: There are questions regarding the status of the NPDES permit of Palisades to utilize and eventually discharge a compound, Betz Clam-Trol, to Lake Michigan to control mussel and clam mussel colonization in discharge and intake pipes. Reports posted by the Michigan Department of Environmental Quality (MDEQ) in 2000 and through 2004 indicated "continued non-compliance." Subsequent updating of the reports now appears to indicate that the plant is and was in compliance with its permit. To further confuse the matter, MDEQ has stated that the original reports were erroneous. We ask that a full explanation be provided for this situation and how it will be considered in the re-licensing decision. The impact of 20 additional years of pollution improperly controlled under requirements of the National Pollutant Discharge Elimination System will adversely affect the water quality of nearby sources, including Lake Michigan.

In its “Ninth Biennial Report on Great Lakes Water Quality,” the International Joint Commission urged that "[g]overnments monitor toxic chemicals used in large quantities at nuclear power plants, identify radioactive forms of the toxic chemicals and analyze their impact on the Great Lakes ecosystem." The draft EIS must address how the NRC or the U.S. Environmental Protection Agency has met this obligation. (GG-42)

Comment: The EIS should be revised to include how the NRC meets its obligations as described in the International Joint Commission’s (IJC) “Ninth Biennial Report on Great Lakes Water Quality.” In it, the IJC urged that "[g]overnments monitor toxic chemicals used in large quantities at nuclear power plants, identify radioactive forms of the toxic chemicals and analyze their impact on the Great Lakes ecosystem." (GG-63)

Comment: Further, other toxic chemical discharges to Lake Michigan, such as Betz Clam-Trol, discharged via a National Pollutant Discharge Elimination System (NPDES) permit, require stricter controls and enforcement of violations, as part of any license extension application. (GG-8)

Comment: The impact of 20 additional years of pollution by non-radiological toxic chemicals will directly affect water quality of nearby sources, including Lake Michigan. In 2000, for example, Palisades was found to be in ‘continuing noncompliance’ for its apparent multiple misuses of Betz Clam-Trol in Lake Michigan for the dispersion of mussels and clams affecting the reactor’s water intakes (EPA 2004). (KK-9)

Comment: License renewal should not be granted to the Palisades Nuclear Power Plant, because (4) there is continued noncompliance of non-radiological persistent toxic chemicals to area water sources. (KK-5)

Response: *The NRC staff addressed the issue of the use of molluscicide Betz Clam-Trol and “continuing non-compliance” noted by the MDEQ in Section 2.2.3 of the SEIS, stating that in 2005 the MDEQ documented that the recurring noncompliance notices on the online database are erroneous, and that the facility is in compliance.*

In its response to the Ninth Biennial IJC Report, the EPA concluded that “The U.S. will continue to monitor nuclear generating stations to insure that toxic chemicals are not being used in large quantities and that radioactive forms of toxic chemicals are not being generated in sufficient amounts to cause significant impact on the Great Lakes ecosystem” (EPA 2006). The accumulation of contaminants is a Category 1 issue that has been evaluated in the GEIS. All effluent discharges are regulated under the provisions of the Clean Water Act and the implementing effluent guidelines, limitations, and standards established by the EPA and the States. Conditions of discharge for each plant are specified in its NPDES permit issued by the State or the EPA. The comment provides no new and significant information and will not be evaluated further.

A.2.8 Comments Concerning Human Health Issues

Comment: Yesterday I received my copy of the Generic Environmental Impact Statement for License Renewal of Nuclear Plants Supplement 27 regarding the Palisades Nuclear Power Plant. Reading through both the manual and its cover letters, I see, despite the potential radioactive hazards, the NRC insists the environmental impacts of the Palisades Nuclear Power Plant and the radioactive materials about its reservation is always regarded as small throughout this report. (B-6) (TT-6) (O-1)

Comment: I, responding I think to David Miller or whoever said that the consequences of the daily releases into the environment of radioactive nuclides is small, I don't know what small means. I know cells are small. And I know that the newest report by the National Academy of Sciences has said that there is no safe threshold for radiation. Not one bit of it. So how do you determine, this is new information. You didn't have that information when you licensed this plant 40 years ago. So this should be considered in your re-licensing process. It's new information. Are you talking about a small person, or a small cell, you know? I'm a small person and I don't want one of my small cells injured. So I think that information needs to be considered in this license application. So please look at that information. (G-1)

Comment: My second question is to the health scientist. Is there any level of radiation where you cannot achieve an increase in incidents of cancer. It is my understanding that there is a linear relationship and there is no threshold between the incidents of cancer and your exposure to radiation, the lifetime. (R-2)

Comment: The Palisades plant harms the environment and the health of its workers and surrounding residents from its discharges of radioactive and toxic substances to Lake Michigan, the air, and land. Routine radioactive discharges by nuclear power plants are incorrectly deemed legal and judged to be "safe" by the NRC and the nuclear power industry, contrary to a recent National Academy of Sciences report that confirms that there is no safe level of exposure to radiation. (GG-7)

Comment: Nuclear reactors, including Palisades, are not 'clean." They emit harmful radioactivity into the environment on a daily basis and generate long-lasting radioactive wastes. (GG-18)

Comment: The NRC also made a determination "that, although no standard exists that can be used to reach a conclusion as to the significance of the magnitude of the collective radiological effects attributable to any plant, 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." This determination made by the NRC

is in direct conflict with a 2005 National Academy of Science report, which concluded that no dose of radiation, no matter how small, can be declared "safe." (GG-25)

Comment: The NRC has placed this issue outside the scope of the EIS for extending the license for Palisades. We strongly disagree.

There are routine everyday discharges from nuclear power plants, deemed to be both explicitly "permissible" or "allowable," and implicitly "safe" or "insignificant" by the NRC and the nuclear power industry. Prior to the advent of nuclear power, radioactive fission products, produced in nuclear reactors, were present in only exceedingly rare, trace amounts in isolated locations on earth. Over 300 different radioactive chemicals are currently created by nuclear chain reactions – and it takes hundreds of thousands to many millions of years for these new chemicals to return to a stable state. (GG-27)

Comment: While concerns about the consequences of human exposure to ionizing radiation are not new, the 2005 National Academy of Science's seventh Biological Effects of Ionizing Radiation (BEIR VII) report on "Health Risks from Exposure to Low Levels of Ionizing Radiation" has confirmed that there is no safe – level of exposure to radiation—that even very low doses can cause cancer and other maladies and that risks from low dose radiation are likely greater than previously thought. The implications of NAS's recent findings require a thorough analysis by NRC in its EIS of the human health impacts of the radioactive substances released by Palisades. (GG-29)

Comment: One time I sat on the beach and I had the sand in my fingers etcetera and there was a lot of gas coming out of Palisades that day and I was near the plant. I got real sick afterwards. It reminded me of when I was out at the nuclear test site the feelings I had afterwards being very tired and nauseous and just really dead tired. I'm a cancer survivor. I know what it's like to go through that dark cloud. I've seen children from Chernobyl. (DD-2)

Comment: I live on land where there's pesticide use. I'm been a victim of that which is an essentially a cause of cancer not radiation but radiation does cause cancer too. (DD-3)

Comment: Well, I wondered if I, I presume that you couldn't calculate an increase number of cancers that would develop because of the increased exposure to radiation in the locality of this plant. And second the study you cited that was commissioned by the National Cancer Institute was a bonafide epidemiology study that, that really looked for a hot spot. (S-1)

Response: *The comments are noted. Radiation exposure to the public during the license renewal term is a Category 1 issue that was evaluated in the GEIS.*

Radiation is only one of many agents with the potential for causing cancer, and cancer caused by radiation cannot be distinguished from cancer attributable to any other cause, such as

chemical carcinogens. The chances of getting cancer from a low dose of radiation is not known precisely because the few effects that may occur cannot be distinguished from normally occurring cancers. The normal chance of dying from cancer is about one in five.

The actual amount of radiation any member of the public receives from activities at nuclear power facilities is so small that scientists have been unable to make empirically based estimates of radiation risk with any precision. There are many difficulties involved in designing research studies that can accurately measure the projected small increases in cancer cases that might be caused by low exposures to radiation when compared to the rate of cancer resulting from all other causes. In the absence of a clear answer, the U.S. Nuclear Regulatory Commission conservatively assumes that any amount of radiation may pose some risk for causing cancer or having some hereditary effect and that the risk is higher for higher radiation exposures. This is called a linear, no-threshold dose-response model and is used to describe the relationship between radiation dose and the occurrence of cancer.

This model suggests that any increase in dose above background levels, no matter how small, results in an incremental increase in risk above existing levels of risk. Although the U.S. Nuclear Regulatory Commission has accepted this hypothesis as a "conservative" (i.e., cautious) model for determining radiation standards, the U.S. Nuclear Regulatory Commission, like other authoritative bodies, recognizes that this model will probably over-estimate radiation risk. The associations between radiation exposure and the development of cancer are mostly based on studies of populations exposed to relatively high levels of ionizing radiation (for instance, the Japanese atomic bomb survivors and the recipients of selected diagnostic or therapeutic medical procedures).

Although radiation can cause cancers at high doses and high dose rates, currently there are no data to establish unequivocally the occurrence of cancer following exposures to doses below about 10 rem. The average annual dose to a member of the public from a nuclear power facility is in the range of less than 1/1000th rem (1 millirem) per year. At Palisades, the dose to a member of the public is much less than 1 mrem per year. This is compared to the 10 rem (10,000 millirem) discussed previously. At doses above 10 rem, a relationship between radiation and cancer can be observed. Although there is a statistical chance that radiation levels that small (i.e., less than 10 rem) could result in a cancer, it has not been possible to calculate with any certainty the probability of cancer induction from a dose this small. Because many agents cause cancer, it is often not possible to say conclusively whether the cancer was radiation-induced cancer.

A number of studies have been performed to examine the health effects around nuclear power facilities.

- *In 1990, at the request of Congress, the National Cancer Institute conducted a study (NCI 1990) of cancer mortality rates around 52 nuclear power plants and 10 other nuclear facilities including Palisades. The study covered the period from 1950 to 1984 and evaluated the change in mortality rates before and during facility operations. The study concluded there was no evidence that nuclear facilities may be linked causally with excess deaths from leukemia or from other cancers in populations living nearby.*

- *Investigators from the University of Pittsburgh found no link between radiation released during the 1979 accident at the Three-Mile Island nuclear station and cancer deaths among nearby residents. Their study followed more than 32,000 people who lived within 8 km (5 mi) of the facility at the time of the accident.*

- *In January 2001, the Connecticut Academy of Sciences and Engineering issued a report on a study around the Haddam Neck nuclear power plant in Connecticut and concluded that exposures to radionuclides were so low as to be negligible and found no meaningful associations to the cancers studied.*

- *In 2001, the American Cancer Society concluded that, although reports about cancer clusters in some communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population. Likewise, there is no evidence linking the isotope strontium-90 with increases in breast cancer, prostate cancer, or childhood cancer rates.*

- *In 2001, the Florida Bureau of Environmental Epidemiology reviewed claims that there are striking increases in cancer rates in southeastern Florida counties caused by increased radiation exposures from nuclear power plants. However, using the same data to reconstruct the calculations on which the claims were based, Florida officials did not identify unusually high rates of cancers in these counties compared with the rest of the state of Florida and the nation.*

- *In 2000, the Illinois Public Health Department compared childhood cancer statistics for counties with nuclear power plants to similar counties without nuclear plants and found no statistically significant difference.*

In summary, there are no studies to date that are accepted by the nation's leading scientific authorities that indicate a causative relationship between radiation dose from nuclear power facilities and cancer in the general public. The amount of radioactive material released from nuclear power facilities is well measured, well monitored, and known to be very small.

In spring 2006, the National Research Council of the National Academies published, "Health Risks from Exposure to Low Levels of Ionizing Radiation, BEIR VII Phase 2." A prepublication version of the report was made public in June 2005. The major conclusion of the report is that current scientific evidence is consistent with the hypothesis that there is a linear, no threshold dose response relationship between exposure to ionizing radiation and the development of cancer in humans. This conclusion is consistent with the system of radiological protection that the NRC uses to develop its regulations. Therefore, the NRC's regulations continue to be adequately protective of public health and safety and the environment. None of the findings in the BEIR VII report warrant changes to the NRC regulations. The BEIR VII report does not conclude that there is no safe level of exposure to radiation; it does not address "safe versus not safe." It does continue to support the conclusion that there is some amount of cancer risk associated with any amount of radiation exposure and that the risk increases with exposure and exposure rate. It does conclude that the risk of cancer induction at the dose levels in the NRC's and EPA's radiation standards is very small. Similar conclusions have been made in all of the associated BEIR reports since 1972 (BEIR I, III, and V); the BEIR VII report does not constitute new and significant information.

The comments provide no new and significant information and will not be evaluated further.

Comment: Historically, the NRC has relied on a 1990 National Cancer Institute (NCI) study to address cancer rates near nuclear power plants. However, this study is now outdated, not accounting for latency periods which could have developed into cancers since 1990. And it was essentially methodologically flawed from the start, as the only data considered by the NCI was from the county that each reactor is located in, and not other downwind and downstream populations potentially affected by radioactive releases of the plants. Further, there are a host of other diseases associated with radiation exposure that have not been assessed, such as thyroid disease, infertility, genetic damage and birth defects, heart disease, and immune system suppression, which require monitoring and attention. A baseline assessment, as well as regular monitoring, of cancer and other disease rates is warranted prior to consideration of Palisades' proposal for a 20-year license extension. (GG-31)

Comment: Effects on the health of populations surrounding Palisades and subject to downstream or downwind discharges must be studied and quantified. The implications of the National Academy of Science's recent findings require a thorough analysis by the NRC in its EIS of the human health impacts of the radioactive substances released by Palisades. NMC/Consumers are obligated to provide the communities in the vicinity of the Palisades plant, with a monitoring program to provide them with independent information regarding radioactive discharges and releases. There is also a need to establish a baseline assessment of cancer and other disease rates, as well as a program of regular monitoring, prior to consideration of the proposal for a 20-year license extension. This should also include an evaluation of the potential

for the synergistic effects of chronic or catastrophic radiation releases combined with the toxic pesticides to which migrant field workers in the region have been exposed. (GG-54)

Response: *The comments propose monitoring the health of people living near Palisades. The evaluation of health effects from exposure to radiation, both natural and man-made, is an ongoing activity involving public, private, and international institutions. International and national organizations such as the ICRP and NCRP provide consensus standards developed from recent and ongoing research.*

The NRC's regulatory limits for effluent releases and subsequent dose to the public are based on the radiation protection recommendations of these organizations. The NRC provides oversight of all licensed commercial nuclear reactors to ensure that regulatory limits for radiological effluent releases and the resulting dose to the public from these releases are within the established limits. The regulations related to radiological effluents and dose to the public can be found in 40 CFR Part 190, 10 CFR Part 20, and 10 CFR Part 50, Appendix I.

Gaseous and liquid effluent releases are monitored at Palisades to demonstrate that they are within regulatory limits. As stated in Section 2.2.7, the dose to the hypothetical MEI is less than 1 mrem. Health effects due to radiation exposure at this level are highly unlikely and would be indistinguishable from effects due to background radiation. The average dose from all sources of radiation, including the natural background, is approximately 360 mrem per year. Therefore, neither the NRC nor the licensees directly monitor the health of the people in the communities around nuclear power plants. As discussed in the response above, a number of studies have been performed to examine the health effects around nuclear power plants, including the NCI report (NCI 1990). The studies have concluded that there was no evidence to indicate that an excess occurrence of cancer resulted from living near nuclear power plants. The comments provide no new and significant information and will not be evaluated further.

Comment: License renewal should not be granted to the Palisades Nuclear Power Plant, because (3) radiative effects are only considered within a 50-mile radius. (KK-4)

Comment: The 50-mile radius considered in the impact assessment also fails to account for the movement of radiation with the wind. The radiation may expand and become less concentrated as it moves away from the epicenter (NRC 2006), but recent studies have shown that there is no safe level of ionizing radiation (NAS 2005). The effects beyond the radius cannot be ignored or discounted as negligible without serious ethical repercussions with this knowledge of toxicity of any level of radiation. (KK-8)

Response: *The comments question NRC staff's use of a 50-mi radius for impact assessment of radiation exposure. As discussed in the responses above, the highest dose to members of the public from the Palisades plant would be much less than 1 mrem per year. The plant-related dose to a member of the public more than a very short distance (e.g., 1 mi) from the*

plant would be even smaller. The background dose to a person living in the United States from all sources of radiation – cosmic, the earth, radon, building materials, medical procedures, and nuclear power plants – is approximately 360 mrem per year. Therefore, the NRC staff concludes that the use of a 50-mi radius for assessment of impact from radiation exposure is conservative and adequate. The comments provide no new and significant information and will not be evaluated further.

Comment: Section 8.2.1, Coal-Fired Generation, page 8-17, under bullet point Human Health. Any dose estimate that would have the potential to fall in the risk range of 10^{-6} to 10^{-4} or greater needs to be specifically evaluated for potential regulatory requirements or risk impacts to the public health. This should be estimated conservatively using the data that is currently available or that can be logically extrapolated from currently available information. (UU-12)

Response: *While it is possible to estimate the dose from a coal-fired power plant, many assumptions would be required, including location and makeup of the affected population. For the basis of comparing alternatives, the NRC staff does not perform a complete assessment of impacts of the alternatives, but rather a qualitative, and if feasible, a quantitative comparison. Because the location of an alternative to Palisades and the surrounding population is purely speculative, an estimated dose would have little real meaning. The impacts on air quality and human health resulting from the operation of a coal-fired plant are discussed in general in the GEIS (NUREG-1437). The GEIS acknowledges that public health risks from emphysema and cancer would likely result from coal-fired power plant emissions of regulated pollutants and radionuclides. The comments provide no new and significant information and will not be evaluated further.*

A.2.9 Comments Concerning Socioeconomic Issues

Comment: Financial benefits to Covert Township, host to Palisades nuclear power plant, are not evident and not expected with a license extension. The township consistently rates substantially below comparable county, State and national economic indicators in median household and per capita incomes and the draft EIS notes no improvements are expected by the license extension. (GG-12)

Response: *Per 10 CFR 51.53(c)(2), an applicant's environmental report is not required to "include discussion of the economic costs and economic benefits of the proposed action or of alternatives to the proposed action . . . ." Section 4.4 of this SEIS discusses the socioeconomic impacts of plant operations as they relate to public services, aesthetics, housing, offsite landuse, cultural resources, and environmental justice. Financial benefits to the community are beyond the scope of the environmental review for license renewal.*

The comment does not provide new and significant information and will not be evaluated further.

Environmental Justice

Comment: License renewal should not be granted to the Palisades Nuclear Power Plant, because (2) the risk of radiation to minority populations is underestimated using census-block grouping. (KK-3)

Comment: Covert Township is one with high levels of minority populations and has many people who are of a low socioeconomic status. In the impact statement, these populations were taken into consideration, but large urban centers such as Battle Creek, Muskegon and Grand Rapids -where significant African American and Latin American communities live -were not considered. Because less than fifty percent of these cities were within the 50-mile radius, they were eliminated, and therefore significant risks to the minority populations were not fully documented." (KK-7)

Response: *The SEIS identifies the distribution of low-income populations within a 50-mi area of the plant at the block group level in order to assess whether license renewal may impact environmental justice. Low-income and minority populations, defined if block groups were found to have more than 50 percent of individuals below poverty level determined in the 2000 Census, or if the number of individuals below the poverty level was more than 20 percentage points higher than the State average, were found in block groups in western Van Buren County, immediately to the west of Covert Township.*

To capture environmental impacts that could potentially impact the population as a whole, a 50-mi area around the plant is used, which is assumed to be the greatest geographic extent of any potential airborne releases from the plant during normal operations or during accidents. The SEIS identifies the geographic distribution of low-income and minority populations within this 50-mi area at the block group level in order to provide a detailed characterization of low-income and minority groups potentially adversely impacted by the plant. Because the cities mentioned in the comment are beyond the 50-mi limit of the impact zone, they are not included in the analysis. Analyses of census data at the census block group level provides information for geographic areas of approximately 1000 people each, on average, and as such provides sufficient geographic detail to assess the impact of Palisades on low-income and minority populations.

The comments do not provide any new and significant information and will not be evaluated further in the SEIS.

Comment: Palisades has been considered a major contributor to Van Buren County's property and municipal tax revenues, but the economic benefit to Covert Township has been

ambiguous. In fiscal year 2004, a total of $3.6 million in property taxes went to Covert Township and schools, with an additional $1.6 million to Van Buren County and schools. As host to the Palisades plant and benefactor of its tax revenue, it is reasonable to assume that Covert Township should at minimum be at economic parity with surrounding geographic household and per capita incomes. Despite the financial benefit such payments suggest, however, Covert Township consistently rates substantially below comparable county, State and national economic indicators in median household and per capita incomes. The EIS overlap of Geographic Distribution of Minority Populations (figure 4-1 on p. 4-29 of the NRC draft EIS) and Low-Income Populations (figure 4.2 on p. 4-30) shows a large area of Covert Township (and St. Joseph/Benton Harbor) to be both "high minority and low-income. Poverty persists in the Covert Township, a high minority and low-income community, despite the presence of the Palisades nuclear power plant for nearly four decades.

Consumers Energy is described as the largest employer in Van Buren County, with 484 employees (draft EIS, Table 2-8). The draft EIS states that unemployment in the county "was moderately high at 7.2% in December 2004," but determines no "incremental change" in employment and personal income resulting from a Palisades license renewal --new employment opportunities are not projected to occur.

Palisades' Permanent Employee Residence Information by County and City (Table 2-3) lists employee residence totals as: South Haven (156), Bangor (14), Grand Junction (13), Paw Paw (12), Hartford (8), and Others (30). Unfortunately, residents of Covert Township that might be employed at Palisades are not specified in this information, raising the question as to whether or not Covert Township residents benefit at all from employment at the plant.

A review of household income further shows a lack of positive benefit to Covert Township from Palisades. Per capita incomes in 2000 were $21,587 for the United States, $22,168 for Michigan, $17,878 for Van Buren County and $12,156 for Covert Township (U.S. Census Bureau, 2000 Census, in 1999 dollars). These figures reveal incomes for Covert Township that range from 45% and 33% consistently lower than the State of Michigan and Van Buren County respectively.

Covert Township reported 14.3% of families with incomes less than $10,000, three times the rate of Van Buren County. There are over three times as many families below poverty level in Covert Township as in Van Buren County. Covert bears the burden of 34% of related children under 18 years of age in poverty compared to Van Buren's 11%; related children under 5 years of age in poverty, 38% compared to Van Buren's 17%; Covert families with female householders, no husband present, 48% compared to Van Buren's 25%; related children under 18 years of age for Covert at 57% compared to Van Buren's 30%, and Covert related children under 5 years of age living below poverty level at 80% versus Van Buren's at 48%. Covert reports 32% of individuals in poverty while Van Buren reports 11% of individuals living in

poverty. As unfortunate as Van Buren County poverty levels may be, Covert Township's poverty is consistently two and three times worse. None of this data was provided whatsoever in the scope of the EIS socio-economic factors.

Comments by local and county government and Chambers of Commerce officials at public hearings have extolled the benefits of new fire trucks and infrastructure improvements, and the EIS notes that Palisades' property tax revenues are "used to fund local and county emergency management programs, public safety, local public schools, local government operations, local road maintenance, and the local library system," (page 2-58, of the draft EIS). Still, Covert Township experiences chronic poverty.

NRC staff ultimately determined that the socio-economic impacts resulting from Palisades' license renewal would be "small", implying that the impacts "would not produce an incremental change in any of the impact measures used. Unfortunately, the draft EIS's methodology neglected a comprehensive analysis of socio-economic conditions in Covert Township and Van Buren County, leaving out those conditions that did not support a positive benefit from the nuclear power plant.

NMC/Consumers discounts potential impacts to Latin American migrant workers in southwest Michigan from an extension of Palisades' license. NMC/Consumers' Environmental Report (page 2-32) notes (inaccurately) that "Berrien and Van Buren Counties host moderate numbers of migrant workers." According to the U.S. Department of Agriculture, however, in 2004, 3,677 and 6,733 temporary farm laborers (many of them Latino) were employed in Berrien and Van Buren Counties, respectively. These numbers, in addition to family members of the workers, represent populations as large as the county seats and even the biggest towns in these counties. Rather than characterizing the number of migrant workers, many of whom are Latino and of low income, as "moderate," a more accurate characterization relative to the populations of the host counties would be "large," and therefore worthy of significant consideration not only in NMC's Environmental Report, but also in NRC's draft EIS.

The Latin American agricultural workforce of the Palisades area is also at disproportionate risk from both routine radioactive discharges, as well as catastrophic radiation releases, given this workforce's complete reliance on agricultural sector employment. A large-scale radiation release from Palisades could seriously damage the region's agricultural base. Even a "minor" accident at Palisades involving radiation release could significantly harm area agriculture, due to the stigma attached to radioactive contamination. In either scenario, the Latino migrant labor workforce would suffer disproportionate harm. There also has been no evaluation of the potential for the synergistic effects of chronic or catastrophic radiation releases combined with the toxic pesticides to which field workers have been exposed. In addition, there are no Spanish language emergency evacuation instructions and notifications prepared to serve the Spanish speaking Latino population within 50 miles of the Palisades reactor. (GG-23)

Comment: A comprehensive analysis of socio-economic conditions in Covert Township and Van Buren County must be conducted to encompass income disparities. NRC must account for the lack of positive benefit by Covert Township residents as a result of the presence of Palisades' nuclear power plant and potential license extension. NRC must also direct NMC/Consumers to address the potential for disproportionate harm to the Latino migrant labor workforce from harm to the agricultural base from a radiation release. (GG-60)

Comment: It is baffling NRC concludes that "offsite impacts from Palisades on minority and low-income populations would be SMALL (sic), and no special mitigation actions are warranted." (EIS, p. 4-31) Just three pages earlier, NRC admits that "[c]ensus block groups with a minority population . . . are located in Covert," Palisades' hometown. Figure 4-2 on p. 4-30 also identifies Covert's predominantly African American population as low-income." Why Covert's African American community is still low-income after 38 years of substantial profit-making at Palisades is quite troubling. In addition, Covert's community suffers the worst radiation doses from routine operations at Palisades, and would suffer the worst health impacts from accidental radiation releases. NRC even ignores the fact that Palisades' tax contributions to its neighboring community in Covert are dwindling over time - shown in Nuclear Management Company's 2005 Environmental Report -- so residents suffer worsening risks as the reactor deteriorates with age, while also receiving decreasing benefits such as tax income. (see http://www.astrongerkinship.com/ for a recent book about the African American history of Covert). (MM-8) (NN-8)

Comment: NRC's treatment - or lack thereof - of Palisades' impact on the surrounding Latin American agricultural workforce is remarkably inconsistent and disconcerting. Regarding environmental interveners' contention that this community would suffer disproportionately from routine and accidental radiation releases from the reactor, NRC staff agreed that the company's license extension application does not sufficiently address the "adverse socio-economic impacts of a catastrophic radiation release...as they would be found among the low-income Latin American agricultural workforce of the Palisades area..." and that such a contention would not necessarily be out of scope. Likewise, NRC's licensing board stated that interveners' allegation of disproportionate impacts upon Latin American agricultural workers from an embrittlement/PTS core rupture might be pertinent and admissible in the proceeding to decide whether or not to grant Palisades 20 more years. Yet, the licensing board dismissed the contention, stating 'no facts that would tend to show impacts falling disproportionately on this community have even been alleged." (see pgs. 57-6 0 of the licensing board's March 7, 2006 ruling dismissing this and all other intervener environmental contentions; also see the contention itself, at Aug. 8, 2005 on the "Palisades Watch" website). (MM-9) (NN-9)

Comment: Isn't it obvious that a catastrophic radiation release at Palisades would ruin nearby agriculture for years, decades, centuries, perhaps even forevermore? Who would eat cherries, blueberries, grapes, peaches, apples, or other agricultural products from west Michigan after a

large radiation release from Palisades? (see EIS, p. 2-54 and 55; Table 2-6 shows that nearly half of Van Buren County's land base is devoted to agriculture!) Wiping out of agriculture would very likely impact the low-income, minority community of Latin American agricultural laborers more than any other segment of the surrounding population. Yet, despite the NRC staff's and licensing board's statements to the contrary, NRC now dismisses any notion of disproportionate impacts upon - or even the existence of - a Latin American agricultural workforce near Palisades, in the space of two sentences. NRC now treats these real people as invisible (EIS, p. 2-57), which represents an environmental justice violation by NRC itself. (MM-10) (NN-10)

Response: *Environmental justice is addressed in Section 4.4.6 of the SEIS, where the NRC staff concludes that offsite impacts from Palisades on minority and low-income populations are SMALL, and no special mitigation action is warranted.*

Regarding radiological impacts during normal plant operation, the NRC concludes in Section 4.3 that the radiation exposure to the general public is SMALL based on GEIS findings. The NRC has similar conclusions in Section 5.1 for the impact of postulated plant accidents at Palisades. Given that these impacts are SMALL on the general population, there is no evidence to suggest that any minority or low-income population could be disproportionately affected by such impacts in a severe or adverse way.

The comments provide no new and significant information and will not be evaluated further.

Historic and Archaeological Resources

Comment: And I'd like to raise a point. In the back of the room, there's a summary of the findings of this EIS and one of them referred to, it's a contradiction with NRC's own report. It said historic and archaeological impacts would be small, but right in the beginning of this report it says that they may be small, but could be moderate for historic and archaeologic resources. And when you read the details in here, NRC actually verifies exactly what we raised last July 28th at this very podium and again during the licensing proceeding, but we got thrown out of that, that Native American sites very well could exist, very likely do exist, NRC is now saying that, at Palisades, but no site survey is going to be required. They can do 20 more years worth of routine radiation releases. If forced to build new dry cask pads that comply with safety regulations, that could be built right on top of a Native American archaeological site, burial grounds, village sites. It's not exactly far fetched when NRC admits that there are 15 such sites within a mile of Palisades or its transmission lines, including one 0.3 miles away, which I believe is the Brandywine in Palisades Park, exactly what we pointed out here. So my question is, how in the world did we get booted out of the NRC licensing proceeding on that one? (A-11)

Comment: NRC reports that 15 Native American archaeological sites have been identified by surveys within 1 mile of the Palisades site and its transmission lines, including a prehistoric village site. Another of the prehistoric sites is of "unknown type," just 0.3 miles south of the

Palisades site, and a third is just outside Palisades' eastern boundary. (EIS, pgs. 2-62 to 63) This validates the environmental contention, arbitrarily dismissed by the NRC licensing board on March 7, that 20 more years of routine radiation emissions, potential accidental radiation emissions, and plant expansions such as additional waste storage pads could do irreversible harm to as-yet unidentified Native American burial sites, village sites, etc. at Palisades. Why did the licensing board dismiss this contention when NRC admits in this EIS that it is an issue? (see http://www.nirs.org/reactorwatch/licensing/palisades.htm at Aug. 8 and 30, 2005 for these Native American impact contentions). NRC admits in its draft EIS that "[i]ntact archaeological sites could be present within the remaining undeveloped areas as well as in soils below the depth of ground disturbance in most areas of the [Palisades] site." It admits "no archaeological field surveys have been conducted either at the Palisades site or for original transmission line construction or maintenance...[and] without accurate knowledge of the cultural resources present at the Palisades site, it must be assumed that power plant construction has the potential to adversely impact significant resources that may exist on the plant site." Palisades' own cultural resource assessment 25 years ago recommended that "an intensive survey be undertaken of the undisturbed portions of the site." Despite all this, no extensive surveying was ever conducted. In its draft EIS, NRC simply brushes off the potentially disproportionate impacts upon Native American cultural resources and spiritual values that could occur with 20 additional years of operations at Palisades. The intensive site survey must be performed, in close and meaningful consultation with affected Native American tribes, before NRC even considers granting Palisades a license extension. NRC granting an extension without requiring such a survey would itself represent an environmental justice violation, not to a mention a potential violation of the American Indian Religious Freedom Act. (MM-7) (NN-7)

Comment: Page Number 4-40, Line Number 19. Suggest adding new sentence at end stating that NMC and Consumers have procedures in place to require evaluation for archaeological resources if land-disturbing activities are planned in previously undisturbed areas. (OO-38)

Comment: Page Number 4-42, Line Number 23-24. Suggest noting that NMC and Consumers have procedures in place to require evaluation for archaeological resources if land-disturbing activities are planned in previously undisturbed areas. (OO-40)

Comment: In an email dated May 18, 2006, Kevin Kamps submitted comments on behalf of Nuclear Information & Resource Service, et al. regarding Native American resources at the site of the Palisades Nuclear Plant. His comments are summarized below, and the full text can be accessed on ADAMS at ML0615700220:

"It is legally and morally incumbent upon the companies and Federal and State agencies involved that a comprehensive site survey of the Palisades property be required and performed, and that it be carried out in close consultation and cooperation with affected tribes on a legally sufficient, government to government basis. If Native American burial sites or other significant

sites are discovered during the comprehensive site survey, then appropriate actions must be taken to protect these sites against 20 more years of radiological and physical disruption and damage; All this, before a license extension can legally be granted for Palisades.

It cannot be overly reinforced and re-emphasized that there should be meaningful consultations not only between the impacted tribes and the Palisades nuclear plant owner and operator, but also government to government consultations between tribes and relevant and involved Federal government regulators and agents, including NRC. A letter or a phone call does not constitute legally sufficient government to government consultation." (PP-1)

Response: *The NRC staff carefully reviewed the records and found that the Atomic Energy Commission (AEC) met the compliance standard for historic preservation consideration when the AEC made its decision to issue the initial operating license for Palisades.*

The original regulations, implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800), were promulgated in 1979, 7 years after the AEC granted the original license for operation of Palisades. The Advisory Council on Historic Preservation (ACHP) had no prescribed regulatory process for Federal agencies to demonstrate compliance with NHPA Section 106 responsibilities until 1979.

As required by Section 106, in 1972 the AEC provided information on the proposed action for Palisades, including information on historic and archaeological resources and determinations, to the ACHP and the U.S. Department of the Interior (DOI) with a request for comment. In a letter dated March 9, 1972, the ACHP stated that the final environmental statement should contain evidence of contact with the Michigan State Historic Preservation Officer (SHPO) and a copy of his comments concerning the effect of the undertaking on historical and archaeological resources. On May 19, 1972, the SHPO office responded to the AEC that Palisades will not adversely affect known historical or archaeological resources of the State of Michigan. On April 7, 1972, the DOI stated that the existing plant should not directly affect any existing or proposed unit of the National Park System, nor any site eligible for registration as a national historic, natural, or environmental education landmark. The DOI went on to state that the final environmental statement should contain evidence of contact with the Michigan SHPO.

NMC submitted an application for renewal on March 31, 2005, pursuant to 10 CFR Part 54. The NRC has established that, as part of the staff review of any nuclear power plant license renewal action, a site-specific SEIS to the GEIS, NUREG-1437, will be prepared under the provisions of 10 CFR Part 51, the NRC rules that implement NEPA. In accordance with 36 CFR 800.8(c), the SEIS includes an analysis of potential impacts on historic and archaeological resources. The NRC has determined that the area of potential effect (APE) for a license renewal action is the area at the power plant site and its immediate environs that may be impacted by post-license renewal land-disturbing operations or projected refurbishment activities associated with the proposed action. The APE may extend beyond the immediate environs in those instances

where post-license renewal land-disturbing operations or projected refurbishment activities, specifically related to license renewal, may potentially have an effect on known or proposed historic sites. This determination is made irrespective of ownership or control of the lands of interest.

As stated in the ER, NMC does not plan to undertake major refurbishment activities for Palisades license renewal. Additionally, there are no plans to significantly alter current operations or engage in any substantive land-disturbing activities on the site or the associated transmission line corridors as part of the license renewal process.

As stated in this SEIS, the NRC staff reviewed the applicant's environmental review procedures for Palisades during the site audit. NMC has stated that these procedures are in place to ensure that any archaeological resources that may be present receive consideration and protection. The procedures require that an archaeological survey be undertaken for any construction and modification activities that involve all ground-disturbing activities in the owner-controlled area of NMC-operated nuclear facilities and to those activities, including, but not limited to, the construction or expansion of buildings, facilities, stations, parking lots, roads, or overhead or underground utility lines. In the event that items of potential historic significance are discovered during surveys, NMC and Consumers Energy would consult with the SHPO prior to proceeding.

Additionally, the NRC staff reviewed the applicant's excavation and trenching control procedures, which require that any planned excavation activities that occur at a depth greater than 6 in. within previously undisturbed land be reviewed by the NMC Environmental Coordinator. The Environmental Coordinator's responsibilities (as defined in NMC's Archaeological, Cultural and Historic Resources procedures) include reviewing excavation and trenching plans to determine if any known archaeological resources are located within the proposed ground disturbance area, assessing the potential importance of any archaeological resources discovered during construction, and coordinating with the SHPO when potentially culturally important resource discoveries are made. The procedures also include a list of the types of archaeological materials that could be encountered during construction. During the site audit, the NRC staff expressed concerns about the NMC procedures not requiring a qualified archaeologist to survey the proposed ground disturbance area for archaeological resources prior to construction. In addition, the NRC staff noted that the procedure did not specify the training, experience, or credential requirements for the site's Environmental Coordinator to recognize archaeological materials or assess the potential significance of historic or archaeological resources. Subsequent to the NRC staff's comments, the applicant revised and implemented its procedures in January 2006 (NMC 2006) to reflect these concerns.

The preliminary draft of the SEIS contained language that reflected the procedures prior to their revision by the applicant. Upon receipt of the applicant's revised procedures, the draft SEIS

was revised by the NRC staff to reflect updated information. In several portions of the draft (e.g., the Abstract and Sections 4.8.3 and 4.9), the original text was inadvertently retained. The SEIS has been revised to reflect this oversight.

Comment: NRC staff, in the draft supplement to the Generic Environmental Impact Statement (GEIS), recommended that the Commission determine that the impacts of continued operation of Palisades were not significant enough to make its extended operation unreasonable. The document states further that: "This recommendation is based on (1) the analysis and findings in the GEIS; (2) the Environmental Report submitted by NMC; (3) consultation with Federal, State, and local agencies; (4) the NRC staff's own independent review; and (5) the NRC staff's consideration of public comments received during the scoping process." Astoundingly, it is obvious that Native American tribes were **not** included in the consultation process for the development of the draft EIS for Palisades.

The role of affected Federally recognized, as well as non-Federally recognized Native American tribes can best be described as unfairly and severely restricted throughout all aspects of the development of the EIS. Even though the re-licensing application from NMC was submitted to the NRC in March of 2005, it was not until four months later that eleven tribes in Michigan and Oklahoma were invited to participate (via one letter) in the license extension proceedings. A single letter to a Federally recognized tribe is not legally sufficient government-to-government consultation. However, other tribes that might be expected to have a substantial interest in proceedings involving Palisades relating to treaty rights and other related issues were left completely out of any part of the process, such as the Bay Mills Indian Community, the Keweenaw Bay Indian Community, the Sault Saint Marie Tribe of Chippewa Indians, all in Michigan's Upper Peninsula, tribes in Wisconsin, the Sauk and Fox Tribes and others in Oklahoma, and the Kickapoo Tribe of Texas (which absorbed the Mascouten Tribe), all with ancestral ties to the Lake Michigan shoreline. In particular, there are concerns for the continued disregarding of sacred burial grounds and other artifacts of tribal groups that may be present on the site and possibly along electric transmission lines extending from the plant, as well as concerns from the tribes in safeguarding such species as the sturgeon that may be negatively impacted by continued operations at Palisades.

Native American tribes are known to have traveled regularly throughout the dunes in West Michigan, hunting in them and using dune plants for food and medicinal purposes. Because of that, it is likely that villages or encampments, as well as burial sites, may well have been located on or in the vicinity of Palisades, especially given the presence of creeks just north and just south of the plant site and the heavily forested, large dunes of the property. This likelihood is confirmed in the draft EIS, on page 2-61 to page 2-62, where the NRC reports "Native American groups that inhabited the area during the historic period were predominantly the Potawatomi, Mascouten, Miami, and Ottawa. During the early historic period, their villages were situated on the edge of forested land, adjacent to prairies and convenient to streams or the lakeside; temporary winter camps were established in sheltered areas. By the beginning of the

nineteenth century, the Potawatomi had established 11 known villages in southern Michigan. Most were near the shorelines of Lake Michigan and Lake Erie, generally along the streams that flow into their waters." Thus, Palisades has a significant potential for such Native American sites to be located on its property.

Nuclear Management Company (NMC), however, gives scant attention to the interests of Native American tribes in its over 500 page Environmental Report, prepared as part of the re-licensing application process. Section 2.10, "Historic and Archaeological Resources," of the report consists of four paragraphs, taking up less than two-thirds of one page (Page 2-46). In fact, the potential for Native American sites on the Palisades property is not explicitly mentioned at all. In its Environmental Report, NMC referenced a number of documents prepared as part of the original license application for Palisades that noted the absence of known archeological or historical resources on the site or in the vicinity to discount the potential for Native American artifacts to be impacted by the license extension application.

The only specific documentation NMC provides in the Environmental Report to support its claim that there are no Native American artifacts, is a letter dated April 7, 1972 from the U.S. Department of the Interior (DOI) to the U.S. Atomic Energy Commission (the predecessor to today's NRC), in terms of nuclear power plant regulation). In that letter, reproduced from Pages C-5 to C-9 of NMC's Environmental Report, DOI states "It does not appear that the existing plant should directly affect any existing or proposed unit of the National Park System, nor any site eligible for registration as a national historic, natural or environmental education landmark; however, the final statement should contain evidence of consultation with the State Historic Preservation Officer concerning the effects of the power station on places on or being considered for nomination to the National Register of Historic Places." However, the DOI statement does not seem to indicate that there was attention placed on locating Native American burial sites, former village sites, etc. located on the power plant site or along the transmission line corridors.

Even though the Michigan State Historic Preservation Office (MSHPO) noted the possibility of unreported artifacts (see Page C-2, Cultural Resources Correspondence of NMC's Environment Report), there has been no survey done by Consumers Power to confirm or dispute this claim and no actions taken by MSHPO officials to resolve the question, demonstrating a distinct lack of significance attached to protecting the interests of Native American tribes. In fact, NRC staff acknowledged in the draft EIS that no adequate surveys have ever been conducted at Palisades. Further, although the draft EIS document determined that the license extension for Palisades might pose a "moderate" impact on the interests of Native American tribes regarding archaeological or historical cultural resources, this initial determination was verbally deemed "a mistake" by NRC staff at the April 5, 2005 draft EIS public comment meeting in South Haven, Michigan. We ask for an explanation as to the reason for this "mistake" and justification for a significant downgrading of the impact level ascribed to Native American interests in such

cultural resources as burial sites from “moderate” in the draft EIS to “small” at the public meeting.

Forty years ago, Native American tribes were seemingly ignored in decisions regarding the original placement and construction of the Palisades nuclear power plant, even though it was an intense and disruptive use on lands at one time occupied by a number of tribes along Lake Michigan, which is revered by all Native Americans of the region. It can only be concluded from this most recent lack of attention in the re-licensing process, that these tribes have once again been accorded neither legally sufficient notification nor appropriate involvement, which is especially negligent in respect to the Federally recognized tribes, which are sovereign entities and are legally entitled to have a government-to-government relationship with the United States.

All Native American tribes and bands that could be expected to have an interest in the application by Palisades to operate an additional 20 years deserve both notification of this process, as well as the opportunity to share government-to-government decision making regarding the application, as allowed for under NEPA and other Federal laws. A comprehensive site wide survey should be performed on the entire Palisades property - as recommended by Palisades’ own cultural resource assessment subcontractor as described in the draft EIS - carried out in close consultation with all affected tribes. If Native sites, such as burials, are found, then appropriate actions should be taken to protect them from damage, again, in close and meaningful consultation with affected tribes in order to ensure that NEPA, treaties, and the terms of other relevant Federal laws, such as the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act, are met. (GG-22)

Comment: Native American interests must be addressed. All Native American tribes and bands that could be expected to have an interest in the application by Palisades to operate an additional 20 years deserve both notification of this process, as well as the opportunity to share government-to-government decision making regarding the application, as allowed for under NEPA and other Federal laws. A comprehensive site wide survey should be performed on the entire Palisades property–as recommended by Palisades’ own cultural resource assessment subcontractor as described in the draft EIS - carried out in close consultation with all affected tribes. (GG-53)

Response: *For all Federal undertakings, Section 106 of the NHPA requires consultation between the lead Federal agency and the affected State Historic Preservation Office or Offices and all affected Native American tribes. Native American tribal governments are to be consulted on a government-to-government basis. The NRC has initiated this consultation by inviting the 11 Federally recognized tribes to participate in the license renewal process (see Appendix E). The NRC welcomes input from concerned Native American government leaders, elders, and citizens who wish to participate in the license renewal process. Government-to-government consultation is an ongoing process that is not limited to the issuance of this NEPA*

document. Additionally, the NRC staff forwarded the draft SEIS to the 11 tribes for comments. To date, no response has been received from the Native American tribes.

Comment: Page Number 2-61, Line Number 2. Suggest clarifying that there are no "known" historic and archaeological resources at the Palisades site. (OO-25)

Response: *The text has not been changed in the SEIS. This is an introductory sentence describing the topic that is to be covered in this section. The requested information follows in the main text.*

Comment: Page Number 4-40, Line Number 14. Suggest clarifying that Section 106 of the NHPA directs Federal agencies, and not the applicant, to contact Tribal Governments to take into account the effects of their undertakings on historic properties. (OO-37)

Response: *Issuance, or in this case, renewal, of the Federal license is the trigger for Section 106 of the NHPA. The NRC is the lead Federal agency that initiates government-to-government consultation. While the applicant is not responsible for contacting tribal governments, it is subject to compliance with the Section 106 process as a licensee of the NRC. The requested change has not been made in the SEIS because it implies the applicant has no obligation under Section 106 of the NHPA. Because the operation of Palisades requires a Federal license, the NRC, and by extension, the licensee, are bound to comply with Section 106.*

A.2.10 Comments Concerning Postulated Accidents

Comment: In terms of reactor accidents, again I will point to NRC's own numbers. They haven't updated these since 1982, so of course the number of people has grown in this region, the economy has grown in this region, so these damages from a severe accident at Palisades would be much worse now than what's given. But NRC calculated that a severe accident and catastrophic radiation release, and this was a 1982 report, a radiation release from Palisades would kill 11,000 people downwind, injure 7,000 people, and do over $50 billion in damages. That's 1982 figures, so if you adjust for inflation, it's over $100 billion now. And of course, if there's a major radiation release from Palisades, that's it for Michigan's tourism, that's it for its agriculture, and that's the reason that our volunteer pro bono citizen's effort to try to stop this 20 year extension has been so determined and will continue to be so at every turn, because we care a lot about the future of this State. (A-10)

Comment: And the last thing I'll say is NRC said that, you know, this license renewal may be granted but there are other factors out there that may end up, you know, deciding whether or not this place will operate for 20 more years. I'd like to say, yeah, there really is. One would be a severe accident at Palisades that would kind of take care of it right away for all of us. (A-12)

Comment: My concern is a catastrophic event. And as this plant becomes older and older as we already heard the Big Rock plant up in Charlevoix has been closed and it hasn't been generating electricity for some time. And as Mr. Kauffman said generating power by nuclear plants is not the cheapest way to generate energy. Now I came from Kalamazoo because we're right downwind of what could happen if radiation was released from the Palisades Plant. It would devastating to Southern Michigan perhaps Northern Indiana. It could, if you look at the Chernobyl case and I would guess that all those government authorities there in the Ukraine were just 100 percent behind Chernobyl until they had their accident. (R-3)

Comment: How horriffic if we in Michigan had a "Chernobyl" incident contaminating Lake Michigan and the surrounding area. What a disaster that would be. (FF-3)

Response: *Section 5.1.2 of the SEIS addresses severe accidents, and Section 5.2 addresses mitigation alternatives. The comments do not provide new and significant information and will not be evaluated further.*

Comment: The draft EIS prepared by the NRC unaccountably discounts the effects of global warming. There is considerable evidence that more extreme winds, as well more frequent and intense tornadoes — all of which global warming could cause — could make operation of Palisades more and more risky over time. (GG-11)

Comment: Environmental impacts during severe emergencies at the Nuclear Plant (uncontrolled releases of radioactive elements) were not considered for comparison purposes with other non nuclear alternative sources of energy. Even though probabilistic, these impacts should be evaluated and mentioned in the report's final summary conclusions. (JJ-4)

Comment: Recognizing that the loss of power at the Palisades Substation could result in severe Plant accidents (core damage), we wonder if all feasible mitigation measures were considered in this regard I.e. adding a second circuit to the 345kV line connecting Covert Plant to the Substation. (JJ-5)

Comment: Given the potential dire consequences of a major accident and radiation release at Palisades, how can NRC screen out "Severe Accident Mitigation Alternatives" because "the required extensive changes.. .would involve implementation costs known to exceed any possible benefit"? (EIS, p. 5-5) In 1982, in its CRAC-2 (Calculation of Reactor Accident Consequences) report, NRC calculated that a severe accident and catastrophic radiation release from Palisades would kill 11,000 people, injure 7,000, and do over $50 billion in damages. The population in the surrounding region has only grown since then (EIS, Table 2-7, p. 2-56), so casualty figures would be higher today. And adjusted for inflation, that property damage figure would top $100 billion, only $10 billion of which would be paid back by the nuclear power industry and its insurance companies (under the Price-Anderson Act, renewed in 2005, U.S. taxpayers would have to pay the rest, or else damages wouldn't be compensated for

at all). A major radiation release at Palisades would ruin Michigan's tourism and agriculture forever. How can NRC's EIS" cost/benefit" analysis ignore its earlier CRAC-2 report? (MM-5) (NN-5)

Response: *In determining whether a severe accident mitigation alternative (SAMA) should be implemented, the licensee performed a cost-benefit analysis using a methodology consistent with the NRC Regulatory Analysis Technical Evaluation Handbook (NUREG/BR-0184). This analysis identifies and estimates the relevant values and impacts of a proposed change and provides a structured approach for balancing benefits and costs in determining whether implementation is justified. The Probabilistic Risk Assessment (PRA) is used within this analysis to evaluate the reduction in probabilities (core damage frequency) and consequences (population dose) that would be associated with implementation of each alternative. Use of the PRA in this manner is an essential and widely accepted part of the cost-benefit methodology, as described in Section 5.6 of NUREG/BR-0184.*

The study alluded to by the commenter (NUREG/CR-2239) was performed in 1982 using the CRAC-7 computer code to estimate offsite consequences, generic "siting source terms" to reflect the spectrum of accidents that could occur at boiling-water reactors or pressurized-water reactors, and "representative" probabilities to reflect the likelihood of each of these source terms. Rather than ignore the earlier report, the offsite consequence analyses performed in support of the SAMA analysis represents a reassessment of offsite consequences based on a later generation offsite consequence code (i.e., Melcor Accident Consequence Code System 2 (MACCS 2), and plant-specific (versus generic) source terms and source term probabilities. Thus, the plant- and site-specific consequence analyses performed for license renewal are considered an improvement over the earlier study. The comments provide no new and significant information and will not be evaluated further.

Comment: Section 5.2.2, *Estimate of Risk*, page 5-6. It is stated that "The baseline core damage frequency (CDF) for the purpose of the SAMA [Severe Accident Mitigation Alternatives] evaluation is approximately 4.05 x 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 Palisades risk estimates; however it did account for the potential risk reduction benefits associated with external events by increasing the estimated benefits for internal events by a factor of two."

The estimates for risks from both types of events should be evaluated and presented, along with a rationale for not basing risk decisions on the external events or including them in the considerations as necessary to get an accurate portrayal of the risk of the licensing renewal. (UU-7)

Response: *Risk estimates for both internal and external events are presented and discussed in Section G.2 of Appendix G of the SEIS. The risk from external events at Palisades is lower than the risk estimates from internal events (e.g., 3.31 x 10^{-5} per year for fire and 8.88 x 10^{-6} for seismic events, compared with 4.05 x 10^{-5} per year for internal events). Nevertheless, potential SAMAs to further reduce external event risk were explored as part of the SAMA evaluation (see Sections G.2.2 and G.3.2). As described in Section G.6.2, the risk associated with external events was specifically accounted for in the risk calculations that were used to support the decision regarding potentially cost-beneficial SAMAs at Palisades. The comment provides no new and significant information and will not be evaluated further.*

A.2.11 Comments Concerning Uranium Fuel Cycle and Waste Management Issues

Comment: My first concern, and more important I think, is in relation to the spent fuel. Everybody know that right now the spent fuel is stored outside, next to the power plant. So this keeps accumulating and there is a possibility of, theoretically send it to a central, national central depository. But it was impossible in 40 years to obtain or to realize this central depository. And the reason for that is not political. It's not because people are not doing their work. It's just because they, they waste half their -- long, long time, I mean. You have to keep it under control, under storage for at least 10,000 years. So nobody can guarantee that even the more stable place can guarantee that. So this is, if we continue doing that we are going to keep this material in that place forever. That's what we have to understand. I mean, this is a fact. What, what, why we are scared? Because we are increasing the possibilities of an uncontrolled releases of radioactive material. The plant has a bigger accident and can have uncontrolled releases, but this other thing we're allowing here can also prove to have accidents by sabotage, by error, human error, by many things that, one important thing in life is imagination. So with a little bit of imagination, we, we can figure out that this is not way to go. It is not the way to go. (D-3)

Comment: Okay. And my second concern is related a little with the first. The analogy that is used at Palisade has been following -- first. Through the use of a large amount of spent fuel waste, which is highly radioactive and this toxicity for a long time, 10,000 years. Second, the waste contains plutonium which if enriched could be used in the manufacture of atomic bombs. Third, it is a low efficient use of the fuel, uranium. If continuing with this old technology, the amount of the available uranium in nature could be exhausted in a short time. The Nuclear Power Industry is in the process of producing a new generation of reactors. General Electric Company, Western Electric Company, Westinghouse Electric Company are doing that using full fuel recycling. These reactors that could be approved by 2015 will not have the above mentioned drawbacks of the old reactor technology. The spent fuel, the spent fuel in this reactors would be reduced in amount and would require shorter time in storage, 400 years. Therefore a Central depository could be readily found. It would use the energy content in the fuel much more efficiently. The uranium available in nature could last for many centuries. The plutonium in the waste is not usable for the manufacture of weapons. (D-6)

Comment: NRC must provide a detailed explanation to the public as to the ultimate disposition of the wastes stored currently on the Palisades plant site, as well as the 290 additional tons expected as part of 20 additional years of operation.

The proposed national repository for high-level wastes from nuclear power plants, Yucca Mountain, Nevada, is not expected to open until at least 2020, and is likely to be delayed beyond that date. Further, by law, the repository can only store 70,000 metric tons, which will not include the additional wastes generated at Palisades during a license extension. (GG-55)

Comment: Section 6.1, *The Uranium Fuel Cycle*, page 6-3. Under the bullet point for Off-site radiologial impacts (individual effects from other than disposal of spent fuel and high level waste disposal), no consideration appears to be given to the potential long-term storage of the spent fuel and high-level waste materials on site until such time-as a permanent facility is finally licensed and begins to accept. these materials for disposal. A reference to other sections that this evaluation may have been included in should be provided here as well as in other sections, or if this evaluation has not been adequately conducted, the issue needs to be considered and an appropriate evaluation conducted. (UU-8)

Comment: Section 6.1, *The Uranium Fuel Cycle*, page 6-8, under the bullet point for On-Site Spent Fuel. A more thorough evaluation for the volume of spent fuel expected to be generated during the additional licensed time needs to be provided, along with more-specific information as to site specific circumstances that.may impair or improve the risk values for potential exposures to this spent fuel storage. (UU-9)

Response: *Onsite storage of spent nuclear fuel is a Category 1 issue. The safety and environmental effects of long-term storage of spent fuel onsite have been evaluated by the NRC, and, as set forth in the Waste Confidence Rule at 10 CFR 51.23 (available at http://www.nrc.gov/reading-rm/doc-collections/cfr/part051/part051-0023.html), the NRC generically determined that "if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in any such reactor and generated up to that time." Section 6.1 provides the information available regarding the status of the application for a high-level waste repository. The comments do not provide new and significant information and will not be evaluated further*.

Comment: Palisades license extension will increase the amount of high-level waste on the Lake Michigan shoreline and the number of dangerous barge shipments of high-level radioactive waste on Lake Michigan. Palisades will generate approximately 290 more tons of high-level radioactive wastes in 20 additional years with no national repository likely to be established to receive the wastes. The U.S. Department of Energy's plan for transporting high-level radioactive wastes generated by the plant's operation, involves barging up to 125 or more giant rail-sized containers of the wastes from Palisades to the Port of Muskegon, up along the Lake Michigan shoreline. The slightest leakage of even a small amount of this waste could not only threaten Lake Michigan as a source of drinking water for ten million people, but also cause a host of other irrevocable impacts on the lake's fish, wildlife, people, and economy. (HH-5)

Response: *Transportation of spent fuel was evaluated in the GEIS and was determined to be a Category 1 issue. The comment provides no new and significant information and will not be evaluated further.*

Comment: The Barnwell, South Carolina "low" level radioactive waste dump, which has accepted shipments from Palisades for decades, will close its doors to wastes from Michigan in 2008. Neither NMC in its Environmental Report, nor NRC in its draft EIS, have explained how Palisades will deal with the "low" level radioactive wastes when Barnwell closes, such as establishing storage installations for "low" level radioactive wastes on the plant site. What NRC and the nuclear industry term "low" level radioactive wastes contain many of the same radio-nuclides as high-level radioactive waste, only less concentrated. Some "low" level radioactive waste can even deliver a lethal dose of radiation at close enough range in as little as 20 minutes. "low" level radioactive waste management at Palisades is a significant health, safety, and environmental issue that requires is largely unaddressed by NMC and NRC in the license extension application and requires specific consideration. (HH-39)

Response: *Low-level waste storage and disposal were evaluated in the GEIS and were determined to be Category 1 issues. The impact was determined to be SMALL. The Commission is confident that all nuclear waste generated will be handled, stored, and disposed of in a manner that assures public health and safety. The comment provides no new and significant information and will not be evaluated further.*

Comment: According to Dr. Arjun Makhijani, Director of the Institute for Energy and Environmental Research, uranium mining and milling inflicts some of the worst human health impacts of the entire uranium fuel chain. This is due to the careless handling of the radioactive materials involved, and dumping of waste materials upon the surface of the land, where they can be dispersed in air and water. Because of this, the Navajo Indian Tribe in the Southwestern United States-the largest Indian Tribe in the country-has officially banned the mining, milling, or processing of uranium upon its reservation territory.

NRC's draft EIS does not address such negative environmental impacts of the nuclear fuel chain. A full cost accounting of the uranium fuel chain's negative impacts on health and the environment is required to properly evaluate Palisades' twenty-year license extension request. (HH-47)

Response: *The comment is related to the uranium fuel cycle and waste management issues. Uranium fuel cycle and waste management issues were evaluated in the GEIS and were determined to be Category 1 issues. The Commission is confident that all nuclear waste generated will be handled, stored, and disposed of in a manner that assures public health and safety. The NRC has specific regulations for releases of radioactive materials from the uranium fuel cycle to the environment. The comments provide no new and significant information and will not be evaluated further.*

Comment: Section 2.1.4.1, *Liquid Waste Processing Systems and Effluent Controls*, Page 2-12. The draft SEIS does not provide quantitative details about the planned modification of the liquid radioactive waste processing system. The draft-SEIS states that NMC is planning to replace the current system, which is based on evaporation, to a system using resins for ion exchange. The draft SEIS does not provide quantitative details about the estimated change in collection efficiency between the two systems. This information should be provided in the final SEIS. (UU-16)

Response: *The information provided in the draft SEIS in Section 2.1.4.1 regarding planned modification of the liquid radioactive waste processing system has been updated to reflect that NMC completed its modification in December 2005. The NRC staff evaluated the modification in Section 2.1.4.1 qualitatively rather than providing quantitative details, because the requirements of 10 CFR Part 20 and Part 50, Appendix I for effluent controls are based on radioactive releases and resulting doses rather than collection efficiencies of the plant's system, e.g., if a batch of liquid waste did not meet release requirements, it could be recycled through the resin bed and sampled again until it met such requirements. In addition, changes or modifications to facilities and equipment at operating nuclear plants are regulated under the requirements contained in 10 CFR Part 50 for operating reactors; any such modifications at Palisades would have been done in accordance with those requirements. However, the NRC staff also notes that similar systems have been employed at other nuclear reactors, such as Nine Mile Point and D.C. Cook, and have shown releases well within regulatory limits. On this basis, the NRC staff expects that the equipment modification would not change the applicant's ability to process liquid radioactive waste much, and that releases would continue to remain within regulatory limits.*

The comment does not provide any new and significant information and will not be evaluated further.

A.2.12 Comments Concerning Alternative Energy Sources

Comment: My question is, in this regard, is that we are reading this report or your final result is administered by you and it's only, is going to say, well, that Palisades can continue. I mean, the fact that Palisades can continue operation is not unreasonable. And I understand that you are stressing that result. But on the side, you are taking position on alternative solutions that I read and I don't think is enough education in your point. Because the fact is that wind is flying. We are having wind all over the world and in here too. So I guess you missed the point in this. And I don't understand why you, you are so concerned on our selecting alternatives if we know about the alternatives. And really, you are not doing a good job and the guys are going to really make the decisions, went through the final decision. (D-1)

Comment: But when I turn to the alternative energy sources, which should be pursued at the Palisades Plant site, their impacts are often referred to as large. Which all considering, they would be, taking into account the enormity of the electrical power the plant puts on the grid, for alternatives to equal out in their current forms at this site. A rather particular assumption bracketing both the plant and the NRC's positions well, yet ignoring the simple fact that if all the resources used to continue operation of this plant were put into renewables and other forms of electrical generation throughout the State, it would turn the argument on its head. (B-7) (O-2) (TT-7)

Comment: And sooner or later human beings probably are going to make some errors. And with a gas-fired plant, right across the road you can -- facilities, as the Palisades Nuclear Power Plant that I kind of wondered, why in the world don't we go to a plant already on line there, already ready to deliver, as opposed to the aging Palisades Nuclear Power Plant. (E-2)

Comment: Secondly, I heard that solar and acreage. And it's my understanding that solar is very commonly mounted on rooftops and walls in cities, which also reduces transmission loss, etc., that comes from centralized nuclear plants scattered around and have this great transmission loss over their process of getting the electricity to where it is needed. (F-2)

Comment: Now, we do want to say that one of the important points, and the word I haven't heard, is sustainable. We have not talked sustainable power and energy. And in the 21st century and beyond, we need sustainable power, not the fossil fuel which nuclear is also. There's a limit to uranium involved, so it's about time that we began to think for our great great grandchildren. And we have, anybody else? This little guy's going to help us here. This is an adaptation of the Raging Grannies presentations that they have given all across the country in various ways. (F-3)

Comment: And this, heard a lot about alternate forms of generating electricity. And I've read quite a bit about it and nothing I have read has convinced me there is a better way. I'm local,

sometimes a lot of these people from far away come in and tell us how we're supposed to do things. I don't particularly appreciate that either. (K-4)

Comment: My hope is that by the time the current license expires in 2011 that nuclear power should be replaced by wind power and by a lot more conservation and more efficient use of electrical energy. That is possible. I'll come back to that. (P-3)

Comment: Also it's [wind power] cheaper. Currently as according to my latest figures and I've been doing a lot of reading on this, wind energy is sold for four cents a kilowatt power or less sometimes when it's under long term contract to where as I understand the cost of nuclear energy is about three times higher than that. So we the taxpayers, the ratepayers are paying so somebody else can make money. And it's not necessary. Let me explain. (P-4)

Comment: In any case wind power is really growing worldwide. It's growing at the rate of 30 percent per year. Most of this is happening in Europe and in Europe Germany is in the lead with I believe at this point 14,600 megawatts of electricity from wind. They seem to know how to do it. So I suggest to the people at the NRC or to the, to the management company that they should go to Germany and ask and say we don't know how to make wind power work here maybe you could tell us how to do it. (P-7)

Comment: And incidently wind generators and their, their towers can be reused and recycled over and over again so that they have that advantage as well. And they provide the jobs that you're so concerned about in this community. (P-10)

Comment: Finally I have to say that according to the GEIS again Consumers Energy has decided they didn't want to deal with what they call DSM and for you who haven't read the book DSM mean demand supply management. In other words giving advise to the consumer to use less energy to get complex for, you know, all of the things that could save energy. Oodles of it. They chose not to do that. Why? Well, it might be very costly or this or that. Now come on. This would be a way of trying to sort of curtail the need for licensing this plant in a risky way for another 20 years. Any relevance has said that we could do with 50 percent less electricity if we used it intelligently and if we conserved. (P-12)

Comment: So I, I believe that we would be far better to spend our money on safer distributing energy sources like wind power particularly in Michigan. My wife and I just came back from California. Even a State like Wyoming has tremendous numbers of wind generating plants now. Wyoming has tremendous amounts of coal. They have tremendous amounts of oil yet they are going to wind generation. And you look out across this nation the idea that you, you cannot have distributed types of energy production is insane in my view point. So let's invest in alternative energy sources. (R-4)

Comment: So if this money were diverted to the renewables and the technology to wind and solar you would and perhaps let's pretend that the, the information in the environmental impact statement is correct for a minute but as submitted by the, in the EIS, that, that wind turbines need X amount of acreage and all this and they can only produce X amount of megawatts etcetera. If you take even a minuet amount of the money that is given to the nuclear industry just as a given and divert that to renewables and, and improve the technology of the renewables this would absolutely not be an issue. (AA-5)

Comment: So let's look for alternatives. We need a whole new way of living. We can get along with a lot less of this, look at this. Lights on all night. You go to the cities they're, and frankly we're going to, we're running out of oil, we're running out of natural gas, we're running out of a lot of stuff. We're going to have to think about doing things a different way guys. (BB-5)

Comment: I think that the premiss is upside down where they consider the, another 20 years of, of Palisades operating as, environmentally a small issue and they consider alternatives as a great impact. I think it's opposite actually. (DD-7)

Comment: The analysis of alternatives to extending the license for Palisades was flawed and biased. Renewable energy sources such as wind power and solar power, as well as alternatives such as energy efficiency and conservation, are not given credible consideration in the EIS. NMC/Consumers and the NRC reveal a bias in favor of fossil fuel and nuclear power by presenting only those two sources favorably and by downplaying the potential for energy efficiency, energy conservation, and renewable sources of electricity. (GG-10)
Comment: The drive for re-licensing of the nation's nuclear power plants started as early as 1982, with research on aging of nuclear reactors, and began in earnest in 1991 when the NRC published safety requirements for renewal. Currently, re-licensing plans are moving more rapidly as proponents attempt to take advantage of the nation's current energy crisis. Extended and new nuclear power generation is now being promoted as a "clean" alternative to the use of fossil fuels, which are now universally acknowledged as contributing to global warming. Many utilities that own nuclear power plants, however, including Consumers Energy, also own coal-burning plants. Consumers Power, in particular, generates a sizable share of its electricity from the burning of fossil fuels. (GG-16)

Comment: In the draft EIS, Section 7.0, "Alternatives to the Proposed Action," renewable energy sources such as wind power and solar power, as well as alternatives such as energy efficiency and conservation, are not given credible consideration. Polluting electricity sources such as fossil fuels are cited by NMC/Consumers as the only realistic alternatives to approval of a 20-year license extension at Palisades. This is not surprising, as nearly three-quarters of Consumers' electricity generation (in 2002) comes from fossil fuel facilities. But the choice is not just between nuclear power and coal as sources for electricity generation. NMC/Consumers reveal a bias in favor of fossil fuel and nuclear power use by presenting only those two sources

favorably in their Environmental Report, and by downplaying the potential for energy efficiency, energy conservation, and renewable sources of electricity. NRC echoes this as well in its draft EIS. (GG-43)

Comment: Renewables, efficiency and conservation are not only available, reliable, safe, clean and affordable options for electricity generation and savings, but also a source for tremendous job growth and cost savings. Using simple energy efficient techniques, Michigan citizens and businesses could easily reduce the State's energy demand by 1%, the energy used by 40,000 homes. In the State of Michigan there is currently 19,250 megawatts of generating capacity. Palisades generates 798 megawatts, or 4% of the power generation in the State of Michigan. Wind power potential in Michigan, according to the DOE, is 16,000 megawatts, or twenty fold the mega-wattage of Palisades, and could be a viable replacement for the energy that Palisades provides. In fact, wind power is the fastest growing new source of electricity in the United States, relative to all other sources. (GG-44)

Comment: There are also many examples of new efforts underway in Michigan to move forward with renewable energy, with the deployment by Mackinaw Power of modern, large capacity wind turbines on the northern tip of Michigan's lower peninsula, plans to deploy more wind turbines on the Lake Michigan shoreline of west Michigan, and advances in solar electricity by United Solar Ovonics in Troy, Michigan (which manufactures solar electricity generating roofing shingles). President Bush visited the headquarters of United Solar Ovonics earlier this year to promote promising renewable energy technologies.

It is especially significant that on April 6, 2006, Michigan Governor Jennifer Granholm signed Executive Directive No. 2006 - 2, which charges the Michigan Public Service Commission to prepare an "Energy Plan for the State of Michigan" by December 31, 2006. The directive calls for the development of a renewable portfolio standard that "establishes targets for the share of this State's energy consumption derived from renewable energy sources" and initiates the "appropriate use and application of energy efficiency, alternative energy technology, and renewable energy technologies.... consistent with the goal of assuring reliable, safe, clean and affordable energy." This puts the State of Michigan in a favorable position to promptly substitute clean energy sources for those with adverse impacts, such as nuclear power, as it moves into the forefront of renewable energy technology. (GG-46)

Comment: NRC must revise its analysis of energy alternatives. Full and objective consideration must be afforded the options of renewable energy and efficiency. NRC must also provide a thorough cost accounting of the uranium fuel chain's negative impacts on health and the environment. (GG-62)

Comment: I agree with Don Williams, retired Hope College chemistry professor that, "not only should Palisades' life be extended, but another reactor...added", and to paraphrase, NRC needs

to plan for decommissioning the current reactor, replacing it with a more advanced, safer, more economical Generation III plant. (HH-3)

Comment: The considered Environmental Impacts were not weighed as required to perform an overall impact evaluation. In other words, not all environmental impacts have the same effect.

Renewable (sustainable) energy sources should be given extra points when compared with energy sources of lower availability. Wind and Solar sources are renewable energy sources. The Standard Nuclear Plant, using Light Water Cooled Reactor, is a source of limited availability. New types of Nuclear Reactors, using advanced fuel cycle or a fast neutron reactor would be of longer availability.

Nuclear Power alternatives using advanced fuel cycles would decrease the amount of long term hazard of nuclear waste. Is this point being considered in the comparison of Nuclear Plants? Is the impact on Proliferation of radioactive materials in the World being considered to evaluate the Nuclear Plants? The standard Nuclear Plant using 5% enriched Uranium has technology and materials that could be used for the manufacture of the plutonium bomb.

Between the alternatives to be considered to obtain an “equivalent” electric generation we believe that the following should be maintained as technically feasible:

-Hydro-Pump storage (not considered in the GEIS)
-Demand side Load Management (considered but disregarded)
I.e. the introduction of smart electric meters
-Wind Power (considered in GEIS Page 8-45, but disregarded)
-Solar Power (considered in GEIS Page 8-45, but disregarded)
-Co-generation (not considered in GEIS)

Are the CO2 atmospheric emissions for the different energy sources being considered in the evaluation of alternatives? (JJ-7)

Comment: Of course, there are many other adverse environmental impacts 20 more years of operations at Palisades would cause. But in addition to all the negatives about Palisades, there are positive alternatives: energy efficiency, wind power, solar power, and biomass could be offered as alternatives to 20 more years of nuclear power and radioactive waste generation. But NRC shrugs off such notions in its draft EIS. (MM-12) (NN-12)

Comment: There are a number of energy efficient alternatives that are more viable for the area. Overlooking the interests of the people and clearly identified health concerns in the interest of plant self-preservation are actions from a bygone era. (RR-3)

Response: *NRC’s requirements to consider the environmental impacts of various alternatives are based on NEPA. The purpose of NEPA is to ensure that relevant agencies examine and*

disclose the potential environmental impacts of their actions before taking the action. NEPA is a procedural statute that does not dictate a decision based on relative environmental impacts. Furthermore, the NRC has no authority or regulatory control over the ultimate selection of future energy alternatives. Likewise, the NRC cannot ensure that environmentally superior energy alternatives are used in the future. The NRC makes its decision whether or not to renew the license based on safety and environmental considerations. The final decision on whether or not to continue operating the nuclear plant will be made by the utility, State, and Federal (non-NRC) decision makers. This final decision will be based on economics, energy reliability goals, and other objectives over which the other entities may have jurisdiction. Moreover, given the absence of the NRC's authority in the general area of energy planning, the NRC's identification of a superior alternative does not guarantee that such an alternative will be used.

Comment: I was wondering on this assessment of wind and solar, granted Michigan doesn't have sunshine every day like the Western states. Solar really isn't feasible here as an alternate. But what about the wind? You're saying it's, it's a large concern because it takes a lot of land. How much of power for Palisades is sold out of State? What percent of the power is sold out of State? Well, this, this, this all comes together because if you're taking this and you're saying 143,000 acres, but if Palisades, like D.C. Cook, sells most of its energy out of State, that's really not a proportionate summation. One other thing, please. This is, this is important. What are you basing on, what size wind generators are you basing this summation on? The small little ones, or the ones that they're using now, the big ones that Consumers Energy's investing in to replace the nuclear? Palisades is up for sale. They want it off their hands. They were investing in green energy and it's working. So I wonder about this. (C-1)

Comment: But I would like to know, technically, all right, how you came to this summary and the size of the wind generators you took into account in this summary, et cetera, et cetera, et cetera. The whole detail. (C-3)

Comment: I asked how much is sold out of State, and what size wind, what size wind generators? What, what is the size in your analysis, what size, what size wind generators are you saying would take that much acreage? And how much of Palisades power is sold out of State? (C-4)

Comment: Several things. Number one, I'm concerned that the kinds of answers we're hearing, I, I feel are very questionable. For instance, wind power in itself, you don't measure that by acreage because farmers are finding a very successful business for them to put the wind farms along their lot lines. And so it's a very definite advantage environmentally in that respect, and I didn't hear that kind of that thing in your report. (F-1)

Comment: And I have a question for Dr. Miller and ask if you really want to stand by those figures that you cited on wind energy 125,000 acres for I presume the kind of megawatts the

plant currently produces. If you, if you, if you do the calculations here I know there's been machines that put out four megawatts each and there could be, you know, maybe you'd need about 200 of them or so to do that and that would be about 500 acres per machine. And that makes it look as if wind is really impossible but it's not. And I think there's a fallacy in there. (P-1)

Comment: Palisades sits on 432 acre site of which 80 acres is developed or I presumed used. That leaves 200 to 300 acres of land which could be available for wind turbines. If you figure four acres per turbine and they're really large, this would be a four megawatt turbine and they exist, you would need or you would have room for about 50 large wind turbines. They could be erected on the site, more land could be rented for farmers down the line along the transmission line too. But even these 200 megawatts that would be produced here by wind is not negligible. That's one fourth as much roughly as the current nuclear plant provides. (P-5)

Comment: Now on page of the GEIS on page 845 I understand that wind power had been considered and rejected for a number of reasons. One of which is that it said could be intermittent and there's sense in which you could say that but I, I have a wind generator next to my house, nearby, and I say that wind power isn't seasonal. Because in this season it hasn't quit running for weeks and weeks. So it's not just intermittent but it might be seasonal. So certain other seasons might require a different mix of energy to keep the customers going. So that's one of the problems I have here. It isn't simply intermittent. It's seasonal. (P-6)

Comment: I want to suggest that there are three paragraphs on page 8-45 of this GEIS dealing with wind power and together the three paragraphs includes so many distortions, falsehoods or simple stupidity that I think if this is a kind of an indication of what's in this book it's bad news because this is not going to fly. (P-8)

Comment: The way this is put down here is to sort of make wind a non starter. And it's not true because as I just said it is growing worldwide and it could here too if people were to take a different kind of attitude. (P-9)

Comment: There, I already mentioned in my comment earlier that it does not require 500 acres for a single wind generator and if the large ones, you know, the, the way the GEIS puts it you really have a system here where they say you need 500 acres or well actually they say 150,000 acres in order to provide 1000 megawatts. I've been on wind farms and many of you have seen them. They're not one per 500 acres. This is either a big mistake by somebody that should have known better or it's a blatant distortion. As I suspect the latter because they don't want to deal with wind power they'd rather deal with nuclear because that's the business that they're in both for the commercial and governmental agency. So I, I worry about this. (P-11)

Comment: So my point is that I think the, the put down of wind energy in this book is so blatant that I suspect I have to say I'm afraid I lose, I think that the nuclear regulatory commission loses

credibility by people who know something about this. And that's a serious thing because I don't want to live in a society where governmental agencies lose credibility because they're supposed to be responsible. (P-13)

Comment: NRC staff's assertion in the draft EIS that such wind power expansion would have a large negative impact due to the large surface area of land it would require is incorrect, and ignores the fact that small-scale family farmers could benefit from the placement of wind turbines on their fields. These farmers could either benefit from the lease payments from wind power companies for use of their land's "windshed," or could work towards owning their own wind turbines on their own land, and thus receive the full income from wind powered electricity generation. Wind turbines would not preclude the farmers' continued use of fields for agricultural crop or livestock production. Wind power could serve as a valuable source of income for farming families, complementing their agricultural livelihood, while also providing safe, clean, reliable, and inexpensive electricity for the region. (GG-45)

Response: *The SEIS has been revised to incorporate the latest information on wind power technology. The National Renewable Energy Laboratory estimates that the footprint of a 1.5-MW wind turbine (the largest land-based turbine currently available) is between 0.25 and 0.5 acres. The spacing between turbines would be at an interval of 5 to 10 turbine rotor diameters (a rotor diameter for a 1.5-MW wind turbine is assumed to be approximately 200 ft). It is estimated that 524 1.5-MW turbines would be needed, in areas with a wind class of Class 3 or higher, to produce 786 MW(e). The total acreage for a wind farm of 524 turbines in optimal wind conditions would be in excess of 2000 acres. Approximately 262 acres of those would be dedicated to the footprint. The remaining acreage could be available for other uses (e.g., farming, grazing).*

The comments also speak to the attractiveness of wind or solar energy versus nuclear power. The SEIS's discussion on alternatives is only intended to disclose the potential environmental impacts of each feasible alternative. The final decision on whether or not to continue operating the nuclear plant will be made by the utility, State, and Federal (non-NRC) decision makers. This final decision will be based on economics, energy reliability goals, and other objectives over which the other entities may have jurisdiction. Moreover, given the absence of the NRC's authority in the general area of energy planning, the NRC's identification of a superior alternative does not guarantee that such an alternative will be used.

Comment: I have two questions involving the last point on the board there. That includes, well, yes I guess, all of, and when you consider those solar and wind power would that be like a centralized like field of windmills and–sun panels. I'm worried about like the environmental effects. Is that moderate or large considering that it would be all in one place? (T-1)

Response: *The factor that elevates the impacts of renewable energy alternatives to MODERATE and LARGE is that you are evaluating the impacts at a baseload capacity. Many of the renewable energy alternatives are very effective at small capacity levels (i.e., under 100 MW(e)). When those alternatives are expanded to meet baseload needs, the potential for environmental impacts becomes very large because of the scale of the project and the need for that baseload capacity to reach the same users of energy from the current Palisades plant. These impacts are evaluated based on centralized or proximate arrays of windmills or sun panels.*

Comment: Section 8.2.3, *Nuclear Power Generation*, page 8-34. The changes in power production would provide a difference in potential risk to the public and needs to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination in this section of the document. (UU-13)

Response*: As stated in Section 8.2.3, the impacts shown in Table S-3 (of 10 CFR 51.51) are for a 1000-MW(e) reactor and would need to be adjusted to reflect the replacement of 786 MW(e) generated by Palisades. For the basis of comparing alternatives, the NRC staff assumes that a hypothetical plant would produce the same amount of power currently generated by Palisades; the risk associated with this hypothetical plant is not expected to exceed that of the current plant at Palisades. Therefore, the comment provides no new and significant information and will not be evaluated further.*

A.2.13 Comments Concerning Monitoring Issues

Comment: Although radiation monitoring occurs at reactor sites, it only provides information on levels of discharges emitted or released. It does not provide specific information about where the radioactive materials end up, or if they contribute to radiation levels in plants, fish, and wildlife as well as body burdens of local and downwind or downstream residents. The Nuclear Regulatory Commission relies upon self-reporting and computer modeling from reactor operators to track radioactive releases and their projected dispersion. A significant portion of the environmental monitoring data is extrapolated – or virtual, not real. (GG-28)

Comment: NMC/Consumers should be required to provide the communities in the vicinity of the Palisades plant, with a monitoring program to supply independent information regarding radioactive discharges and releases. These communities are currently dependent upon the operators of Palisades to provide notification of radiological releases. Establishment of an independent program would give evidence of NMC/Consumers' interest in and commitment to ensuring the health of its surrounding communities. (GG-30)

Response: *The NRC requires licensees to report plant discharges and results of environmental monitoring around their plants to ensure that potential impacts are detected and*

reviewed. Licensees must also participate in an interlaboratory comparison program that provides an independent check of the accuracy and precision of environmental measurements. In annual reports, licensees identify the amount of liquid and airborne radioactive effluents discharged from plants and the associated doses. Licensees also must report environmental radioactivity levels around their plants annually. These reports, available to the public, provide the results of the sampling of ingestion sources such as milk, fish, invertebrates, and broad leaf vegetation. Radiological environmental monitoring program reports have not shown any significant elevation in radiological contamination of foodstuffs from surrounding farms. The applicant's effluent and environmental radiological monitoring programs are regularly inspected by health physics experts from the NRC's Region III office. In additional, the Michigan Department of Environmental Quality conducts an environmental radiological monitoring program in the areas around Palisades. The comments provide no new information and will not be evaluated further.

Comment: Section 2.2.7, *Radiological Impacts*, pages 2-49, 2-50. The references to the environmental standards need to be more complete citations, including title of the rule or regulation along with the basic standard for comparison provided consistently. All of the environmental standards that could be used for comparison should be used, including 40 CFR 61 Radionuclide National Emission Standards for Hazardous Air Pollutants values. This will reduce the time needed to look up these citations and verify values that are cited in the text. (UU-2)

Response*: As stated in Section 2.2.7, "the limits for all radiological releases are specified in the Offsite Dose Calculation Model (ODCM) (NMC 2004a), and these limits are designed to meet Federal standards and requirements. The primary radiological standards applicable to Palisades are contained in 10 CFR Part 20, 40 CFR Part 190, and 10 CFR Part 50, Appendix I." Additional text has been added to reference Section 3.8.1.1 "Regulatory Requirements" of the GEIS, which provides a summary and specific numerical dose limits associated with these standards and requirements. Complete citations for these standards are provided in the reference section of Chapter 2.*

Regarding the comment to include 40 CFR Part 61, the EPA rescinded Subpart I as it applies to power reactors on September 5, 1995 (60 FR 46206), based on the reasoning that "the regulatory program established by the NRC pursuant to the Atomic Energy Act provides an ample margin of safety to protect the public health." No change was made to the SEIS as a result of this comment.

Comment: Section 2.2.7, *Radiological Impacts*, page 2-49. We are concerned about the level of information provided in the draft supplemental environmental impact statement (SEIS) on direct and cumulative radiological impacts. According to the draft SEIS, Nuclear Management Company, LLC (NMC), the applicant for the operating license, has conducted a radiological

environmental monitoring program (REMP) around the Palisades site since 1971. Through this program, NMC has monitored and documented radiological impacts to workers, the public, and the environment. The draft SEIS states: The REMP includes monitoring of the waterborne environment (ground water, surface water, and sediments), ingestion pathways (milk, fish and vegetation), direct radiation (gamma dose at thermoluminescent dosimeter [TLD] locations), and atmospheric environment (airborne radioiodine, particulates, gross beta, and gamma). [Page 2-49]

The draft SEIS cites two annual reports which summarizes information from the REMP, but the draft SEIS does not contain this summary information itself. Summarized quantitative information about-radiation and exposure pathways in the environment is relevant in determining radiological impacts from the continued operation of Palisades. We are unable to make such a determination from the draft-SEIS as it is written. In addition, the draft SEIS lacks a comprehensive assessment of cumulative radiological impacts, since it does not include quantitative information about the D.C. Cook Nuclear Plant, located about 28 -miles south-southwest of Palisades on Lake Michigan's shores. Therefore, we suggest that the final SEIS include(1) current annual summary information from the REMP and (2) a quantitative cumulative impact assessment of radiological impacts which accounts for impacts from the D.C. Cook Nuclear Plant. (UU-3)

Response: *Radiological impacts of normal operations were considered and evaluated in the GEIS, and the generic conclusion was reached that these impacts were SMALL. Therefore, this is a Category 1 issue. In the supplements to the GEIS, such as this supplement for Palisades, the NRC staff determines if any new and significant information is available that would change that generic conclusion. No such new and significant information was identified. The text, as it is written in Section 2.2.7 summarizes the results of the radiological environmental monitoring program (REMP), as documented in the annual reports. More detailed information about the REMP and its findings can be found in the annual Radiological Environmental Operating Reports referenced in Section 2.2.7. These reports are available to the public through the NRC electronic reading room at http://www.nrc.gov/reading-rm/adams.html. In preparing the SEIS, the NRC staff summarizes and incorporates by reference such reports unless a unique call for specific data is required.*

Section 4.8.3 of the SEIS has been revised to include clarifications about how the cumulative impacts analyses do consider the impacts from the D.C. Cook Nuclear Power Plant. The doses due to releases from D.C. Cook on receptors near the Palisades have not been quantified but they would be essentially zero considering the distance between the two plants; that is, the MEI dose given in Section 2.2.7 would not change. Therefore, the MEI dose given in Section 2.2.7 would be bounding for any offsite individual in the vicinity of Palisades. As discussed in Section 2.2.7, the MEI dose is a small fraction of the applicable regulatory limit of 25 mrem per year in 40 CFR Part 190. The comment provides no new and significant information and will not be evaluated further.

Comment: Section 2.2.7, *Radiological Impacts*, pages 2-49, 2-50. Providing the estimated total effective dose equivalents (TEDEs) for comparisons helps in providing the public with additional assurances that doses are monitored and do meet the As Low As Reasonably Achievable (ALARA) principals of the U.S. Nuclear Regulatory Commission (NRC). (UU-4)

Response: *The estimated total effective dose equivalents (TEDEs) are provided in Section 2.2.7 of the SEIS and are compared to the EPA's 10 CFR Part 190 dose limit of 25 mrem per year as follows: "Over this 5-year period, the maximum annual TEDE for the MEI was estimated to be 7.53 × 10-3 mrem with an annual average TEDE of 3.73 × 10-3 mrem. These doses represent approximately 0.03 percent and 0.015 percent of the 25-mrem limit, respectively." The explanation of how these doses compare to the 25 mrem limit (0.03 and 0.015 percent, respectively) helps in providing additional assurance that doses are monitored and do meet the ALARA principles, i.e., the relevant data was provided to show an appreciation for the magnitude of difference between the TEDEs and corresponding limit.*

Comment: Section 4.8.3, *Cumulative Radiological Impacts,* page 4-38; 4-39. Information or procedures used to generate values to support the assertions in this section need to be provided in a clearer manner to reduce the possibility of misunderstandings and the reasoning on procedures to reach these conclusions. (UU-6)

Response: *For aditional clarity, the discussion of Cumulative Radiological Impact in Section 4.8.3 of the SEIS has been revised in response to this comment.*

A.2.14 Comments Concerning Decommissioning Issues

Comment: Section 7.1, Decommissioning, 7-2, under bullet point Radiation Doses. As the GEIS is based on a forty-year licensing period, an extension of this period would have an impact that needs to be quantified and reported. This information should have been included specifically in the draft SEIS as part of the risk that would be associated with the license extension. The specific methodology needs to be provided and explained. (UU-10)

Response: *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 GEIS (NUREG-1437) and in NUREG-0586, Generic Environmental Impact Statement for Decommissioning Nuclear Facilities, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors, published in 2002. The findings from these two documents are used to support the findings in the SEIS by the use of tiering. Tiering is a process by which agencies eliminate repetitive discussions and focus on actual issues ripe for discussion. The effect of license renewal on the impacts of decommissioning are stated in Chapter 7 of this SEIS. The radiation doses to the public during the period of extended opeation are expected to be well below applicable regulatory limits, and the occupational dose during the time the plant*

undergoes decommissioning would be expected to increase only slightly. The comment provides no new and significant information and will not be evaluated further.

A.2.15 Comments Concerning Global Warming

Comment: A majority of scientists throughout the world now believe that increased emissions of carbon dioxide since the Industrial Revolution are enhancing the greenhouse effect of the atmosphere that surrounds the earth, and causing a warming that will cause dangerous effects to the earth's climate and inhabitants - global warming. The NRC confirms it as well, in its analysis of impacts of alternatives that might be more appropriate options than extending the license for Palisades, as it concludes that the impacts of substituting coal plants for Palisades would be a "large" impact, due to their contribution to global warming.

A one-degree Celsius warming of the earth's surface may seem insignificant, but it is not. The temperature of the earth's surface greatly affects our climate in many ways. In particular, a warmer planetary climate means more rain, flooding, and snow in various regions, earlier spring arrivals, hurricanes, heat waves, drought and fires in some places, frigid cold in others.

The effects are already seen in Michigan, where water in the Great Lakes is warming. According to Dr. Natalia Andronova, research scientist at the Department of Atmospheric, Oceanic, and Space Sciences at the University of Michigan in a May 7, 2006 interview with the Ann Arbor News, "Measurements of the near-surface temperature over the northern part of Lake Michigan and southern part of Lake Huron showed that for both lakes the period from 2000 to 2005 was warmer by at least two degrees Celsius than the period from 1981 to 1985." An increase of Lake Michigan water temperatures may eventually affect Palisades' operation, since the condenser within the plant requires cooler water to operate efficiently. During a heat wave in the late 1990s, reactors on the U.S. side of Lake Ontario shut down because the water temperature was too high to efficiently cool the reactor and generate steam for electricity production. During the extreme heat wave in France in recent years, nuclear reactors released so much superheated water to rivers that fish kills occurred; operators had to hose down the exterior of reactors as an emergency measure to provide additional cooling at the same time.

In the recent interview, Dr. Andronova also noted conditions particular relevant to re-licensing of Palisades. She commented that "it is becoming windier over the Great Lakes. The extreme winds increased from the one period to the next by more than 3 meters per second." More extreme winds, as well more frequent and intense tornadoes – all of which global warming could cause – could make operation of Palisades more and more risky over time. For example, documents received by the Nuclear Information and Information Resource from NRC during a Freedom of Information Act request regarding the October 2005 "near-drop" of a storage cask into the irradiated nuclear fuel pool at Palisades revealed that on extremely windy days, Palisades is prohibited from lifting loaded dry casks from the pool, as the high winds make crane operations too dangerous.

The potential danger presented by tornadoes to reactors was clearly shown in 1998, when a tornado struck the Davis-Besse nuclear plant in Ohio, knocking out the off-site electricity supply; the emergency back up diesel generators also malfunctioned. If not for extreme efforts by staff, the plant could have lost coolant, leading to a meltdown. An increase in severe weather due to global climate destabilization in the region could well increase risks at Palisades. Far from being a solution to global warming, nuclear power could become unacceptably dangerous and unreliable due to global warming.

The draft EIS prepared by the NRC unaccountably discounts the effects of global warming, noting that its effects cannot be predicted. We assert that there is sufficient information currently available that should be investigated and considered regarding the impacts of changes in weather that may occur in a 20-year extension to Palisades' license. This must also include an analysis of the increased potential for an electrical station loss of power that could lead to loss of cooling in the reactor core and waste storage pool, with the potential for core meltdown and waste pool fires, with consequent catastrophic large-scale radiation releases to the environment. The warming of the cooling water supply from Lake Michigan must also be considered in regards to the efficiency and safety of Palisades continued operation till 2031. (GG-49)

Comment: NRC must assess and consider as part of the EIS, the information currently available regarding the impacts of global warming to the region. This must also include an analysis of the increased potential for an electrical station loss of power that could lead to loss of cooling in the reactor core and waste storage pool, with the potential for core meltdown and waste pool fires, with consequent catastrophic large-scale radiation releases to the environment. The warming of the cooling water supply from Lake Michigan must also be considered in regards to the efficiency and safety of Palisades continued operation till 2031. (GG-64)

Response: *While climate change is a legitimate concern, the specific impacts of climate change within a particular region are still highly speculative, and are, therefore, beyond the scope of a NEPA review for reactor license renewal. The comments do not provide new and significant information and will not be evaluated further.*

A.2.16 Comments Concerning Editorial Issues

Comment: Page Number 2-4, Line Number 22. Suggest that text specifically state the Covert Generating Station is owned and operated independently of Palisades. (OO-1)

Comment: Page Number 2-5, Line Number 1. Replace "40-ac" with "400-ac" (See ER p 2-1). (OO-2)

Comment: Page Number 2-12, Line Number 4-12. The new Radwaste system became operational in December 2005. Change “NMC is planning to modify...” to “NMC has modified...” Remove 2 sentences describing old radwaste system. Change “The system NMC plans to install relies...” to “The system relies...” (OO-3)

Comment: Page Number 2-12, Line Number 14. Change “The equipment NMC plans to install...” to “The equipment NMC has installed...” (OO-4)

Comment: Page Number 2-14, Line Number 39-40. Change to “Sanitary waste is sent to three onsite septic systems.” (See DSEIS Figure 2-3). (OO-5)

Comment: Page Number 2-19, Line Number 1-2. Change “plant area” to “protected area.” (OO-6)

Comment: Page Number 2-19, Line Number 18. Change “OLs” to “OL” (OO-7)

Comment: Page Number 2-22, Line Number 25. The NPDES Permit (corrected copy of 11/8/04 submitted to NRC in letter dated 12/8/04) requires outfall observations five times per week. Suggest changing last word from “day” to “week.” (OO-8)

Comment: Page Number 2-23, Line Number 5. Suggest adding third sentence to the paragraph which states, ”Clam-Trol treatments are no longer required to be recorded in Palisades’ DMRs, but monitoring during Clam-Trol treatments is performed in accordance with the NPDES permit.” (OO-9)

Comment: Page Number 2-23, Line Number 8-9. Revise sentence to state, “Temperature data collection at monitoring point 001A is conducted in accordance with the NPDES permit.” As written, sentence implies, incorrectly, that monitoring was not conducted prior to 2005. (OO-10)

Comment: Page Number 2-24, Line Number 7. Correct name of facility is the “Benton Harbor-St. Joseph Wastewater Plant.” (OO-12)

Comment: Page Number 2-25, Line Number 27. Wind class differs from wind class given on DSEIS p. 8-45 line 21. (OO-13)

Comment: Page Number 2-26, Line Number 16. Change “2350" to A2500." The rated capacity of the diesel generators is 2500kw per FSAR Section 8.4. (OO-14)

Comment: Page Number 2-49, Line Number 35. Change “NMC performed an assessment...” to “NMC performs an annual assessment...” (OO-15)

Comment: Page Number 2-51, Table 2-3. Suggest adding footnote "Figures may not add due to rounding" (OO-16)

Comment: Page Number 2-52, Line Number 34-35. Fire protection services are provided by the Covert Township Fire Department and the South Haven Fire Department. (OO-17)

Comment: Page Number 2-54, Line Number 19. Change "Table 2.6" to Table 2-6" (OO-18)

Comment: Page Number 2-55, Line Number 23-25. Stated building heights are not correct. Suggest either deleting heights or replacing with the following approximate values: turbine building-94 ft; containment building-192 ft; auxiliary building-108 ft; cooling tower pump house-35 ft; two cooling towers-65 ft; and feedwater purity building-58 ft. These are approximate heights above grade as the buildings would be seen from the west. (OO-19)

Comment: Page Number 2-57, Line Number 23. Value "27,488" appears to be an error. "27,488" does not represent 39% of Van Buren County's 16,977 employed in 2002, as stated. (OO-20)

Comment: Page Number 2-57, Line Number 36-38. Appears that "Van Buren County" should be one of the two counties referenced (instead of both sets of figures being attributed to Berrien County). (OO-21)

Comment: Page Number 2-58, Line Number 25-27. Taxes are also paid to Lake Michigan College and the Michigan State Education Tax (See ER, p. 2-40) (OO-22)

Comment: Page Number 2-58, Line Number 34. According to Table 2-9, taxes paid to Covert Township averaged 58 percent of tax revenues. The word "spent" should be deleted from this sentence. (See DEIS Table 2-9, p. 2-60). (OO-23)

Comment: Page Number 2-58, Line Number 35. According to Table 2-9, taxes paid to Covert School District averaged 32 percent of total property taxes. (See DEIS Table 2-9, p. 2-60). (OO-24)

Comment: Page Number 2-63, Line Number 10. Approximately 80 acres of the site are developed or maintained (See DEIS p. 2-4 line 29). (OO-26)

Comment: Page Number 2-63, Line Number 12-13. Replace existing sentence with, "Most of these facilities are located along the main and north access roads." (OO-27)

Comment: Page Number 2-63, Line Number 19. Suggest changing "former" to "pre-operational:" (OO-28)

Comment: Page Number 2-68, Line Number 13. Change “Straminea” to “Pitcheri” (OO-29).

Comment: Page Number 4-24, Line Number 11. No “Table 2-10" exists; should be changed to “Table 2-9.” (See DSEIS p. 2-60) (OO-30)

Comment: Page Number 4-24, Line Number 13. Taxes paid to Covert Township averaged 58 percent of tax revenues spent in the county (See DSEIS Table 2-9, p. 2-60.) (OO-31)

Comment: Page Number 4-24, Line Number 14. The Covert School District received an average of $2.7 million annually from Consumers over the 3-year period (See DSEIS Table 2-9, p. 2-60) (OO-32)

Comment: Page Number 4-24, Line Number 21. VBCO & VBCISD received 3-5 percent of revenues from Consumers (See DEIS Table 2-9, p. 2-60) (OO-33)

Comment: Page Number 4-26, Line Number 11 &15. Suggest rewording “The applicant has stated that these procedures are in place...” and replacing with “These procedures are in place...” (OO-34)

Comment: Page Number 4-27, Line Number 8. Change to “(1) no major...” (OO-35)

Comment: Page Number 4-37, Line Number 23. Line should read, ”...Palisades’ NPDES permit...” (OO-36)

Comment: Page Number 4-41, Line Number 1. According to cited study, groundwater flow velocity is from the east-southeast to west-northwest at approximately 23ft/yr. This would indicate a westward flow. (OO-39)

Comment: Page Number 5-5, Line Number 34. Change “its” to “it.” (OO-41)

Comment: Page Number 5-8, Line Number 11. % Contribution column does not add to 100%. Suggest adding footnote, “Figures may not add due to rounding.” (OO-43)

Comment: Page Number 5-6, Line Number 10. “CP 1996” is not in ER reference list-remove reference here; “CP 1995” and “CP 1996” are not in DSEIS Chapter 5 reference list. (OO-42)

Comment: Page Number 5-9, Line Number 32. “NRC 2004” is not in the Chapter 5 reference list. No reference is cited for NUREG/BR-0058. NMC 2005a is not in Chapter 5 reference list. (OO-44)

Comment: Page Number 5-9, Line Number 29. Reference should be NRC 1997b, and reference should be added to Chapter 5 reference list. (OO-45)

Comment: Page Number 5-10, Line Number 1. "NRC 2004" is not in the Chapter 5 reference list. No reference is cited for NUREG/BR-0058. (OO-46)

Comment: Page Number 5-10, Line Number 27. NMC 2005a is not in the Chapter 5 reference list. (OO-47)

Comment: Page Number 5-10, Line Number 36. NMC 2005b, NMC 2005c are not in the Chapter 5 reference list. (OO-48)

Comment: Page Number 8-4, Line Number 6. There are no threatened or endangered aquatic species known at Palisades; suggest removing "including threatened and endangered species." (See DSEIS page 2-32) (OO-49)

Comment: Page Number 8-4, Line Number 29. Palisades has three onsite sanitary drain fields (see DSEIS Figure 2-3). (OO-50)

Comment: Page Number 8-5, Line Number 28. "Covert County" should be either "Covert Township" or "Van Buren County." (OO-51)

Comment: Page Number 8-7, Line Number 17-31. Annual Energy Outlook 2006 is now available. Suggest updating paragraph to reflect latest information from DOE. (OO-52)

Comment: Page Number 8-34, Line Number 4-6. Suggest noting that the AP1000 design is now certified also. See NRC website for references. (OO-53)

Comment: Page Number 8-45, Line Number 21. Wind class differs from wind class given on DSEIS p. 2-25, line 27. (OO-54)

Comment: Page Number 8-53 & 8-54, Heading. Table numbers should be Table 8-8. (OO-55)

Comment: Page Number 9-1, Line number 7. "NMC" should be replaced with "the plant owner" (OO-56)

Comment: Page Number E-3, Line Number 8. The South Carolina Radioactive Waste License for Delivery was reissued for 2006. Authorization information is as follows: Number 0006-21-06; Issue Date: 01/09/2006; Expiration Date: 12/31/2006. (OO-57)

Comment: Page Number E-3, Line Number 10. The Tennessee Radioactive Waste License for Delivery was reissued for 2006. Authorization information is as follows: Number T-MI003-L06; Issue Date: 01/01/2006; Expiration Date: 12/31/2006. (OO-58)

Comment: Page Number G-2, Line Number 39. Change "is 1.0 x 10^{-7}" to "is about 1.0 x 10^{-7}". Also change "NMC 2005a" to "NMC 2005b". (OO-59)

Comment: Page Number G-4, Line Number 28. Column does not add to 100%. Suggest adding footnote, "Figures may not add due to rounding." (OO-60)

Comment: Section 2.1.4.2, *Gaseous Waste Processing Systems and Effluent Controls*, Page 2-12, second paragraph. Citations of dose values should include the dose value, in addition to the citation, to make the values clearer. (UU-1)

Response: The *comments are noted, and wording in the identified sections of the SEIS have been changed to reflect this information, where appropriate.*

Comment: Section 8.2.3.1, Closed-Cycle Cooling System, page 8-39, under bullet point Waste. Waste impacts need to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination made in this section of the document. (UU-14)

Comment: Section 8.2.3.1, Closed-Cycle Cooling System, page 8-40, under bullet point Human Health. Human-health impacts need to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination in this section of the document. (UU-15)

Response: *As a supplement, this SEIS relies on tiering from the GEIS (NUREG-1437) and does not need to repeat all analysis and conclusions presented in the GEIS. The SEIS relies to a great degree on impact analyses presented in the GEIS by the use of a process called tiering. Tiering was promulgated by the Council on Environmental Quality in 1978 in 40 CFR Part 1502.20. Appropriate sections of the GEIS are referenced, when necessary. Human health impacts are presented in 10 CFR Part 51, Appendix B, Table B-1. For ease of review, this table can be found at http://www.nrc.gov/reading-rm/doc-collections/cfr/part051/part051-appb.html. More detailed information on this topic can be found in Volumes 1 and 2 of the GEIS, which are available at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/ sr1437/v1 and http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/v2, respectively. The comments do not provide any new and significant information; therefore, no changes were made to the SEIS text.*

Comment: Page Number 2-23, Line Number 13. Suggest defining "several" by stating the number of spills cited within the last five years. (OO-11)

Comment: Section 4.2.2, *Electromagnetic Fields-Chronic Effects,* page 4-17. We commend NRC for providing the reference to the National Institute of Environmental Health Sciences results and recommendations on chronic exposures to electromagnetic fields. This will provide the public with valuable information on these types of exposures (UU-5)

Response: *The comments are editorial in nature, and no changes were made to the SEIS as a result of these comments.*

Comment: Section 8.1, No Action Alternative, page 8-5, under the bullet point Human Health. The value representing the cited percent value should be specifically provided in addition to the citation. This will reduce unnecessary additional research by readers, except for value verifications, and potential misunderstandings or confusion as to the actual value(s) being specified. (UU-11)

Response: *The assessment of Human Health impacts in Section 8.1 was qualitative and incorporated summaries of conclusions reached in Chapter 4. Therefore, no specific values were cited. The comment will not result in modification of the SEIS text.*

A.2.17 Issues Outside the Scope of the Environmental Review for License Renewal: Safeguards and Security; Cask Incident; Dry Cask Storage, Waste Confidence Rule, Spent Fuel; Aging Management; Allegations Process; Cost-Benefit Analysis; Energy Policy; and Emergency Preparedness and Response

Safeguards and Security

Comment: What I wondered is, the basis like sabotaging where taking account can be – in this way too. And if you have done that, because this, my contention is [it] is a new issue. They're not the same like previous plan. (D-2)

Comment: I'm curious as to where Homeland Security and terrorism falls in this environmental impact. (Q-1)

Comment: The SEIS (Supplemental Environmental Impact Statement) report should acknowledge that there has been changes in our government strategy since the original issuance of Palisades OL, particularly regarding sabotage and/or terrorism. Therefore additional analysis are required for OL Renewal. We believe that additional Severe Accident Mitigation Alternatives (SAMAs) regarding this issue should be considered for Palisades Operation License Renewal. (JJ-2)

Response: *Section 5.1.2 discusses the impacts of severe accidents including sabotage. The GEIS findings state that compliance with the NRC regulatory requirements under 10 CFR Part*

73 provide reasonable assurance that the risk from sabotage is SMALL. Even if such events were to occur, the Commission would expect that resultant core damage and radiological releases would be no worse than those expected from internally initiated events. Based on the above, the commission concludes that the risk from sabotage and beyond design basis earthquakes at existing nuclear power plants is small and additionally, that the risks form other external events, are adequately addressed by a generic consideration of internally initiated severe accidents.

Comment: One time I was sitting on the deck of my cottage, which is right on the shores of Lake Michigan, a stone's throw from the, from the plant and of course, this was after 9/11 and a no-fly zone was instituted. And all of a sudden a Japanese zero comes zooming down the lake shore there about 50 feet over the water. It of course flew right over the plant on its way up to an old plane show someplace up north along Michigan. And I thought to myself well, how easy it would be for somebody, a plane to come on, and you know, I was really surprised that the accident report didn't include sabotage and other things along that line. So that's, that's kind of a problem. I'm a boater, and I boat past the plant many times from South Haven down to Palisades Park where the cottage is. And now it's not a no fly zone, but a no boat zone. The parameters of the property are 3/4's of a mile. And I looked at my boat and I said, boy, those casks are so easy. They're right, right over there. So I think that somehow or another we need to entrust the issues of, of license renewal for just 20 years because we're really looking, according to what I read, 10,000 years down the pike. (E-1)

Comment: My last thing, in yesterday's New York Times, I don't know if you all saw it, but maybe some of you from the NRC might get red ears when you read this article, because it is, after consulting with the industry, the Nuclear Regulatory Commission weakened security regulations it had proposed for reactors, government auditors said in a report to be released Tuesday. This is a GAO report. The audits said the process, quote, created the appearance that the changes were made based on what the industry considered reasonable and feasible, feasible to defend against rather than assessment of the terrorist threat itself. The report, by the Government Accounting Office, stopped short of saying that the Commission had made changes, quote, based solely on industry views. This cozy relationship between the NRC and the industry is what really bothers all of us. (G-4)

Comment: There is strong evidence that suggest security measures at Palisades are not adequate. Recent reports, including one in March of 2006 by the Government Accountability Office, call into question the ability and motivation of the NRC and nuclear power industry to take the necessary steps to ensure that the nation's nuclear power plants have instituted the most stringent security measures to protect against terrorist attacks. (GG-4)

Comment: The NRC has placed this issue outside the scope of the EIS for extending the license for Palisades. We strongly disagree and assert that the decision to allow Palisades to

operate an additional 20 years in a much higher risk condition mandates extensive involvement by the public.

Maintaining the security of the Palisades plant is a high priority concern since the events of September 11, 2001. That threat is real and imminent, as nuclear power plants were considered to be potential targets by the terrorists who carried out 9/11, according to the report of the 9/11 June 30, 2006 Commission. The Commission report notes that several of the terrorists had given indications that a nuclear power plant near New York City was a considered target for an airplane attack, due to the large population that would be affected by a release of radioactivity. That did not happen, reportedly, because the terrorists appeared to have concluded that it would have been difficult to control the effects of a release of radioactivity. But, the fact that it was considered means that each and every nuclear power plant in the U.S., including Palisades, should be regarded as a potential target for terrorism and security measures must be the most stringent available to address this threat. In fact, reactors such as Palisades are likely more at risk of terrorist attack than certain other reactors, as it is situated on the shoreline of Lake Michigan, the source of drinking water for the region.

Both the NRC and nuclear power companies assert that the events of 9/11 stimulated additional security at plants. However, numerous reports following 9/11 suggest otherwise, including a 2002 report by the Project on Government Oversight (POGO) referencing the plight of overworked and fatigued security guards at the plants during the year following 9/11, and numerous high-profile media accounts of risky gaps in security.

An October 3, 2002 Kalamazoo Gazette article, “Palisades incident leads to reassessment,” describes a security response lapse due to Palisades’ failure to follow proper procedures, leading to a communications breakdown. When three cars approached Palisades on the eve of the first anniversary of the 9/11/01 attacks, Palisades mistakenly phoned the local police rather than the county 911 system, leading to a 45 minute delay before State police arrived on the scene. By that time, the suspicious cars were long gone.

An October 20, 2002 New York Times article, “Guards at Nuclear Plants Say They Feel Swamped by a Deluge of Overtime,” described an emotional breakdown by an armed security guard at Palisades with “unescorted access” to vital areas of the plant after she had been forced to work 72 hour work weeks for months on end. If guards complained about their fatigue, they faced the loss of their job, or forced psychiatric evaluations. Apparently, as reported by POGO, some nuclear utilities chose to nearly double current guards’ duty time in order to avoid the added costs of training and providing benefits for newly hired guards.

In March of 2006, an independent nonpartisan investigatory Federal agency, the Government Accountability Office (GAO), issued a report that demonstrates that there is much yet to be done to protect the nation from terrorist threats to nuclear power plants. The report, Efforts Made to

Upgrade Security, but the Nuclear Regulatory Commission's Design Basis Threat Process Should be Improved (GAOBO6B388), assessed the NRC's current efforts and found evidence that suggested the nuclear industry attempted to avoid strengthening security to avoid costs. It also noted slow progress in conducting mock attacks or force-on-force exercises to test safety at plants, as well as egregious examples of security lapses in the small number of mock attacks that NRC has carried out to date.

NRC'S process for determining risk to nuclear power plants was flawed and undercut by the nuclear power industry

The recent GAO report was done to review the process that the NRC used to revise the Design Basis Threat (DBT) that was in place for nuclear power plants prior to 9/11. The DBT is a description of the threats that might be anticipated from terrorist activities and is used to recommend appropriate security efforts at plants. The GAO also looked at what nuclear plants were doing to meet the threats, and the results of mock attacks, called "force-on-force" inspections, to test security efforts, carried out by NRC staff.

Trained "threat assessment" staff within the NRC used intelligence information that provided information on the capabilities of terrorists and recommended that the DBT be changed to accommodate a larger suite of threats. After sending out the revised DBT for review by nuclear power plant industry officials and groups, however, the NRC changed their recommendations for revising the DBT to reflect nuclear industry concerns about what was "reasonable and feasible" to defend against.

Judgment calls were made on most likely threats

Much of the threat assessment analysis involved a review of a limited amount of information (not much was available specific to nuclear power plants) as well as personal judgment by NRC staff to predict what might be used in a terrorist attack against nuclear power plants. For example, the staff considered whether to increase the number of potential attackers in the DBT, based on knowing the number of attackers in other incidents. Staff did not, however, recommend increasing the number of attackers in the DBT because they assumed that a large number of attackers would be more likely to be caught before they could carry out an attack – a judgment call. NRC staff concluded that an attack similar to 9/11 would not focus on a single nuclear power plant and that since an attack from the air was not an option used often by terrorists, did not recommend that scenario to be included in the DBT. Staff did assess the possibilities of an attack from water, but concluded that a bomb transported by water would necessarily be of smaller size, because it would need to be carried on a boat. (This assessment would not apply to a facility on Lake Michigan, as boats of quite large size could approach Palisades; in addition, it is plausible that speedboats could have the ability to launch an attack on Palisades before plant security defenses could react.

Undue influence by the nuclear industry changed NRC recommendations.

The GAO report, in its review of the revisions to the DBT, noted that because the nuclear industry had the opportunity to review the draft DBT, the changes that were made to the draft appeared to reflect concerns by the nuclear industry over the high cost of some increased security measures, suggesting undue influence by the industry. For example, industry representatives protested the inclusion of certain weapons in the DBT, saying that one would render the ballistic shielding of the plants obsolete and that another would be too costly. The industry argued as well that protecting against the use of certain weapons by terrorists was the responsibility of the U.S. Federal government, namely, the Department of Defense.

The industry also opposed the inclusion of a threat of an attack from inside the plant, from an "active violent insider," saying there were no cost effective ways of avoiding this scenario. NRC staff made changes to the draft DBT that appeared to be influenced by the industry comments. When the draft DBT was presented to NRC commissioners, even more changes were made based on industry objections, for example, allowing plants to use a "human reliability program" to reduce the potential for an insider situation. The commissioners also removed some weapons from the list recommended by staff that plants would have to defend against that would have added to the cost of increasing security, as well as voting to decrease the maximum amount of weight of equipment, weapons, and explosives an attacker might carry, downgrading the level of security required at plants. The GAO report concluded that some of the changes suggested by commissioners and included as part of the DBT, were made due to judgment, rather than specific criteria.

Few mock attacks carried out to date

The GAO report noted that as of November 2005, the NRC had only conducted mock attacks, or force-on-force demonstrations at 20 of the 65 nuclear plant locations (with 103 reactors) in the U.S. The GAO reviewed documents from inspections and force-on-force demonstrations as well as observing a number of force-on-force demonstrations. Its review of 18 baseline inspection reports and demonstrations noted problems, including an intrusion detection failure at one site:

- Notice of demonstration dates were given 8 to 12 weeks in advance, and daytime and nighttime exercises were generally convened at the same times at each event, leading to a lack of unpredictability in the exercises.
- There were instances where advance information about attack scenarios had inadvertently been provided to plant personnel.
- The quality of feedback from NRC personnel to plants after an inspection varied. For example, not all potential problems were discussed by NRC with plant officials after each demonstration.

- Alarms failed to activate; some did not function properly.
- Gaps in patrols were observed.
- Not all personnel entering protected areas within the plant were searched (for example, a security officer did not examine objects that set off the metal detector).
- Some security officers were inadequately trained for a terrorist attack (lack of physical stress preparedness, training inappropriate to threat).
- Security officers in one location were noted as inattentive at their posts.
- A vehicle barrier system was improperly and ineffectively placed at one plant location.

Accountability to the public on security is non-existent

The need to keep classified certain sensitive information about measures taken at potential targets of terrorism is understandable, but those who live in the vicinity of Palisades, as well as those throughout the region who might be affected by a terrorist attack directed at Palisades, must be assured in no uncertain terms by the NRC, Palisades, and elected leaders that every measure has been instituted that will provide safety and peace of mind to the public. It is disturbing to note that keeping back information on the plants has even broader implications. In March 2004, for example, the NRC decided not to publicize results of problems related to security at plants, as well as enforcement information relating to actions taken by the NRC against the reactor licensees for violations of safety regulations. This appears to be taking advantage of the heightened attention and concern for security at nuclear power plants to limit information about unsafe operations that should be readily available to members of the public.

If a force on force demonstration has not been conducted at Palisades, it should be conducted as soon as possible. Classified results of the demonstration should then be directly communicated to the region's U.S. Congressional representatives and senators, as well as the Governor and Attorney General of the State of Michigan, for their thorough review and approval and reporting back to the public. To truly secure the Palisades nuclear power plant and dry cask storage, the following security safeguards, if not instituted already, would need to be in place.

- Sufficient cameras and patrols;
- Delay measures, such as fences outside buildings and entrances that would delay potential attackers;
- Bullet resistant structures in the protected areas of the plant site;
- Adequate and specific training for security officers;
- Several levels of intrusion detection systems (Needed especially by Palisades to protect against intrusion from potential attackers that may enter from Van Buren State Park, adjacent to the plant site);
- Vehicle barrier systems to prevent vehicles with bombs from entering the site;
- Anti-aircraft capability, and;

- Shore patrol equipped with stationary weaponry capable of preventing an offshore assault.

While some of these safeguards may appear excessive, they are necessary to secure the facility. Unfortunately, some of these measures have significant civil liberties ramifications for the communities surround Palisades, therefore we request that the NRC address how this will be handled in a 20-year license extension in the draft EIS.

Palisades must also ensure that its irradiated nuclear fuel storage pools are safeguarded from terrorist activities. A study released in April 2005 by the National Academy of Sciences shows that the cooling pools at nuclear reactors, which store 10 to 30 times more radioactive material than that contained in the reactor core, are at risk from attacks by terrorists. According to the study, the cooling ponds could be severely damaged by crashing aircraft, high-powered weapons or explosives, releasing large quantities of radioactive material into the environment. (GG-19)

Comment: Security issues at Palisades must be addressed immediately**.** If a mock attack or force on force demonstration has not been conducted at Palisades, it should be conducted as soon as possible. Classified results of the demonstration should then be directly communicated to the region's U.S. Congressional representatives and senators, as well as the Governor and Attorney General of the State of Michigan, for their thorough review and approval and reporting back to the public. The following security safeguards, if not instituted already, must be put in place immediately:

- Sufficient cameras and patrols;
- Delay measures, such as fences outside buildings and entrances that would delay potential attackers;
- Bullet resistant structures in the protected areas of the plant site;
- Adequate and specific training for security officers;
- Several levels of intrusion detection systems (Needed especially by Palisades to protect against intrusion from potential attackers that may enter from Van Buren State Park, adjacent to the plant site.);
- Vehicle barrier systems to prevent vehicles with bombs from entering the site;
- Anti-aircraft capability, and;
- Shore patrol equipped with stationary weaponry capable of preventing an offshore assault.

NRC and Palisades must also ensure that the plants irradiated nuclear fuel storage pools are safeguarded from terrorist activities as well as address civil liberties ramifications of increased security to the host and surrounding communities of Palisades. (GG-52)

Comment: Security measures and supervision requirements for the on-site storage of the spent fuel. It is clear that the amount of on-site storage, dry stored, spent fuel will increase during the renewal term as long as there is no final off-site storage facility provided by the Federal Government. Therefore there would be additional security measures and supervision requirements to take care of the status of the on-site dry storage of spent fuel for an indeterminate period of time. Security measures would be: locate the dry storage facility at a place, guarded, hidden and less vulnerable to terrorist activity. I.e. The fact that the South Haven Municipal Airport is within 6 mile distance from Palisades, could imply the need to move the location of that Airport. Supervision requirements are related to continuous monitoring and accounting of the spent fuel during offsite storage. This activity could be an important part of the Palisades renewal term. All these impacts should be considered for OL extension alternative. (JJ-1)

Response: *Security issues such as safeguards planning are not tied to a license renewal action but are considered to be issues that need to be dealt with constantly as a part of the current (and renewed) operating license. Security issues are periodically reviewed and updated at every operating plant. These reviews continue throughout the period of an operating license, whether original or renewed. If issues related to security are discovered at a nuclear plant, they are addressed immediately, and any necessary changes reviewed and incorporated under the operating license.*

Since 9/11, the NRC and other Federal agencies have heightened vigilance and implemented initiatives to evaluate and respond to possible threats posed by terrorists, including the use of aircraft against commercial nuclear power facilities and independent spent fuel storage installations. The NRC routinely assesses threats and other information provided by other Federal agencies and sources. The NRC also ensures that licensees meet appropriate security-level requirements. While security issues are legitimate matters of concern, they will continue to be addressed through the ongoing regulatory process as a current and generic regulatory issue that affects all nuclear facilities and many of the activities conducted at nuclear facilities. The issue of security and risk from malevolent acts at nuclear power facilities is not unique to facilities that have requested a renewal to their licenses. The comments are outside the scope of the license renewal review as set forth in 10 CFR Part 51 and Part 54; therefore, they will not be evaluated further.

Cask Incident

Comment: How many of you here heard about the near drop of the fully loaded dry cask at Palisades last October? I have a question for folks at NRC. When we were having the hearing in early November in this, down the block here, how come that wasn't brought to our attention? I mean, our, if we have any credibility left in the NRC and in the company, if we had any trust left in the company and in this government agency that's supposed to protect our health and

well being and our environment and our safety, it's gone. It's absolutely gone. And NRC's response in the press is, it was not a reportable incident. (A-3)

Comment: The potential consequences, according to NRC's own documents of that incident, if the cask had dropped into the pool and damaged the pool and drained away the water, there could have been a radioactive inferno in the waste. And thousands to tens of thousands of people could have died downwind. Those are NRC's own numbers. I'm not making this stuff up. So it just is a real betrayal of the public to have on our part, to have taken part in good faith and at that very moment be kept in the dark about something as significant as that. So the outrage we'll try to control to an extent, but it's, it's deep burning at this point in the local community. (A-4)

Comment: This is the NRC inspectors writing. Therefore, the on scene inspectors concluded that working outside the bounds of the approved work package and manipulating the brake release on the crane represented an increase in the risk of a load drop, the load being the fully loaded cask on the crane. This increase in risk is directly associated with the reactor safety cornerstone objective of the spent fuel cooling system as a radiological barrier. What does that mean? The pool water could have drained away. What happens then? The waste catches on fire. What happens then? (A-14)

Comment: Talk about this crane hanging up. I've been around machinery enough to know that there's things like that do happen, and that things can be secured and there's no danger from them. (K-3)

Comment: And what I thought I would really focus on because it really caused quite a stir earlier today and I think it deserves as much attention from the public as it can get because the public deserves to know about it was the incident last October involving the cask that was stuck on a crane above the pool at Palisades. And I just wanted to read some passages from NRC documents from Palisades documents that reveal the serious nature of that incident. So I'll start with something I read earlier. The NRC inspectors concluded that working outside the bounds of a work package on a crane with a suspended load that if dropped would damage the spent fuel pool warranted a safety significance determination. Had the load dropped the spent fuel pool could have sustained severe damage. The inspectors concluded working outside the bounds of the approved work package and manipulating the break release represented an increase in the risk of a load drop. This increase in risk is directly associated with the reactor safety cornerstone objective of the spent fuel, spent fuel cooling system as a radiological barrier. And what that last sentence means is if the cask which weighed 107 tons had fallen into the pool it would have cracked the floor of the pool, drained away the water which cools the waste in the pool. And in a matter of time, some hours, the waste would catch on fire and it would be a large scale radiation release perhaps worse than Chernobyl. So what were the potentially catastrophic consequences had the cask dropped. And again this is from an NRC

report entitled Technical Study of Spent Fuel Pool Accident Risk published in February of 2001. The analysis exclusively considered drops severe enough to catastrophically damage the spent fuel pool so that pool cooling water inventory would be lost rapidly and it would be impossible to refill the pool using onsite or offsite resources. There is no possibility of mitigating the damage only preventing it in the first place. The staff assumes the catastrophic heavy load drop creating a large cooling water leakage path in the pool would lead directly to a zirconium fire. Zirconium is the metal cladding around the fuel rods. It's, it's a combustible material, highly combustible. The time from a load drop until a fire varies depending on fuel age, burn up and configuration. The dose rates in the pool area before any zirconium fire are tens of thousands of rem per hour making any recovery actions very difficult. Tens of thousands of rems per hour would deliver a lethal dose of radiation to someone close to that in a matter of minutes. And that's what happened to the firefighters at Chernobyl. They received deadly doses of radiation in a very short period of time. They died two weeks later because their red blood cells stopped reproducing. I'm reading directly from the NRC again. Based on discussions with NRC staff structural engineers it is assumed that only spent fuel casks are heavy enough to catastrophically damage the pool if dropped. In fact NRC has reported, "the possibility of a zirconium fire leading to a large fission product release cannot be ruled out even many years after final shutdown of a reactor." Palisades is an operating reactor so the waste in the pool is thermally hot, it's radioactively hot. All the more likely to lead to worst case end results. So this is a quote from a study done by Robert Alvarez and others in 2003 and it was about pool fires. This is the quote: "Spent fuel recently discharged from a reactor could heat up relatively rapidly to temperatures at which the zurcolode fuel cladding could catch fire and the fuel's volatile fission products including 30 year half life, cesium 137 would be released. The fire could well spread to older spent fuel. The long term land contamination consequences of such an event could be significantly worse than those from Chernobyl." Another quote from that same report, "The damage that can be done by a large release of fission products was demonstrated by the April 1996 Chernobyl accident. More than 100,000 residents from 187 settlements were permanently evacuated because of contamination by cesium 137. Strict radiation dose control measures were imposed. The total area of this radiation control zone is huge equal to half the area of the State of New Jersey. During the following decade the population of this area declined by almost half because of migration to areas of lower contamination". From the Alvarez study. (CC-1)

Comment: And so we found out about this cask incident by a fluke because a number of us attended an unrelated NRC technical meeting where a piece of it was mentioned. But we understood what it could mean and so we followed up. And we did a Freedom of Information Act request which NRC informed us would take two to four weeks to get back to us. Well, it took two months to reach us. And in the meantime we found out all that we could and we found the tables in that earlier report I read from about spent fuel waste fires and the casualty figures downwind were quite remarkable. The NRC's own numbers again 20,000 to 44,000 cancer deaths over time downwind out to a distance of 500 miles away from a pool fire. That was at 2001 NCR study. So we finally got the FOIA, this was after the Detroit Free Press exposed the

incident in that front page article. We only received a partial FOIA response at this point. And the, the document that I read from earlier was the quarterly inspection report from the NRC. That was the first public document of that incident. But the details that came out in the FOIA were quite interesting. The precursors that led to the incident. Here's, here's a quote from an internal Palisades mia copa done by the inspection crew that inappropriately handled the crane. Well, I'd like to encourage everybody to go over to that table in the back corner and get their own copy of this thing and read it because it's worth it. (CC-2)

Comment: So this is, this is the company's workers who made the mistake that could have overridden the emergency brake. That's the whole point. They shouldn't have handled the crane because they didn't understand the crane. We failed to consider the severity of the consequences if our troubleshooting caused the load to slip or fall into the spent fuel pool. This is why we set up an event response organization to, to allow an open forum with full consideration of how these activities will affect the plant and the health and safety of the public. This is the company saying this. The NRC earlier said that the risk of a load drop was increased because of this inappropriate handling. So I'll just, please do pick up a copy. The precursors of the event that led to this thing, the false setting of the emergency brake were due to the fact that Palisades lacks knowledge of the crane. They have to bring in the crane company to help them operate the crane. The crane company representative who came last August to set the emergency brake had to get to vacation. He was in a hurry. So instead of setting the emergency brake correctly with three checks on the emergency brake he did one check. And he set it wrong that time. He thought he set it at 175 foot pounds. He actually set it at 140. So that was one precursor. He had to go home on vacation. And the other one was that Palisades doesn't know how to handle the crane. The people that did know how to handle it have left the company. And one of the amazing admissions by the company is that there may be other aspects of operations where we also lack full knowledge not just this crane. (CC-3)

Comment: And I think this, this incidents of the crane that was just mentioned that's another incident I believe that was not reported to the NRC. And I believe that Palisades asked for an exemption that they don't want to report things any more. (DD-6)

Comment: the Palisades -- crane break down on October 11th. 55 hour shutdown with a 110 casks containing spent fuel assemblies partially suspended broke in the air fell partly submerged over the fuel pool. The fuel pool went well beyond its original design capacity with fuel assemblies going back to the 70s. I gather from the Tribune article all the brakes froze because plant personnel did not set the emergency brake properly just before leaving for his vacation. How big a rem stream would this situation be giving off. How many rems the article certainly didn't say. Did the whole fuel pool area must have had, must have had to been decontaminated. How much did it receive. All that spent fuel at risk should that cask have dropped down onto decades where for spent fuel assemblies it would have caused a fire making for an accident much worse than Chernobyl. The article also pointed out this incident

was considered of low significance by the NRC within its quarterly report. Quite a change from the NRC in the early 90s when dry storage cask storage was initiated at Palisades hearing the operators 30 violations for everything from cracked pipes to mishandled drop fuel assembly rods into its reactor vessel. Did they ever find the two pounds of missing fuel. To Palisades Conversation Group this incident further demonstrates the aged long time ineffectiveness of both the equipment and the personnel at the Palisades Plant right along with the current NRC not handing out violations for such – This must have been some long term radiation being released for over two days within the flow through area. Were procedures fumbled, could not get their crane to budge for days because one brake froze and all the brakes shut down for 55 hours. What were the plant personnel doing scratching their heads. A further explanation of partly suspended a 110 pound metal inner cask leaves me with cause for concern as it did others, was not made clear in the article. Just insistent that everything was okay. Just what is the shielding of a bare metal cask, that neutron thermal shielding that they're in the cask at the time. (O-8) (TT-13)

Comment: In October 2005, crane handling errors led to a 107 ton NUHOMS transfer cask fully loaded with high-level radioactive waste dangling for 55 hours above the storage pool. Reports confirmed that the risk of a heavy load drop had been increased due to improper emergency brake manipulation during the incident. NRC reported that, had the load dropped, severe damage to the pool could have resulted. A separate NRC report, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," (NUREG-1738, Feb. 2001) revealed that a heavy load drop can cause the cooling water to drain away. The densely-packed waste in the pool could then overheat, spontaneously combust, and ignite a waste fire causing catastrophic radiation release. NRC concluded that up to tens of thousands of people could die from cancer over time, downwind of such an accident.. Despite similar crane problems years earlier at its Big Rock Point nuclear power plant in northern Michigan, failure to communicate "lessons learned" within the nuclear utility contributed to repeating the same dangerous errors at Palisades. (GG-35)

Comment: How can NRC approve a license extension for Palisades when Consumers Energy and Nuclear Management Company nearly dropped a 107 ton nuclear waste container into the storage pool in October 2005? Such a drop could have punched a hole in the pool floor, draining away the cooling water, leading to a waste fire and radioactive inferno. Tens of thousands of people could have died from radiation-induced cancer downwind. The company cannot safely handle its radioactive wastes with its present workforce, a situation that can only get worse as experienced personnel leave the plant or are laid off as plant owner Consumers Energy tries to sell Palisades, and as plant operator Nuclear Management Company has already been told it will not be retained in the future. Instead of protecting the public health and safety and environment against such hazards as the near-drop of such a heavy load into the vulnerable waste pool, NRC helped the company keep the public in the dark about the incident for months! (MM-3) (NN-3)

Response: *The NRC resident inspectors at Palisades identified a finding of very low safety significance and an associated noncited violation when plant personnel performed activities outside the scope of the work package used to inspect the spent fuel pool crane on October 11, 2005. While raising a dry fuel storage (DFS) cask from the spent fuel pool following loading of the cask, the emergency brake on the crane engaged. The engaged emergency brake stopped movement of the load, resulting in suspension of the load partially out of the pool. During troubleshooting activities, the workers exceeded the bounds of the approved work package by manipulating the brake release. This finding represented a violation of the license by performing work contrary to requirements specified by NUREG-0612. Corrective actions include reinforcing site standards for procedural adherence as well as successfully lowering the DFS cask. The licensee entered the item in the Corrective Action program. The safety significance of the finding was dominated by the extremely low probability of the brakes failing. The actions by the worker did not result in any load motion. Both crane brakes remained fully set, either of which could have supported the full load of the cask. While such action by the licensee represented an increase in the risk of load drop from a human performance perspective, the NRC estimates that with both brakes engaged, such action would not have significantly increased the likelihood of a load drop because of the reliability and independence of the brake mechanisms. Nevertheless, the NRC noted the procedure violation, and remains observant of the licensee's activities in repairing, maintaining, and other general crane operations. The licensee complied with requirements for reporting the event to the NRC. The NRC documented the event in the next inspection report, which was issued in January 2006. At the time of the event, public interest was not anticipated. The event was not discussed at the November hearing because it is outside the scope of license renewal.*

The comments are outside the scope of the license renewal review as set forth in 10 CFR Part 51 and Part 54; therefore, they will not be evaluated further.

Dry Cask Storage, Waste Confidence Rule, Spent Fuel

Comment: What I'd like to address in regards to this proceeding today is radioactive waste, speak of the devil, and reactor accidents. The NRC says in its Nuclear Waste Confidence decision that a repository for commercial irradiated fuel will open by 2025. And it's appropriate to bring this up because the Bush Administration yesterday introduced a bill to get rid of any remaining impediments to opening Yucca Mountain. That means public health protections and safety regulations, that kind of thing. Just get rid of those. But the problem is that Yucca's in complete disarray. The last date DOE gave for its opening is 2012. They won't give dates anymore. They won't give cost estimates any more. It used to be $60 billion, but they won't give that kind of prediction. So the State of Nevada's challenging this NRC Waste Confidence decision in Federal court. So how NRC can dismiss this issue at Palisades is just really beyond me, especially given the irony that Palisades license is up in 2011, and that's the very year that Yucca will be full. Will have reached its legal limit long before it opens because there will be

that much commercial waste in the country, 63,000 tons of it. Quite a bit of that at Palisades, its fair share. (A-5)

Comment: So from 2011 to 2031 all waste made at Palisades would be excess to Yucca's capacity. So it would continue to sit at Palisades with nowhere to go, unless a second repository's opened, this time in the east. So would that be in Michigan or Wisconsin perhaps? (A-6)

Comment: So it needs to be pointed out that Palisades' current dry cask storage pads are in violation of NRC regulations. We raised this during the NRC licensing proceeding on this extension and were rejected. But our expert witness on this matter is none other than Dr. Ross Landsman from NRC region three, whose job it was to inspect those pads and the casks on them. And he warned NRC since 1993 that the cask close to the lake, the pad close to the lake is in violation of safety regulations, specifically earthquake regulations. If there's an earthquake, the -- could open up, the lake could pour in, and one of those casks or more than one, could end up in the lake under water. And what could that mean? If water infiltrates the cask there's enough fissile material inside to sustain a nuclear chain reaction. So we could have a nuclear reaction in Lake Michigan. (A-7)

Comment: In another scenario, the sand could open up in an earthquake and casks could be buried under the sand. Overheating could occur. The cask could be damaged. Radioactivity could escape. And it would be a matter of time before it hit the lake. NRC now says in another Orwellian twist that Dr. Landsman's allegations against the newer pad built in 2004, also that it violates earthquake regulations are under review. Those allegations are under review. They have been for years. The incredible thing is that while under review, the storage pad is used for storing waste. More and more waste as time goes on. The cask dangle that happened last October, was a part of that campaign to move dry casks to that newer pad, seven of them. (A-8)

Comment: So we've got two pads at Palisades, both in violation of NRC's safety regulations, and just yesterday we filed an emergency petition to the NRC to enforce its own regulations and stop storing waste on those pads. So the question is, where is Palisades going to store 20 more years worth of waste? (A-9)

Comment: A cut rate move Consumer's Energy Company took when their fuel pool was filled to maximum capacity. Well passed its original design capacity threatening a shut down of the plant. Breaking another promise made when the plant was first built, that no highly contaminated radioactive materials would be on the plant site outside of its high level containment structure. For purposes other than refueling and eventual removal of spent fuel assemblies to a national repository. (B-2) (TT-2)

Comment: What my real concern here is the fact that the GEIS report does not take into consideration of dry cask storage or other highly radioactive contaminated things such as the former steam generators on site. Many would argue the Palisades reservation is already a defacto high level nuclear waste dump. Which to their, our Palisades Conversion Group and my viewing of this issue, a large impact on this fragile lake shore environment. (B-8) (O-3) (TT-8)

Comment: And yes, dry cask storage casks piling up on site. I'm sure we'll all hear about Yucca Mountain or the Goshutes, Skull Valley Indian Reservation taking all of this off our hands for the umpteenth time in the last 20 years. There are now over 20 to 30 dry casks on site. Will anyone here give us an exact number? Or are you going to just dodge the question again, insisting it's a Federal issue, none of this re-licensing businesses concern. This is a local community concern for we will have to live with and care take all of this waste for generations to come. In '93 we were told these experimental cut waste storage casks would be gone in 1998, time and time again by Mark Savage the plant's spokesperson. Now we're told by the NRC, they're licensed to store – Well you know, you literally could go on for years because this thing has and it keeps piling up a good record for anybody that really takes a look at it. (B-11) (O-6) (TT-11)

Comment: Mark Savage if he was still here can well attest that I've been a gadfly at Palisades for 20 years now. And, thank you, I don't plan to be for another 20. It astounds me that this proceeding can go on like a runaway train in light of the fact that the industry has been allowed to run for 50 years with no high level waste facility, guaranteed or otherwise. Different things about Yucca Mountain are interesting in that they have gone on and approved almost everything that the opponents have suggested, seismic, water leaking into the -- underneath it, and other things. And then most recently, we hear that the original loading of it, if it were carried out would cause overheating and make --, if they were to use it, to have that capacity. And if it had opened 10 years ago when it was supposed to, that capacity wouldn't have taken care of what waste we had at that point anyway. So now it's, maybe a quarter of what we have, if they were to use it. And if they don't use it and the Indian Reservation is brought up as an alternative, it's, it will be interesting to see how the EIS has arranged for that. Maybe there's an -- under it like the Mississippi River for all we know. That sure would be a mess. (L-1)

Comment: On April 4th the Squaw Valley Reservation will be approved for above ground storage but with Yucca Mountain's inability to take this slated cask off the Goshute's hands, there will not be move in either nuclear waste storage site for all the waste piling up at Palisades now much less that all the additional waste produced during the 20 year relicensing period. All for a little electricity now. Decades perhaps centuries of radioactive waste for the local citizenry to look at. (O-7) (TT-12)

Comment: Have you factored into your considerations the impact of an earthquake. And the reason I ask that is that, well, we don't have earthquakes here really. The largest earthquake in the continental United States occurred in the Midwest in the early 19th century. That could happen again. Have you taken that into consideration–in your computations. And that's in regards to both the reactor as well as those waste storage containers that are sitting there on the shore of Lake Michigan. (S-2)

Comment: I would like a quick question as to what sort of seismic event did you assume in this calculation. In other words on a Richter scale. And second why wouldn't you include the waste or the spent rod storage in this calculation because I don't think we can count on, on Yucca Mountain coming online because as I understand it there have been some conflicting information that's been presented on the Yucca Mountain situation and that might not be approved for many years. Well, I guess I don't understand how you can say it's 15,000 years for this part of the Midwest because new information suggests that it's a rebound of the land – (S-3)

Comment: There was a gentleman asked a really profound question why the dry cask things weren't affiliated or weren't in with the seismic analogy. And to me that seems more important than the deteriorating radioactive, see and I don't even know the terminology, so forgive me. (Y-2)

Comment: The waste generated, dry casking it there and not having a home for it worries me. 20 years from now what's that going to be like or where are we going to be with, how much more waste will they produce in those 20 years. And right now from what I've read and again I'm naive so I'm here to be educated but we don't have a home or a place to put this waste that's one of the most toxic substances on the plant from what I understand. It's sitting 150 yards from our precious resource the lake. Why that doesn't trouble more people I don't know. (Y-4)

Comment: I think that Palisades was burgeoning nuclear waste which is a problem, unstable geological strata, the singing sands, the shifting sands, freezing and thawing conditions on the casks. Cask number four which is surrounded by other casks has bad welds, could crack. (DD-8)

Comment: Palisades' high-level radioactive waste storage facility is defective and risky, situated on the Lake Michigan shoreline. There are numerous incidents dating from the installation of the waste storage facility to the present that demonstrate the risks associated with the dry cask storage containers, as well as their problematic placement on a high risk erosion stretch of the shoreline, on pads not adequately designed to be stable during events such as earthquakes. (GG-6)

Comment: Lake Michigan dunes constitute a series of dynamic environmental settings, from bare beach shorelines, to "growing dunes" or lightly vegetated foredunes, fragile interdunal wetlands and ponds, and finally to mature, forested "oldest" dune hills. Vegetation -- grasses, bushes, and trees -- is an essential key to the stability of the dunes. When dune vegetation is disturbed by footpaths or other activities, high winds and storms can widen a small stretch of bare sand into an increasingly wide swath or "blowout." Blowouts, areas of blowing and unstable sands, in dunes in the vicinity of Palisades' dry cask storage system could threaten the integrity of the dry cask storage waste system, by clogging vents in the casks, and causing the wastes to overheat, which could lead to an explosion. Left unattended, large blowouts in the dunes surrounding the casks could possibly decrease the stability of the pads on which the casks are situated. This issue must be addressed in the EIS. Palisades must, at minimum, be required to monitor the dunes for potential blowouts and ensure that the dunes are consistently vegetated and stable. (GG-20)

Comment: Michigan has had a lengthy history of earthquake activity, dating back to the first several historically recorded quakes, in 1811 and 1812, originating from the New Madrid fault, centered in New Madrid, Missouri. These quakes registered at 8.0 or higher on the Richter scale. Additional quakes were felt in a variety of locations throughout Michigan in the later 1800s. The largest earthquake experienced in Michigan was in 1947. With a magnitude of 4.6, it was felt throughout southern Michigan, affecting an area of 50,000 square miles. A quake originating in south central Illinois in 1968 extended approximately 580,000 square miles and was felt throughout southern Michigan. The last earthquake in Michigan registered 3.5 and was centered in Lansing in 1994.

The New Madrid zone has produced the country's largest earthquake and is considered the country's most seismically active region east of the Rocky Mountains. The United States Geological Survey (USGS) has given the New Madrid fault a 25 to 40% probability of having an earthquake of 6.0 or greater in the next 50 years (USGS Fact Sheet FS-131-02). Movement has already been noted and described in a June 2005 *Nature* article describing the results of a University of Memphis study that detected a half-inch shift in the fault from 2000 to 2005.

The potential for earthquake activity to damage Palisades' outdoor dry cask storage pads, upon which the casks have been placed, warrants rigorous consideration, which unfortunately, is not in evidence in the draft EIS. Concerns regarding the impacts of an earthquake that might cause disruptive movement to the waste storage facilities at Palisades surfaced as early as 1994, from within the NRC. Dr. Ross Landsman, Nuclear Safety Engineer and Palisades Dry Cask Storage Inspector, questioned the adequacy of requirements associated with earthquake activity for Palisades' dry cask storage facility in a letter to the chairman of the NRC. In his letter, Dr. Landsman voiced his concerns, "Actually, it's the consequences that might occur from an earthquake that I'm concerned about. The casks can either fall into Lake Michigan or be buried in the loose sand because of liquefaction [soil taking on liquid characteristics]. This event might

be in the public's mind in view of what just happened in Southern California. It is apparent to me that NMSS [NRC's Office of Nuclear Material Safety and Safeguards] doesn't realize the catastrophic consequences of their continued reliance on their current ideology."

In a September 15, 2005 affidavit, Dr. Landsman further describes his concerns regarding the ability of the storage pads to withstand movement due to earthquakes, asserting that both the older pad nearer Lake Michigan and the newer one further inland, are in violation of NRC earthquake regulations, 10 CFR ' 72.212(b)(2)(i)(B), which require that: "Cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion. . . ."
Dr. Landsman noted that Palisades' analysts and engineers apparently failed to acknowledge the differences in elevation between the plant and pad sites in their design of the storage facility. This led to mistakes in the calculations made to determine the potential movement of the pads due to an earthquake. Dr. Landsman noted the violation after inspecting the new storage pad in 2004 and warned that it was not safe, but his concerns were not addressed and casks have nonetheless been allowed by NRC to be placed on the pad right up to the present.

The implications of damage to the casks from an earthquake are significant. Wastes in casks covered in or buried by sand, could overheat, causing severe damage to the irradiated nuclear fuel assemblies and making future storage, handling, transport, and management more dangerous. Overheated radioactive wastes could damage the dry storage casks, leading to leakage of radioactivity into the environment. Emergency responders could be at risk from any damage to the radiation shielding measures on the casks.

The dangers of nuclear waste cask submersion underwater are two fold. First, radioactivity could leak from the cask into the water. Leakage of even a fraction of a cask's contents into Lake Michigan could endanger the source of drinking water for ten million people. Second, enough fissile uranium-235 and plutonium is present in the high-level radioactive waste inside the casks, that water, with its neutron moderating properties, could actually cause a nuclear chain reaction to take place within the cask. This would complicate emergency responses, as potentially fatal radiation doses could be emitted from within the cask.

There is undoubtedly an elevated probability of a strong earthquake originating from the New Madrid fault in the next 50 years, and the potential for it to extend to southwest Michigan. Because of that, it is imperative that the question of the safety of the concrete pads and the 29 storage casks of high-level wastes be resolved to the satisfaction of citizens of the region. (GG-21)

Comment: The NRC also concludes that any impacts from high-level waste and irradiated fuel disposal from a license extension (even acknowledging the uncertainties about the proposed Yucca Mountain repository) 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. (GG-26)

Comment: The NRC has placed the issue of waste generation and storage outside the scope of the EIS for extending the license for Palisades. We strongly disagree.

The Palisades nuclear power plant has generated, on average, 14.5 tons [U.S. Dept. of Energy's Feb. 2002 Final EIS for Yucca Mountain. Appendix A. Tables A-7 and A-8] per year of high-level radioactive waste. The Nuclear Waste Policy Act was amended in 1982 to allow the NRC to approve interim storage of high-level radioactive waste in dry cask storage facilities in a "generic licensing" without studies specific to each plant site or Environmental Impact Statements. In 1993, several tons of wastes that were accumulating in the Palisade plant's overfull irradiated fuel pools were moved into massive concrete and steel storage casks on concrete pads on the plant site. (GG-32)

Comment: Inexplicably, the extremely dangerous radioactive wastes from Palisades, that will remain dangerous for tens to hundreds of thousands of years, were deliberately placed within a high-risk erosion zone, which is highly unstable, dynamic and risky. Currently, around 20 of a total of 29 casks, weighing 132 tons each, are situated approximately 150 yards from Lake Michigan, sitting atop loose sand dozens of feet thick. Thus, the casks, and the concrete pad upon which they sit, are not anchored to bedrock. This stretch of Lake Michigan's southwest shoreline is known to have the ability to recede in an exceptionally short time frame. The high-risk erosion zone requires 30-year construction setbacks that range from 55 ft. to 140 ft. and 60-year setbacks that range from 115 ft. to 260 ft. (GG-33)

Comment: One of the waste storage cask systems at Palisades, the "VSC-24," (Ventilated storage cask containing 24 pressurized water reactor irradiated nuclear fuel assemblies) utilizes passive ventilation to keep the waste at the appropriate temperature. The vents on this type of cask need regular cleaning so they will not clog from blowing dune sand, debris, or snow. This cask is also not considered transportable, like some casks, and as such, wastes contained within them will need to be unloaded and transferred into shipping containers, when or if transport occurs. But even though Consumers Energy and the NRC testified in Federal court that the casks could be safely unloaded, there have been numerous problems. When weld defects were detected in the fourth VSC-24 cask to be loaded in 1994, for example, it was found that there were critical questions about how to handle the procedure. This defective cask has yet to be unloaded, twelve years later.

To further complicate the unloading problems of Palisades' casks, the configuration of the dry casks currently stored on the older pad nearer Lake Michigan is such that those casks furthest back cannot be moved or unloaded until all other casks in front of them have been moved out of

the way first. Thus, casks that cannot be unloaded on the shore side of the pads will effectively halt unloading of the casks behind them.

There have been other accidents and incidents with the VSC-24 system. While a VSC-24 cask was being welded shut at the Wisconsin Point Beach nuclear power plant in 1996, a spark from the welding caused a hydrogen gas explosion that tilted the lid of the cask (3 tons of metal) several inches ajar; this incident occurred on the edge of the waste storage pool, threatening to damage the pool and unleash a potentially catastrophic radiological accident. Additional weld defects have been detected in other casks at Palisades and at other plant sites.

On February 6, 1997, Mary P. Sinclair Ph.D. co-chair of Don't Waste Michigan, wrote to Dr. Shirley Jackson, Chair U.S. Nuclear Regulatory Commission and reviewed this history in great detail with documentation and references for each point made. In her letter to Dr. Jackson, Dr. Sinclair wrote the following:

" . . . Attorney General Frank Kelley petitioned for an injunction in May 1993, against the loading of these casks in the Western Michigan Federal Court at Grand Rapids. (Case No. 4:93 CV 67). Consumers Power Co.'s response to the Court was that the company would unload the casks and place the nuclear waste back in the spent fuel pool if the Court should rule against them and, therefore, an injunction to prevent loading was unnecessary. A supporting position for the utility's action was filed by Charles Haughney of the NRC, in which he assured Judge Robert Holmes Bell that Consumers was able to do this by simply reversing the process of loading, if the Court so ordered. This demonstrates that, not only did Consumers Power Co. mislead the Judge, perhaps out of ignorance, about Consumers' ability to unload these casks, but more importantly, Charles Haughney of the NRC pledged the Agency's credibility in support of this position. His statement is signed, "Pursuant to 28 U.S.C. sec. 1746, I declare under penalty of perjury that the foregoing is true and correct." (Executed and signed on May 5, 1993). Judge Bell, of course, could hardly grant an injunction under those circumstances. This is one of many instances in which the judgment of the staff was flagrantly in error, and helped to compound the problems that have later developed. [pp. 3-4, Requests that Commission review 2.206 petition filed on 950919 & amended on 960930 by Lake Michigan Federation & Don't Waste Michigan, Sinclair MP. Accession Number: 9704090248, Docket Number: 05000255,07200007, Microform Address: 92410:204-92410:211] A hard copy of this letter is being provided by Don't Waste Michigan to be entered in its entirety into the record as part of comments being submitted on this draft EIS. There are additional comments in the letter, which also pertain to this EIS process.

The Wisconsin explosion led to a three year hiatus in the loading of VSC-24 casks nationwide, in order to improve safety procedures. Palisades was the first plant in the country to begin loading VSC-24s again, in June, 1999. However, mistakes were made yet again. A welding crew accidentally ignited flammable hydrogen gas being vented off a loaded VSC-24. But it failed to notify the next welding crew coming on shift to replace them. The new crew also

ignited the leaking hydrogen gas, representing a breakdown of safety protocols, risking a repeat of the Wisconsin explosion.

During the June, 1999 dry cask loading campaign, Palisades also loaded irradiated fuel that had not yet thermally cooled and radioactively decayed in the underwater storage pool for the required minimum of five years. This represented a violation of the technical specifications for the casks, and thus NRC safety regulations. Also in June 1999, a fire at Palisades in an office trailer storing paper records on the dry cask storage installation destroyed records on the most recent, and earlier, accidents. (GG-34)

Comment: In 1982, with the passage of the Nuclear Waste Policy Act, the U.S. Department of Energy (DOE) was given the responsibility for finding a permanent site to build and operate a repository for all of the wastes accumulating at the reactors across the country. Original plans were for the repository to begin accepting irradiated nuclear fuel in 1998, but it has been pushed back until 2020, according to the most-recent predictions made by Energy Secretary Samuel Bodman. In 2002, Congress voted to allow DOE to apply for a license from NRC to construct and operate a repository at Yucca Mountain in Nevada. The opening of the repository is uncertain: the State of Nevada has actively opposed the plan, and raised legitimate questions about the suitability of the site; DOE does not have full funding for construction and operations, and recently, a Federal appeals court found that the impact of the project must be evaluated for longer than the 10,000 years currently considered. Even if the Yucca site were to open in 2020, DOE has projected in its 2002 Final EIS for Yucca that it would take 24 to 38 years to transport wastes to Yucca from reactors across the U.S., including Palisades. Thus, even if Yucca opened in 2020, it would take until 2044 or even until 2058 for the wastes generated before 2010 at Palisades to be moved to Yucca Mountain, Nevada. Because of this, existing wastes from Palisades are likely to remain on the Lake Michigan shoreline indefinitely. (GG-36)
Comment: Yucca Mountain is limited by law to store 70,000 metric tons of nuclear waste. Only 90%, or 63,000 metric tons, of that can come from commercial nuclear reactors. 63,000 metric tons is approximately the amount of nuclear waste that will be stored on-site at reactors around the country by 2010. A 2004 analysis by the Environmental Working Group found that the 26 reactors at nuclear power plants re-licensed between 2000 and 2004 will produce an additional 9,000 metric tons of high-level nuclear waste over the 20-year period of their license extensions. Eighteen more reactors at nine power plants with license extensions pending would add another 6,600 metric tons of waste, for a total of 15,600 additional metric tons. Wastes produced at Palisades for 20 additional years-- 290 additional tons of irradiated nuclear fuel --will likely be stored indefinitely in the same manner as the other Palisades wastes that have been produced to date, resulting in a massive assemblage of concrete and steel silos extending along the high risk erosion zone on Lake Michigan, as well as a packed storage pool within the Palisades plant. (GG-37)

Comment: The DOE has estimated that transporting the waste from the plants to Yucca Mountain would require more than 53,000 truck shipments to Yucca over 24 years or about 2,200 per year. If rail is the primary means of transporting the waste, and DOE has stated that it prefers rail, the proposed action would require more than 10,700 cross-country shipments over 24 years, or about 450 per year (Halstead 2002). Re-licensing to date has added about 5,700 more truck shipments, or 1,050 rail shipments to that total.

The Department of Energy declared in April 2004 that rail shipment to Nevada is the preferred mode of transportation for high-level nuclear waste. Barge shipments are being considered under this option because 17 nuclear power plants, including Palisades, have no rail access, yet could connect to rail lines via barges.

For Palisades, DOE has proposed barging up to 125 giant rail-sized containers of high-level radioactive waste from Palisades to the Port of Muskegon, up the Lake Michigan shoreline. DOE's estimate of 125 shipments may very well be an underestimate, in that DOE assumed Palisades would only get a 10-year license extension, while NRC's practice to date has been to approve every request for a 20-year license extension. Thus, an additional 10 years worth of waste generation would mean that many more barge shipments between Palisades and Muskegon.

The barging of 125 or more shipments of high-level radioactive waste is very risky. Any submersion of the casks in water, could stimulate the fissile uranium-235 and plutonium, both present in the high-level waste, to cause a nuclear chain reaction. The slightest leakage of even a small amount of this waste could not only threaten Lake Michigan as a source of drinking water for ten million people, but also cause a host of other irrevocable impacts on the lake's fish, wildlife, people, and economy. (HH-38)

Comment: Barging of high-level radioactive wastes in Lake Michigan must be removed as a transportation option. The barging of 125 or more shipments of high-level radioactive waste on Lake Michigan is simply too risky. Any submersion of the casks containing the wastes in water, could stimulate the fissile uranium-235 and plutonium, both present in the high-level waste, to cause a nuclear chain reaction. The slightest leakage of even a small amount of this waste could not only threaten Lake Michigan as a source of drinking water for ten million people, but also cause a host of other irrevocable impacts on the lake's fish, wildlife, people, and economy. (GG-57)

Comment: The safety of the concrete pads and the storage casks of high-level wastes must be resolved to the satisfaction of citizens of the region. The potential for earthquake activity to damage Palisades' outdoor dry cask storage pads, upon which the casks have been placed, warrants rigorous consideration, which unfortunately, is not in evidence in the EIS. Further, blowouts, areas of blowing and unstable sands, in dunes in the vicinity of Palisades' dry cask storage system could threaten the integrity of the dry cask storage waste system, by clogging

vents in the casks, and causing the wastes to overheat, which could lead to an explosion. Palisades must be required to monitor the dunes for potential blowouts and ensure that the dunes are consistently vegetated and stable. (GG-61)

Comment: The spent fuel during the renewal term, while in on-site storage, would have discharges of radioactive elements and neutrons that by collision with the surrounding natural molecules could generate additional radioactive elements. These discharges should be added to the atmospheric emissions and ground discharges of the Plant to verify overall compliance with the EPA and NRC regulations. (JJ-3)

Comment: License renewal should not be granted to the Palisades Nuclear Power Plant, because (1) both of the dry cask storage pads at Palisades are in violation of Nuclear Regulatory Commission's earthquake regulations. (KK-2)

Comment: Potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion are of great concern, especially considering the geological nature of sand increasing the likelihood of sand avalanches (Landsman 2005). The violation of the Nuclear Regulatory Commission's own standards in storage of radioactive material must be followed. (KK-6)

Comment: The NRC says in its "Nuclear Waste Confidence Decision" that a repository, or permanent dump, for commercial irradiated nuclear fuel will open by 2025. But the only site under consideration for such a dump - Yucca Mountain, Nevada - is in remarkable disarray. Due to the site's scientifically unsuitable geology, as well as legal, political, and popular resistance and skyrocketing costs, the dump's opening has been delayed from 1998 to 2010, then 2012. Now the U.S. Dept. of Energy won't even hazard a guess as to when the dump will open, if ever, and at what cost. In addition, the State of Nevada, adamantly opposed to becoming the country's atomic sacrifice area, has filed Federal lawsuits against the proposal at every turn. One of them challenges NRC's "Waste Confidence Decision" directly. NRC is supposed to be the objective judge of whether or not Yucca Mountain should be opened, but if NRC sticks to its arbitrary 2025 deadline, its bias in favor of approving the dump at Yucca Mountain, despite its defects and dangers, is obvious. Even if Yucca does open someday, it could only accommodate commercial wastes generated before 2011, due to its capacity limit under the Nuclear Waste Policy Act for only 63,000 tons of commercial irradiated fuel. That much will have been generated in the U.S. by the end of 2010. Thus, any waste generated at Palisades during its license extension from 2011 to 2031 could not legally go to Yucca Mountain, even if the ever-more-doubtful dump opens.How can the NRC approve 20 more years of waste generation and storage on the Lake Michigan shoreline when there is nowhere for those wastes to go? How can NRC declare such an essential issue to environmental and public health and safety to be "out of scope" during this environmental impact proceeding? The

ongoing generation of nuclear waste at Palisades must be stopped as soon as possible. (MM-1) (NN-1)

Comment: Palisades' dry cask storage installations - outdoor "parking lots" for gigantic 150 ton concrete and steel silos filled with high-level radioactive waste - are in violation of NRC's own earthquake safety regulations. Dr. Ross Landsman, now retired NRC dry cask storage inspector for the Midwest region, has warned for well over a decade that the 13 year old concrete cask pad just 150 yards from Lake Michigan could fail during an earthquake, resulting in casks being buried under sand or being dumped into Lake Michigan. Burial could result in the irradiated fuel overheating, damaging the containers, and releasing radioactivity. Underwater submersion could result in a nuclear chain reaction in the fissile materials still present in the waste. Even the two year old pad further inland is in violation of NRC earthquake regulations. Despite claiming these alleged violations are "under review," NRC has allowed Palisades to continue loading casks onto these unsafe pads. How can NRC allow Palisades to generate 20 more years' worth of waste, when even its current storage facilities violate NRC safety regulations? (see http://www.nirs.org/reactorwatchllicensinglpalisades.htm at Sept. 15, 2005 and at Feb. 17, 1994 for more information) (MM-2) (NN-2)

Comment: I am also concerned about the safe disposal of the spent fuel rods. Over the next 25 years, more rods will be used and where will they be stored? Is there a safe place to store this nuclear waste or will they be stock piled here along our precious resource Lake Michigan? (QQ-3)

Response: *Onsite storage of spent nuclear fuel is a Category 1 issue. The safety and environmental effects of long-term storage of spent fuel onsite has been evaluated by the NRC, and, as set forth in the Waste Confidence Rule, the NRC generically determined that such storage can be accomplished without significant environmental impact. In the Waste Confidence Rule, the Commission determined that spent fuel can be stored onsite for at least 30 years beyond the licensed operating life, which may include the term of a renewed license. The NRC has a certification process for casks, regulated by 10 CFR Part 72. Such wastes are under continual licensing control. Siting of a waste repository is a separate regulatory action involving DOE. A geologic repository is not expected to be ready before 2010 (GEIS). In the interim, onsite spent fuel storage in pools and in dry cask storage facilities continues in accordance with NRC regulations. Consequently, the comments do not provide new and significant information and will not result in modification of the SEIS text.*

Aging Management

Comment: I have seen construction of and then finished [nuclear] plants during tours. The plants then new and impressive, then again many years later aging, much obsolete, often highly contaminated equipment, malfunctioning devices such as the reactor containment hatch door inoperable for some time while I was de-conning when Consumers Energy operated the plant.

Things get old, dilapidated with time especially when they are neglected. I'm sorry, my glasses, I have to back off to read here. Things get old, dilapidated with time, especially when they are neglected, worn out, under the influence of radiation, outdated or used up such as the Palisades plant's fuel pool, now double racked. Steam generators replaced highly contaminated previous units within their own mortuary on the plant site. Along with approximately 30 V.S.C. 24 and 34 dry storage casks in use for above ground spent fuel assembly storage, also on site. (B-1) (TT-1)

Comment: After 38 years of operation, Palisades Nuclear Power Plant and its reservation is showing its age and effects of embrittlement. Its pressure reactor vessel being protected with old, many cycled fuel assemblies, a case in point. Years now, no vessel replacement or further shielding in sight. Or 2007 says the NRC, 2011 say others. 2014 say Palisades' lawyers. This should have been replaced ten years ago. As P.R. spokesman Mark Savage told the local press back in 1993 when the problem surfaced during an interview with the South Haven Daily Tribune. Once they finally got to admit, there was a metal condition called embrittlement affecting the reactor. (B-3) (TT-3)

Comment: More to the point potential in fact should things not go as designed or planned or promised which over the last 38 years time and time again have been broken. With an additional 20 years worth of above ground dry storage cask along with other contaminated equipment which is sure to be replaced should this plant be pushed so far past its original design capacity which it already has by years now. Counter to the GEIS's insistence that no changes to the plant need to take place in the additional 20 years. (B-9) (O-4) (TT-9)

Comment: Isn't the reactor head soon to be replaced? In July perhaps? The pressure reactor vessel long in question operated in such a patchwork method since embrittlement was discovered more than ten years ago. How long before it's replaced? Annealiated as once promised in court or a neutron thermal shield installed? Or the reactor replaced? (B-10) (O-5) (TT-10)

Comment: And it was only built for a certain amount of time. The engineers that designed that place built it, they thought it would last that long, and the licensing is, is beyond that point. I believe that so far these band-aids have, people have been very lucky that we haven't had accidents with stuck valves, leaking coolant, all accidents that have happened at Palisades over and over again, they've always been able to fix it in time. (C-9)

Comment: My second concern is regarding the equipment refurbishing, refurbishing of our equipment. I have low opinions. A plant with 40 years is ready for a good refurbishing. You can tell that, you have done a wonderful job, but I don't believe it. And your report, the NRC is saying that they considered, I don't know, I don't think, this is requested by the licensee, but the

NRC I don't know really, what he's, he's going to do, but it doesn't look like he's going to request. (D-5)

Comment: Now the other thing is the issue of embrittlement, and the question was have you considered an accident based on the fact that Palisades is quite embrittled. When Palisades was licensed 40 years ago, the issue of embrittlement I don't think was considered because you didn't really know that that's what was happening or would happen. So in my understanding, this is, if there is an accident, the result, as a result of embrittlement, it would be a beyond design accident, if that's the correct terminology. So that's an accident that you're not considering, but that's new information since this plant was re-licensed 40 years ago. So I think you need to look at what would happen if there is an accident as a result of embrittlement, since you didn't know that when you licensed this plant 40 years ago. (G-2)

Comment: It's my recollection that Big Rock went, went into service about 1959 or 60 about 11 years before Palisades. And it's my recollection that Big Rock has not been running really as a power plant for some number of years here now. And it's got a lot of trouble. So that means that if you go ahead and, and renew this you'll be, this reactor will be far exceeding the line time of the Big Rock Plant in terms of production. (R-1)

Comment: The biggest issue I've heard about and this is not disputed, this is fact. Is that it is embrittled. In a layman's terms I'll try to explain to you what embrittlement is. When a nuclear reactor has, of the, the design at Palisades is, had so many reactions through the years it gets like little finger holes in it, lots of little holes from all this stress and these reactions. Cooling, heating, cooling heating and the near misses they've had. And after you get this, these holes in the, in the design structure it becomes embrittled which means that if there was a stuck value, broken coolant pipes, lots of things could happen to cause a meltdown, okay, and then it starts heating up. And they cool, they had to cool it real fast. So they flood it with water. If the plant is embrittled as Palisades is it's like taking a really hot glass coffee pot and immersing it in cold water. Bang. That's what accurate embrittlement is and that's what I've hear would, would be the most probable thing that would happen to cause a meltdown. (DD-10)

Comment: I feel it is in the best interests of the public for safety issues, to close Palisades down and certainly NOT RENEW THE LICENSE with that aging reactor and all the surrounding safety issues as a result. (FF-2)

Comment: Aging and extended operation increase the risk of accidents at Palisades. The longer Palisades operates, the more embrittled its reactor pressure vessel becomes, increasing the risk for Pressurized Thermal Shock, a condition caused by any number of system malfunctions which can result in a severe, sudden overcooling of the reactor pressure vessel. This can lead to a loss-of-coolant accident, meltdown, and catastrophic release of radiation to the entire Great Lakes basin. (GG-9)

Comment: A top concern directly related to the re-licensing of Palisades for 20 additional years, is the aging of the plant, in particular *embrittlement*, or the gradual weakening of the reactor pressure vessel (RPV) from decades of bombardment by neutrons emitted by the nuclear chain reaction in the core. It is generally acknowledged that the reactor pressure vessel at Palisades is one of the most embrittled in the nation. The longer Palisades operates, the more embrittled its RPV becomes, increasing the risk for Pressurized Thermal Shock (PTS), a condition caused by any number of system malfunctions which can result in a severe, sudden overcooling of the reactor pressure vessel. This, combined with the intense pressurization in a pressurized water reactor, can stress the RPV such that its walls could crack or rupture, leading to a loss-of-coolant accident, meltdown, and catastrophic release of radiation to the entire Great Lakes basin.

Age-related failure of Palisades' systems could initiate the sequence of events that leads to PTS. Examples of aging systems at Palisades are evident in this short list of recent incidents:

1. Alert Declared Due to Loss of Shutdown Cooling (Event # 39699 March 25, 2003)
2. Failure of the Control Rod Drive Mechanism (see PNO-III-04-010 August 11, 2004)
3. Reactor Manually Tripped Due to Fire in 2B Condensate Pump (Event# 41002 August 31, 2004)
4. Relief Requests for Reactor Vessel Head Penetration problems (NMC Request 10/4/04)
5. Reactor Vessel Head Nozzle Cracking - Through Wall Cracks (Degraded Condition 10/17/2004)
6. Manual Reactor Trip/Main Condenser Vacuum (Event # 41319)
7. Emergency Declared on Primary Coolant System Integrity (Event # 41681)
8. Control Rod Stuck in Reactor Core (Event #42569 May 11, 2006)

The embrittlement at Palisades, the unresolved risks of PTS, and the ever-increasing likelihood of the failure of the RPV as Palisades ages warrant special environmental considerations. This type of accident is considered one that goes beyond the design of the reactor. NRC has not, however, included the issue in the EIS nor incorporated it in "Beyond Maximum Credible Accident" scenarios for Palisades as a potential accident. Further, NMC in its Environmental Report, has declined to undertake major refurbishment for Palisades' license renewal, despite Consumers Energy's earlier pledge to "anneal" (super-heat) the reactor pressure vessel. This super-heating theoretically can bring back ductility or flexibility to the metal, thus reducing potential for PTS. Annealing has never been performed in the U.S., however, and thus raises concerns itself as an experimental procedure.

Please include for the record the Adobe PDF document entitled "Palisades Nuclear Plant Yearly Capacity Factors" & "Palisades Plant - Record of Transients or Operational Cycles" for Occurrence #1 dated 1/11/1972 through Occurrence # 126 dated 1/9/2005. This is a record

which has major implications for embrittlement and the Reactor Pressure Vessel at Palisades. A hard copy will be sent. Please enter it into the record.

Age-related deterioration also increases the likelihood of unintentional leaks, as plant systems, structures and components wear out and fail. Palisades' age-related degradation means increasing amounts of radioactivity will be "routinely" released over time. Plans for addressing embrittlement and other aging issues at Palisades are not provided in NMC's Environmental Report or in the EIS. Any discussion of 20 additional years of operation at Palisades necessitates a specific plan for addressing embrittlement and aging issues.

The most recent NRC report on a potential accident at Palisades, done in 1982, (Calculation of Reactor Accident Consequences or CRAC- 2), predicted that a meltdown and large-scale radiation release from the Palisades reactor would cause 1,000 fatalities and 7,000 injuries in just the first year, 10,000 cancer deaths over time, $52.6 billion in property damage (based on 1980 census, expressed in 1980 dollars, thus significantly underestimating current and future impacts due to population growth and inflation; adjusting for inflation, property damage could exceed $100 billion expressed in year 2005 dollars). The above CRAC - 2 report did not take into account a "Beyond Maximum Credible Accident" scenario. We request the EIS provide assessment of the consequences of a "Beyond Maximum Credible Accident" as Palisades' embrittlement status increases the likelihood of such an accident. (GG-40)

Comment: NRC must require Palisades to develop and implement a specific plan for addressing embrittlement and aging issues. Plans for addressing embrittlement at Palisades are not provided in by NMC or in the EIS. Any discussion of 20 additional years of operation at Palisades necessitates such a plan to address the aging of plant structures and components. We request the EIS provide assessment of the consequences of a "Beyond Maximum Credible Accident" as Palisades' embrittlement status increases the likelihood of such an accident. (GG-58)

Comment: The fact that in the Application for renewal the Licensee states that no refurbishing will be performed prior to extended term operation is of our outmost concern. We believe that after 40 years of operations, a thorough refurbishing should be mandatory to insure a safe Plant operation during the extended term. (JJ-6)

Comment: Due to deterioration and degradation, old reactors are more likely to experience accidents than younger reactors. At 39 years, Palisades is one of the oldest operating reactors in the U.S., and has been considered a "nuclear lemon" since it began operations in the first place. The risk of a severe accident at this "geriatric" reactor is reason enough to close it down in 2011 at the end of its current license. (MM-4) (NN-4)

Comment: By NRC's own reckoning, Palisades has one of the most embrittled reactor pressure vessels in the U.S. Consumers Energy and Nuclear Management Company admitted

in November, 2005 that in 2014, Palisades will surpass NRC embrittlement criteria. In fact, Palisades has surpassed NRC's limits on embrittlement a number of times - the earliest in 1981, just ten years into operations - only to see NRC weaken its standards, allowing Palisades to continue operating. Embrittlement makes the risks of "pressurized thermal shock" (PTS) too great to keep operating this reactor. During an emergency, PTS could fracture Palisades' reactor pressure vessel like a hot glass under cold water. Since such a fracture is a 'beyond design basis" accident, there is no countermeasure to prevent a melt down. Operating Palisades till 2031 risks a Chernobyl on the Lake Michigan shoreline, a risk that only grows worse with time. (see environmental interveners' contentions and supporting documents at http:/Avww.nirs.org/reactorwatch/icensinglpalisades.htm at 1993, 2004, Aug. 8 and Sept. 16, 2005.) (MM-6) (NN-6)

Comment: The NRC officials avoided detailed answers to questions regarding the safety of the aging reactor. When questioned about renewing the license for an additional 20 years beyond 2011, (exceeding the original lifespan of Palisades of 40 years), the NRC officials once again avoided the issue of safety.

Given the poor track record of safety at Palisades along with present conditions of the reactor—how can we expect Palisades to be a source of safe and efficient power for the next 25 years? (QQ-2)

Response: *The principal safety concerns associated with license renewal are related to the aging of structures, systems, and components important to the continued safe operation of the facility. When the plants were designed, certain assumptions were made about the length of time each plant would be operated. During the safety review for license renewal, the NRC must determine whether aging effects will be adequately managed so the original design assumptions will continue to be valid throughout the period of extended operation, or verify that any aging effects will be adequately managed. For all aspects of operation, there are existing regulatory requirements governing a plant that offer reasonable assurance of adequate protection if its license were renewed. The comments are noted. The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. Safety matters related to aging are outside the scope of this review. An NRC safety review for the license renewal period is conducted separately. The comments provide no new and significant information and will not be evaluated further.*

Allegations Process

Comment: One of the biggest complaints from plant critics is the operators have been less than forthcoming when problems surface. Make excuses, rosy predictions they know will never come to pass. Or lie to anyone listening when the information might or will be perceived as contentious, placing public trust in jeopardy. (B-4) (TT-4)

Comment: Finally, I am in agreement with the Kalamazoo Gazette article, April 2, that "it would be smart of the NRC to provide prompt reporting of even allegedly minor incidents." (HH-2)

Comment: I know someone that worked inside of Palisades. He said he wouldn't work in the Michigan anymore. He works in another State. I won't mention his name. I won't mention what State he works at, although the NRC and other people have tried to find out. He told me that Palisades is the most likely to blow of all the nuclear reactors in the United States. He said it's a well known fact in the nuclear industry. And I said well why, you know, like at DC Cook I know that for ten years they operated with a cooling system that wouldn't function in the case of a melt down. I said are they trying to cover something up at Palisades? He says no, it's just the way they run things. He says they don't report things. He says there's so much that goes on that people don't know about. He says the NRC doesn't know about it, and I don't know what he was talking about. I tried to get more information out of him. He wouldn't talk, but that bothers me. And I think that a lot people are in the dark and I'm one of them. And I come here. I take time out of my life, and like Kevin and other people, we're doing this without any monetary reward. We're using our own gas money which is expensive and everything else, and I hope somehow that something I'm saying makes a difference, you know. That something is going, that somehow that something I say or write or do is going to forestall a big disaster. And I don't know if it, if it means anything at all. I don't know if everything I say is futile, if anybody's listening, if anybody cares. But I know that if it blew, then your little plant that's full of holes, if it blew, that people would understand what I'm talking about because you can't get it back. An acceptable risk, as far as you're dealing with something this big, if you can shut it down, go to natural gas, Consumers Energy is already --, then do it. Why not. (C-10)

Comment: I know a man who worked at Palisades and he's still in the nuclear industry he's got a real high job in the nuclear industry. And he told me that it's well known quote un quote, is what he said it's well know within the nuclear industry that Palisades is the most likely to blow of all the nuclear power plants in the United States at this time. And I asked him well why is that. I said is it, are they covering something up like they did at DC Cook which for ten years they covered up the fact that they had a non functioning coolant system. Or if they had a meltdown they could not have, they could not have stopped the meltdown. And only by the grace of God we have not had a meltdown yet. Well, they covered that up and as people have mentioned the whistle blower got in trouble for that. And now he said no he says Palisades they don't cover things up he says they just don't report it. (DD-5)

Response: *Allegations or safety concerns reported to the NRC are handled under the allegations program as described in NUREG/BR-0240, Rev. 3, "Reporting Safety Concerns to the NRC." The comments are outside the scope of the license renewal environmental review and will not be evaluated further.*

Cost-Benefit Analysis

Comment: A 20-year extension for Palisades will be costly. Ratepayers and (by default) taxpayers are to pay for maintenance of the waste generated by the utilities. The fifty year old Price-Anderson Act requires taxpayers to pay for any major accident or terrorist incident at nuclear power plants over a cap of merely $11 billion paid for by the nuclear utilities and their insurance companies for accidents or terrorist incidents at the plant, a liability that could run into many hundreds of billions of dollars. This liability protection is a unique subsidy provided to the nuclear power industry, at taxpayer expense. (GG-13)

Response: *The Commission determined that an applicant for license renewal need not provide an analysis of the economic costs or ecnomic benefits of the proposed or alternative actions. The comment is outside the scope of the license renewal environmental review as set forth in 10 CFR Part 51 and Part 54 and will not be evaluated further.*

Energy Policy

Comment: And forgive me for not having the information with me, the facts and figures at the moment, but the information I have been reading indicates that nuclear industry has received more government subsidies during its lifetime than any other industry. It's well over 50 percent of all of the tax incentives, breaks, guaranteed loans, supplementing catastrophic insurance for the industry etcetera. (AA-1)

Comment: The amount of money that the taxpayers are paying out of their tax, taxes to the industry on top of these high electric rates that they're having to pay monthly rates is absolutely extraordinary. If people knew that and if that was, if that was analyzed down to a level and given to them so they could see it they would be absolutely appalled. (AA-2)

Comment: And the renewable, the percentage of, of money going to renewal is something like 11 percent of all the money and the nuclear industry gets well, well over 50 percent as I say. (AA-3)

Comment: Now in the, and the media has, you know, made some, had been reporting a large subsidy and tax incentives to the oil industry and everybody is appalled over that. The nuclear industry has them by a mile. (AA-4)

Comment: Decommissioning, or the closing and dismantling of nuclear power plants, ranges from $280-$612 million for each plant, ultimately paid for by utility customers. DOE's latest cost prediction for the Yucca site for high-level radioactive waste generated up to the year 2010 is $58 billion. Energy Secretary Bodman has recently admitted, however, that DOE has no total price tag predictions for the project and the State of Nevada predicts the cost will top

$100 billion. Ratepayers who receive electricity from nuclear reactors pay a Nuclear Waste Fee on their electricity bills. Several billion dollars of the Fund have already been spent at Yucca; about $20 billion remains in the Fund, far short of DOE's now underestimate of $58 billion for Yucca. The shortfall will have to be paid, yet again, by US taxpayers, many of whom have already paid as ratepayers. (GG-48)

Response: *The NRC makes its decision whether or not to renew the license based on safety and environmental considerations. The final decision on whether or not to continue operating the nuclear plant will be made by the utility, State, and Federal (non-NRC) decision makers. This final decision may be based on economics, energy reliability goals, and other objectives over which the other entities may have jurisdiction. The comments are outside the scope of the license renewal review and will not be evaluated further.*

Emergency Response and Preparedness

Comment: Emergency responders in the 50-mile zone around the Palisades nuclear reactor are likely to be inadequately trained and inadequately equipped to respond to a major radioactivity release during an accident or attack at the Palisades plant. Covert Township does not have the staffing, equipment, training or preparedness for a major radiological emergency, the risk of which increases with 20 additional years of operation at Palisades, as the plant ages.

Other communities within the 50-mile zone are mostly rural, and maintain only volunteer fire departments, which have even less equipment and training than Covert Township. Radiation monitors and radiation-protective gear are unheard of, or in limited supply. Isolation wards for radioactively contaminated victims – the patients themselves posing a hazard to emergency medical technicians, doctors, and nurses -- are limited as well at hospitals within 50 miles of Palisades

NMC/Consumers are obligated to demonstrate how the communities that surround its facility are equipped for such a risk referenced in NRC's 1982 report, of a catastrophic radiation release, as well as ensuring that the plant's current Radiological Emergency Response Plan projects 20 years forward and incorporates population trends and development, highway construction projects, transitory populations of migrant workers, and provisions for bi-lingual notifications and dissemination of information. (GG-41)

Comment: NMC/Consumers must demonstrate how the communities that surround its facility are equipped for a catastrophic radiation release. The plant's current Radiological Emergency Response Plan is inadequate and must be revised to project 20 years forward and incorporate population trends and development, highway construction projects, transitory populations of migrant workers, and provisions for bi-lingual notifications and dissemination of information. This requires Spanish language emergency evacuation instructions and notifications prepared to serve the Spanish speaking Latino population. (GG-59)

Response: *The Commission considered the need for a review of emergency planning issues in the context of license renewal during its rulemaking proceedings on 10 CFR Part 54, which included public notice and comment. As discussed in the Statement of Consideration for rulemaking (56 FR 64966), the programs for emergency preparedness at nuclear power facilities apply to all nuclear power facility licensees and require the specified levels of protection from each licensee regardless of plant design, construction, or license date. Requirements related to emergency planning are in the regulations at 10 CFR 50.47 and Appendix E to 10 CFR Part 50. These requirements apply to all operating licenses and will continue to apply to facilities with renewed licenses. Through its standards and required exercises, the Commission reviews existing emergency preparedness plans throughout the life of any facility, keeping up with changing demographics and other site-related factors. Therefore, the Commission has determined that there is no need for a special review of emergency planning issues in the context of an environmental review for license renewal.*

The comments are outside the scope of the license renewal review; therefore, they will not be evaluated further.

A.3 References

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A.4 Public Meeting Transcript Excerpts

Excerpts of Transcripts of the Afternoon Public Meeting on April 5, 2006, in South Haven, Michigan

[Introduction by Mr. Cameron]
[Presentation by Ms. Franovich]
[Presentation by Mr. Bo Pham]

MR. CAMERON: Yes. Let's see if we have questions on the process before we get into the substantive findings of the EIS. And we just need to make sure that we save time to get your questions on that, but any questions on the license renewal process at this point? Yes, let me get you with this microphone here.

MS. CAREY: Well, as a mother of four boys and a teacher of fourth graders, I usually talk pretty loud, but I wanted to ask you, the hour before the meeting, in other words, the pre-meeting availability of all these nice people to answer questions. Is that new in the process or has that gone on from the beginning?

MR. CAMERON: Okay, good question. Bo? The informal open house that we do, traditionally do before
the --

MR. PHAM: That has --

MR. CAMERON: -- the meeting.

MR. PHAM: Yes. Both the scoping meeting and our draft meetings we have traditionally have held one hour before and after, before the formal presentations itself as an open house.

MS. CAREY: I think my question about it is that in order to get the issue, I may have a question and issue that I really want answered, but I want other people to hear it too because I need everybody's input. And if it's done on this private discussion before and after the meeting, it means that the other people that are hear don't get a chance to hear my very important question.

MR. CAMERON: And that's, I think, Rani would tell you, would urge you to, to also ask the question here so that everybody else can hear it. It's not, the open house is meant to give people an opportunity to informally talk to the NRC's staff, and it's not meant to foreclose any questions or comments from coming up in this session. Right, Rani?

MS. CAREY: Thank you.

MR. CAMERON: Okay. Yes, sir? And we have a question back there, but, and please introduce yourself too.

MS. CAREY: Oh, I was Corinne, oh, go ahead.

MR. CAMERON: Go ahead, sir.

MR. LOWE: Yes, this is Corinne Carey.

MR. CAMERON: Thank you.

MR. LOWE: And I'm Chester Lowe. Both from Grand Rapids, Michigan. I wanted to know what the, or whether or not there are any local residents from South Haven here that had any input or any kind of part for the environmental review process, and what happens here in the community. In other words, are there any representatives of South Haven area, or even this area of Michigan? In the, as part of a team for part of the process of this? Also, about the socioeconomic factor. I wanted to know more about that.

MR. CAMERON: Okay. We'll, we'll hold off on the socioeconomic and go back to that after you hear Dave Miller's presentation on that. And in terms of local residents and local government being, being part of the process, I think Bo and/or Rani are going to tell you about the fact that we did have local residents who spoke at the scoping meeting and I think that Bo, and you elaborate on this, in terms of how we work with local government here in terms of the process, okay?

MR. PHAM: Yes. During the scoping process, when we had the meeting here in July 28th last year, we basically, we asked everybody that if they were interested and they registered at the meeting, and we had the address and contact information, we have been keeping everyone on our expanded mailing list. If there any correspondence that we have been sending out regarding the license renewal issues, everyone should have been getting, so and when we published the Draft Impact Statement, we also mailed a copy to everyone on that.

Now as far as the people are showing up here today, I couldn’t tell you who specifically is from the community, but that, the process carries on from here on to and that if you register, and that's one point I, I kind of wanted to follow-up onto. If you're here and you haven't registered I ask that you please do so, so that we can have your information so that we continue to keep you informed of the whole process here.

MR. CAMERON: Good, good point. And we're going to go here, and then we'll go over to you. And if apropos of Corinne's question about the informal open house, we'll be here after the

meeting too if anybody wants to get more information on a point or a question to talk to the NRC staff after the formal part of the meeting is over. And, Kevin?

MR. KAMPS: My name is Kevin Kamps. I work for Nuclear Information and Resource Service, but I'm from Kalamazoo. And my question, Bo, has to do with the schedule that you went through. My question is what is the breakneck speed up there all about? I mean, back in July 28th, we requested an extension to the scoping period and I don't even think we got an answer on that. We sure didn't get an extension, but we didn't get an answer even. And so my question is if you really want public input on this stuff, then, and I know you're going to say, well, the Commission told us to and maybe even, well, Congress told us to beyond that but, this, this breakneck speed, this sprint is just, you know, kind of, the writing's on the wall, I would have to say. A-1

MR. CAMERON: And Bo, in terms of a couple of points as, you know, the basis for the, for the schedule, perhaps something that you might not know is what did we do with Kevin's request, which I remember, I think, from the last scoping meeting. Not that it matters that I remember, but what we did with that. Kevin, I don't know if implied in your question you're formally, or at least at this meeting, requesting that the comment period be held open. If you are, we'll want to get that on the record.

MR. KAMPS: I would like to make that request. I'd like to ask for another three months on the comment period --

MR. PHAM: Okay --

MR. KAMPS: -- for meaningful public input.

MR. PHAM: Let me --

MR. CAMERON: Okay.

MR. PHAM: Let me have Bob take on the first part of the question and whether we responded to your request. I remember hearing about that, but Bob was the, the Environmental PM at the time. And now, Bob?

MR. SCHAAF: Right. Kevin, we did respond to that request and I can get you the accession number for the letter. I thought it had been addressed, actually, to you. It may have been misdirected in responding, but we did, we did address that, that request. And I'll make a note to get that accession number for you.

MR. CAMERON: Okay. Great. That's Bob Schaaf. Thank you, Bob, and --

MR. SCHAAF: I, I, as, as far as the schedule and, and the timing and the amount of time for comments, you know, the gist of our response both for, for the scoping period and I guess it would be a similar answer to your question regarding comments on the draft, is that the Commission has, has a number of, of goals that, that we work towards, one of which is openness to the public and involving the public in our process. We also have goals regarding, you know, efficient operation, conduct of, of the public's business.

And the Commission has determined that these time frames are reasonable time frames for balancing those, those goals that, particularly in the case of, actually in the case of the comment on the draft period. Our regulations stipulate a 45 day comment period and include opportunities for the public to request 15 day extensions. And by default, when we started the license renewal process, we, we went ahead and added on essentially two 15 day extensions to the, the, the regulatory requirement for a 45 day comment period. So there has already been some allowance for additional time, nearly double the, the required time frame for that response, for folks to provide responses.

MR. CAMERON: Okay. And we're going to go on to one last question before, and see if we can revisit these issues, but we'll go to you. Then I just want to give Kevin a follow-up.

A-2 MR. KAMPS: Well, just to respond to that. I mean, our efforts as local concerned citizens regarding this very dangerously deteriorated plant have involved the NRC licensing process, performed pro bono by us through completely volunteer efforts on a grass roots level. And so this thing is going on at the same time as that licensing process, which we're still engaged in because we've appealed the licensing board's ruling against us. So I think the Commission's regulations are unreasonable.

MR. CAMERON: Okay. And that is on record, Kevin, as is your request. And let's go right here and then we'll go on. Yes, ma'am?

MS. ELZERMAN: My name is Mary Ann Elzerman, and I am a Physicist for the Department of Environmental Quality. And I want to assure all of you that we have had two people, two physicists, in this process of the environmental and the technical review ever since it started. And the state is very aware of what's going on and we do comment on all of the publications that come from the NRC.

MR. CAMERON: Great. Thank you State of Michigan, Department of Environmental Quality. Thank you very much. Let's, do you have a quick process question sir, before we go on? And also please introduce yourself.

MR. PICCIUCA: My name is Sebastian Picciuca, and I live in, within 50 miles of the plant. Did, you said 45 days, it's only 43 at the bottom, one of the upper ones was only 30, like 3, 25. What was the 45 days?

MR. PHAM: It was, it's 45 days from the publishing of our Draft Environmental Impact Statement and the recognition of it by the EPA, and as published in the Federal Registered Notice. So that's the 45 days, and actually they, May 18th --

MR. PICOIUCA: So when's the 45 days?

MR. PHAM: It, it should have been from February 24th, which is the date that the EPA issued the Federal Registered Notice. So 45 days from February 24th, but actually when I'd put up the schedule, May 18th built in a little cushion just in case. We could even make the 45 days. So you actually have more than 45 days.

MR. CAMERON: Okay. Thank you. Ken, let's go to you.

MR. RICHARD: I'm Ken Richard.

MR. CAMERON: Well, Ken, what I wanted to do is, is get Dave on with his substantive findings and then we'll go to you first after he's done with that for your question. Because I think it may relate more to that, I don't know. And we do have the socioeconomic in the parking lot, so to speak too. So we didn't forget that, Chester. It is Chester, right?

MR. LOWE: Right.

MR. CAMERON: All right. Dave? Dave Miller.

[Presentation by Mr. Dave Miller]

MR. CAMERON: Let's go for questions. Okay, Bo, do you want to clarify something?

MR. PHAM: Yes. I want to just take a quick moment just to pause here and make sure that Chester was satisfied with our addressing of the socioeconomic. We looked at factors like housing, the infrastructure and land use for the area, and we did not find anything that was, that negatively impacted the environment.

MR. CAMERON: And let me just see if Chester has a follow-up on that. Chester, do you have more things that you want to ask about the socioeconomic analysis.

MR. LOWE: Not about the socioeconomic. Mainly about the sociological impact.

MR. CAMERON: Okay. Let me go to Ken, and then we'll go to this young, Nancy? Kathy. All right. All right. So are you guys ready to answer questions? Okay. Okay, Ken, please introduce yourself to us.

MR. RICHARD: I'm Ken Richards. I live three miles from the plant and I've been following this issue probably since the plant's inception. And the first question I have is about the process here. We've, I've been talking with a lot of local people. There's a lot of folks who really think this license is already done. It's already been issued. I was wondering if you would clear that up. I'm reading in the manual and I come across, or it sounds like it's trying to justify the license that is already done. And other places I see, it's not going to be, the decision won't be made until 2007. There's still another meeting in Washington, D.C. in December. When does this license get issued?

MR. CAMERON: Okay. And what I'd like you to do Bo, is to not only talk about what remains to be done on the Environmental Impact Statement, but please tell people going back go Rani's initial presentation all the different parts that need to come together before there is a decision and what time frame. I think starting off, the bottom line is is there has been no decision yet. And Bo with that, can you explain --

MR. PHAM: Yeah.

MR. CAMERON: -- to the audience what this is all about?

MR. PHAM: Yeah. Definitely I want to reiterate that there has been no --

AUDIENCE MEMBER: Louder.

MR. PHAM: Okay. It was off. Can you hear me now? Okay. Yeah, I definitely want to reiterate that no decision has been made and there's no finality on this decision. What we're here today, what we're here to do today is to take your comments regarding the environmental review process. And if you look at this screen up there, the process of license renewal breaks down into two paths basically. One is the safety review, and Juan Ayala is the Project Manager for that path. And I am here for the environmental review process. And we're not complete with that, you know, so basically towards, at the end there what you're going to have is a complete review from both paths and that, those two, you know, when the Commission comes to a decision based on those two paths, is the finality of the review and that's when the Commission will decide whether a license is renewed.

MR. CAMERON: Okay.

MR. PHAM: Does that answer your question?

MR. CAMERON: Let's just, Rani, do you want to, hold on a minute Ken. Just let me see if Rani wants to add anything to that for your benefit.

MS. FRANOVICH: The final Safety Evaluation Report, which is the culmination of the Staff's safety review, here, that is expected to be issued in October of this year. Once we issue the Safety Evaluation Report, it will go to the ACRS for their independent review. And once they've completed their review, they'll have some recommendations for the Commission directly. The NRC decision on whether to issue a new license here, is when Juan? What's the ETA for the new licenses? 22 months from the time that we get the license in hand. So 22 months from March, I guess it will be January of '07. January of '07 is when we are supposed to --

MR. RICHARD: Is that the old original, one of the, and one of the decommission --

MR. CAMERON: Ken, we need to get you on the record, so I'm going to give you a follow-up, and then I'm going to go to Kathryn. And then we'll go over to you. And that estimated time for the decision, is the decision on whether to renew the license?

MS. FRANOVICH: Correct.

MR. CAMERON: Okay. Do you have one follow-up?

MR. RICHARD: No, I've got quite a few. I was going to wait for the two hour session.

MR. CAMERON: Okay. All right. Let me go to Kathryn.

MS. BARNES: Yeah. These questions are for Mr. Miller. You are, your degree is in Environmental?

DR. MILLER: Engineering.

MS. BARNES: Engineering. Have you worked with wind technology?

DR. MILLER: Well, members of my team have. Oh, sorry, yes. I am the team lead as I --

MS. BARNES: Okay.

DR. MILLER: -- wanted to point out. We had another ten other experts in their various subject matter experts.

MS. BARNES: Okay.

DR. MILLER: For instance, when I, when I actually do a subject matter expert, mine's hydrology ground water, water resources, because that's where my discipline is. So we bring the appropriate expertise to the subject matter.

C-1 MS. BARNES: I was wondering on this assessment of wind and solar, granted Michigan doesn't have sunshine every day like the Western states. Solar really isn't feasible here as an alternate. But what about the wind? You're saying it's, it's a large concern because it takes a lot of land. How much of power for Palisades is sold out of state? What percent of the power is sold out of state?

DR. MILLER: I'd like to address the wind, the wind point first and then I can ask others to address that.

MS. BARNES: Okay. Well, this, this --

DR. MILLER: But, may I address the wind part of it?

MS. BARNES: Well, this, this, this all comes together because if you're taking this and you're saying 143,000 acres, but if Palisades, like DC Cook, sells most of its energy out of state, that's really not a proportionate summation.

DR. MILLER: I, I think I understand your question. I think I understand your question.

MR. CAMERON: -- please.

MS. BARNES: And also I was wondering --

MR. CAMERON: Kathryn, let me --

MS. BARNES: One other thing, please. This is, this is important. What are you basing on, what size wind generators are you basing this summation on? The small little ones, or the ones that they're using now, the big ones that Consumers Energy's investing in to replace the nuclear? Palisades is up for sale. They want it off their hands. They were investing in green energy and it's working. So I wonder about this.

C-2 And also, this whole summation. It's all, you're all under the premise on this whole review that there's, nothing's going to happen. That there's no accidents. But there's things that happen all the time. So this, you're, you're, you're process, I think is defective.

MR. CAMERON: And Kathryn --

C-3 MS. BARNES: But I would like to know, technically, all right, how you came to this summary and the size of the wind generators you took into account in this summary, et cetera, et cetera, et cetera. The whole detail.

MR. CAMERON: And if you could just, we appreciate your comments and we want to hear them.

MS. BARNES: I'd like some answers.

MR. CAMERON: But if you could just hold your comments until the comment period and we'll try to get you some answers to your question. And I just want to make sure that Dave gets a chance to answer the question about the analysis. And Bo you indicated you understand where Kathryn's going with the amount of power generated, shipped out of state. Why don't we let Dave talk about how that analysis was done on wind, and then you can tie that going out of state thing in, I think --

DR. MILLER: Sure.

MR. CAMERON: -- would be good.

DR. MILLER: Well, regarding, and I realize it is a complex issue, and that's why we do look at combinations of alternatives. And the details that are fairly significant would be difficult to get into completely here, but they are laid out both in the GEIS and then supplemental information in the supplement.

But to answer the basic question about the kind of wind generation capacity that's considered, it's not a single specific design. It's basically a design that uses current efficiencies ranging between about 25 to 35 percent efficiencies that, that would gather roughly 25 to 35 percent of the energy available in the wind, in that wind field at any single time. And so that, and then you look at the size of area that you need to support that amount of wind and you scale it by the 25 to 35 percent value, and that's how you come up with the acreage required for the wind replacement of the base level.

MS. BARNES: So you're --

MR. CAMERON: And its size, and Kathryn, I'm sorry, we need to get everybody on the transcript. And also, although I apologize for this, we can give so much of an answer now to the questions, and then we might have to talk to you after the meeting because we do want to hear your comments also. So let's go with the questions that you have on the floor, and I think that, did we answer? You did have a question about the size of the wind turbines that are used. Steve, can you say anything about that?

DR. MILLER: Yes. The analysis, the alternative analysis assumes that Palisades is producing 780 megawatts of electricity right now. And so we're trying, in all of our alternatives we try to baseline that as the replacement amount of energy that needs to be, that needs to be provided.

So based on that the scale of the wind farm or, you know, other sources, in the particular case of wind and solar, the amount of land use that's required for, to produce that capacity is going to have a greater impact. And that's why we, you know, we're not saying that wind power in general has a large effect on the environment. We're just comparing to what we have today. And so that's the basis of our comparison and analysis.

MR. CAMERON: Okay. And you can please talk to Kathryn after the meeting with more details on this. And I'm going to go to this gentleman over there, and then Corinne, and we're going to go on to the SAMA issue. Okay? Yes sir? And please introduce yourself.

D-1 MR. DAL MONTE: My name is DalMonte, and I am the President of -- Now my, my question is, in this regard, is that we are reading this report or your final result is administered by you and it's only, is going to say, well, that Palisades can continue. I mean, the fact that Palisades can continue operation is not unreasonable. And I understand that you are stressing that result. But on the side, you are taking position on alternative solutions that I read and I don't think is enough education in your point. Because the fact is that wind is flying. We are having wind all over the world and in here too. So I guess you missed the point in this. And I don't understand why you, you are so concerned on our selecting alternatives if we know about the alternatives. And really, you are not doing a good job and the guys are going to really make the decisions, went through the final decision. Okay, thank you.

MR. CAMERON: Mr. Dal Monte, thank you for that. And we are going to hear from you later on. I think that the question there that we could provide some information on is why do we do the alternatives analysis. Can you put that in perspective for us Bo?

MR. PHAM: Yeah, let me try to frame that. You know, like I said before, we take a baseline of what we're trying to replace, the energy source that we're trying to replace, which is the Palisades Nuclear Plant that's there right now. We're not, if you can try to look at it as not comparing wind power versus nuclear power versus anything else. We're looking what, what the potential environmental impact of each of those alternatives is going to result in. So that's what our analysis is.

We're not here, and we don't, the NRC doesn't have the jurisdiction really to make the energy policy of what, you know, what comes out of Palisades and what other different sources of energy. And so what we're here, and you know, I'm trying to, I guess, define the scope of what we look at is really, all these different alternatives and not comparing them and making the judgment of whether one is better than the other. We're just simply stating that this is what the environmental impact is going to be with wind power, with the nuclear power plant, or with solar power, or with other alternatives as well.

MR. CAMERON: And Rani, do you want to add to that?

MS. FRANOVICH: I just want to add something. You know, you're, you're looking at a nuclear power plant. It's already built. It's already operating today. So the impact of its continued operation is quite different from the impact of closing that facility, building a wind farm of large components that would harvest the wind energy, or another site that would have solar panels to harvest the energy of the sun. The environment associated with building those new sites is larger, it's a larger impact to the environment than continuing to run a facility that's already built and operating now. So on a logical level, that time makes sense.

MR. CAMERON: Okay. We're going to go to this gentleman.

MR. HENKEL: I'm Don Henkel.

MR. CAMERON: Yes, we usually --

MR. HENKEL: I'm still Don Henkel. Point of information. I understand there's some hundred and some odd nuclear power plants throughout the United States. How many of those have applied for renewal licenses? And of those who have successfully applied for a renewal license, how many have been approved and how many have been disapproved?

MS. FRANOVICH: Okay. That's a good question.

MR. CAMERON: And Rani, please, put that in the context too in terms of our process about rejection of applications, et cetera, et cetera. Thank you sir.

MS. FRANOVICH: There are 103 operating reactors across the country. We haven't quite gotten halfway through the fleet. I'd say 47 or 48 or so, thus far, have applied for renewal. And this is reactor units, not necessarily sites. There have been a couple that we've returned because the information in the application was not adequate or sufficient for the Staff to begin and complete its review.

For those that we did not return, we requested additional information and it depends on really the quality of the original submittal will dictate how many requests for additional information the NRC needs to put out there. But for the plant that I managed back a few years ago, there were 273 requests for additional information. So the Staff does not grant renewal for every application it receives because it's a pro forma review. The Staff will continue to get the information it needs to complete its review, and will not be satisfied until that information is received.

So when we issue our Safety Evaluation Reports, a number of times there are still open items that the Staff is not satisfied with. We do not issue a final Safety Evaluation Report and brief the ACRS on our work until the Staff is satisfied.

So the answer is we're roughly halfway through the fleet. We've returned a couple of applications for sufficiency issues. For the rest, we gathered more information than we received to insure we were satisfied with the information to complete our review.

MR. CAMERON: In terms of the number of licenses we've renewed though?

MS. FRANOVICH: I don't have the specific number off the top of my head, but I'm saying 40, I'm thinking 48, 49 --

MR. CAMERON: 39.

MS. FRANOVICH: 39 per unit.

MR. CAMERON: All right. And Corinne, you had a question?

F-1 MS. CAREY: Yes. Several things. Number one, I'm concerned that the kinds of answers we're hearing, I, I feel are very questionable. For instance, wind power in itself, you don't measure that by acreage because farmers are finding a very successful business for them to put the wind farms along their lot lines. And so it's a very definite advantage environmentally in that respect, and I didn't hear that kind of that thing in your report.

F-2 Secondly, I heard that solar and acreage. And it's my understanding that solar is very commonly mounted on rooftops and walls in cities, which also reduces the transmission loss, et cetera, that comes from centralized nuclear plants scattered around and have this great transmission loss over their process of getting the electricity to where it's needed. And there was a third point, and I can't think of it right now.

MS. FRANOVICH: Did you have a question?

MR. CAMERON: And no, I think Corinne is, I think the comment we have of what Corinne is saying is that there may, comments like she just made and like we're going to hear tonight, and I'm sure from Kathryn, for example, on wind power are all the things that we need to hear to consider in finalizing our report. And Dave Miller did a summary of the report and didn't get into every detail where that type of thing may be coming out. And I'm going to go to this lady back here for a question, and then I think we need to go on to SAMAS. If we have time to come back to you, Kathryn, we will. But we really need to get to the next presentation. Yes ma'am?

MS. HIRT: I'm Alice Hirt. And I do not really need to ask a question right now, but I want to respond to Ms. Franovich. Is that what your name? I, I feel that you respond to the question about the impact of other technologies on the environment with a very subjective answer. And I sort of resent you making that sort of sweeping statement. I don't believe that you are an expert on all other technologies and for you to say that new other sources, say wind and so forth,

would have a greater impact on the environment than keeping Palisades going, I, that is certainly not my estimation, and I don't believe that that was really your place to make that sort of a sweeping comment.

MR. CAMERON: Okay. And the, Alice, what we have in the report, and Rani is the Section Chief for the environmental section that does these, there's details in there that arrives at that conclusion as Mr. Miller presented. And he may have done that before you, I don't know if you were here for his presentation, but that is the conclusion. And indeed people will, can and will disagree with that, and we want people to tell us if they disagree with it and tell us why they disagree with it basically. And Rani, do you want to add anything else at this point? It wasn't --

MS. FRANOVICH: She's entitled to her --

MR. CAMERON: -- a question.

MS. FRANOVICH: -- view and I appreciate her expression of it. I, I'm not an expert. You're absolutely right. What I was doing was explaining the Staff's conclusions on the analysis that was performed by the experts.

MR. CAMERON: Which was done by the experts.

MS. FRANOVICH: Correct.

MR. CAMERON: Okay. And I'm sorry that we can't go back for second questions here.

MS. BARNES: I didn't have my first one answered. I asked questions and no one answered them.

MR. CAMERON: They tried their best to answer the question Kathryn.

MS. BARNES: I asked how much is sold out of state and what size wind, what size wind generators. C-4

MR. CAMERON: Okay. That's two questions. How much is sold out of state and what is the size of the turbine? That's, that's true Kathryn.

MS. BARNES: No. What, what is the size in your analysis, what size, what size wind generators are you saying would take that much acreage? And how much of Palisades power is sold out of state? Those are two questions I asked they will not answer.

MR. CAMERON: You want to do this one? Okay. Exactly right.

MR. PHAM: Only can answer the first one. I do not have the numbers to provide for you regarding how much power is sold out from Palisades. That's, the NRC doesn't have any say in that, in that decision actually. Your second question regarding the, what size turbine, I believe we look at the predominant research that's out there based on the Department of Energy and other bodies. The National Academy of Sciences, for example, and take a look, and we use, we don't use specific models or types of turbines. We look at the general baseline efficiency of what wind turbines, the best and the worst of what the wind turbines can do right now.

MR. CAMERON: Okay. And if anybody does have the information on the amount of power sold out of state, if they can give Kathryn after the meeting, please, please do that. And, yes sir?

AUDIENCE MEMBER: I'm, I'm, my only questions is why was oil in the same category with solar and wind? That's, in the alternative, it was listed with the alternatives.

MR. CAMERON: And the answer to that question? And is it going to be Bo or Dave?

MR. PHAM: I would say that there was no connotation or nothing meant by it. Yeah, it's just one of the alternatives that we looked at.

MR. CAMERON: Okay.

MR. SCHAAF: I can, I can --

MR. CAMERON: All right. Bob Schaaf on that one.

MR. SCHAAF: What we look at in the alternatives analysis is, NEPA requires us to evaluate and assess the impacts of alternatives to the proposed action. The proposed action here is for the plant to continue operating for an additional 20 years. At the very least, we need to look at what's called the no action alternative, which would be not renewing the license and identify those impacts. The NRC has decided from a practical standpoint, if the plant does not continue to operate, something will need to be done to replace the generation lost when that plant ceases operation. That may be a new base load power generating facility. It may be purchasing power from outside of the service area. That may be renewable alternatives. It may be a new, large, base load power generating station.

When we do these alternatives' analyses, we look at the infrastructure that is in place in the vicinity of the site to look for what are the likely alternatives that we do a detailed analysis on. You have a gas fired plant just across the freeway from the Palisades site. So there is infrastructure in place to deliver natural gas which would allow you to install and construct a large base load gas-fired generating station. There's a rail line in the vicinity of the site, which would allow you to bring in coal to construct a coal-fired generating station. Although I believe in this case we didn't look at placing the coal-fired plant at the site. We looked at placing it

somewhere else in the service territory because of the sensitivity of the dunes area. We also looked at new nuclear construction because there is interest in the industry in constructing new nuclear generating stations.

Under other alternatives, the reason oil is in with the wind and the solar and the conservation, is because these are alternatives that we looked at in less detail because we didn't consider them to be the likely alternatives for replacing loss generation if the license was not renewed. There's not infrastructure in place necessarily to bring an oil, plus there are other uses for oil in transportation and in the chemical industry. That's why it's in there.

We're not saying that it's equivalent to some of these renewable sources that we considered, the wind, the solar. The reasons that the wind and solar aren't looked at in, in as great a detail frankly, is that we're talking about replacing a large base load generating station that is expected to operate for roughly 90 percent of the time. Wind won't generally do that. Solar won't generally do that. And so we consider those alternatives, and we discuss the impacts of those alternatives, but we don't view them in the same level of detail.

MR. CAMERON: Okay.

MR. SCHAAF: I guess that's, that's why it's in there.

MR. CAMERON: Thank you. That's very helpful.

MR. SCHAAF: And that's kind of a concise discussion on that.

MR. CAMERON: That's very helpful. We really, I'm sorry, we really do need to move on to Bob Palla.

MR. SCHAAF: And I'm available to discuss that after, after the meeting is over.

MR. CAMERON: Yes. I think that gentleman and a bunch of people might want to talk to you about that, Bob. Thank you Dave, Bob, Bo. And we're going to go to Bob Palla. And then we'll be back to Bo for some final comments here. These are accidents, the accident analysis.

[Presentation by Mr. Bob Palla]

MR. CAMERON: Okay. Thank you Bob. And that's all laid out in the Draft Environmental Impact Statement. Anybody have any questions on this SAMA aspect?

AUDIENCE MEMBER: Are they detailed in the EIS?

MR. CAMERON: Yes they are.

MR. PALLA: In the supplement. Chapter five is a summary, Appendix G is a detailed accounting.

AUDIENCE MEMBER: The ones that were not approved are detailed also?

MR. PALLA: The entire set is described there. And then which ones were deemed to be cost beneficial, and which ones are being further evaluated, that's all spelled out specifically.

MR. CAMERON: Thank you. Mr. Dal Monte?

D-2 MR. DAL MONTE: What I wondered is, the basis like sabotaging where taking account can be -- in this way too. And if you have done that, because this, my contention is is a new issue. They're not the same like previous plan.

MR. CAMERON: Bob, I think this is a question that we get in terms of seismic, what are the subjects that are included within the scope of SAMA procedures.

MR. PALLA: Well, let me say what is included. The short answer is sabotage is not included within the risk profile that we do this, the SAMA analysis for. What we include is internally initiated events, fires within the plant, internal floods, seismic events, high wind events, things that we can analyze basically. When it comes to sabotage, even if we wanted to include it, it defies quantification and really systematic analysis. So that, that would be one deterrent to, to try and include it here, is that it just is very difficult to quantify the frequency of these events.

Now Rani Franovich mentioned at the beginning, this is, these issues are being addressed as part of the current situation with the plant. We're not done with that work yet. This is still in progress. Plants are, have beefed up their security arrangements and are looking further at mitigation strategies within the plant to deal with things like aircraft impact. This is all not being forgotten. But we're looking at it now. It's not really tied into license renewal. And it was not part of this evaluation.

MR. CAMERON: Okay. Thank you. And let's have one more question right here on SAMA, and then Bo if you could conclude and then we can go and hear what people have to tell us. Yes ma'am?

MS. MCFADDEN: I'm Jean McFadden. I'm a social worker. I'm assuming that the SAMA discussion doesn't relate to the embrittlement of the aging reactor.

MR. PALLA: That's correct.

MS. MCFADDEN: Okay.

MR. PALLA: That would be determined to be acceptable as part of the, as the safety review did.

MS. MCFADDEN: So, so then, looking at this other report on emergency finding and preparedness, are you confident in the ability of FEMA, after seeing Hurricane Katrina, to come in and manage an emergency here in Van Buren County?

MR. CAMERON: And can we just, this, this is an important issue, obviously, emergency planning. And can you just, Rani or Bo, can someone just lay out what the responsibilities are for emergency planning NRC, local government, FEMA, and we may need to talk to you further about that, but can you do that?

MR. PHAM: Yes.

MR. CAMERON: All right.

MR. PHAM: The, basically, the NRC, our jurisdiction as far as emergency planning is to make sure that the personnel on site are protected from the dose, dosage in the case of emergencies. Now in the case with outside of the, offsite, that's something that we coordinate with FEMA, local authorities and everything. I can't, I can't answer your question regarding do I have confidence in FEMA to do it.

MS. MC FADDEN: Why not?

MR. CAMERON: Okay. Rani, do you want to try to address this, and we'll just hear from the State of Michigan before we go on. But can we do, can we tell people what FEMA's responsibility is vis a vis local government and the NRC, at least tell them that?

MS. FRANOVICH: Yes. And we're experts more in the license renewal arena, so we don't have people at this meeting who can really speak to you on the details of, of, you know, the NRC's coordination with FEMA and local and state officials.

But I can tell you that licensees periodically conduct drills, and the NRC participates. So does FEMA, so do state and local officials. And after the drills there is a debriefing, there is a look at lessons learned, so that is where the NRC is engaged. We really can't comment, it wouldn't be even appropriate for us to comment on FEMA's capabilities. But I can tell you that our jurisdiction is, does the site have an emergency plan? Do they exercise that plan on a periodic basis? And does that involve coordination with other stake holders, state and local officials and --

MR. CAMERON: And I think we're going to hear from the, from the people who have direct responsibility, Jean, right now, with the state. Can you explain that please?

MS. ELZERMAN: The State of Michigan is very proactive in doing their own emergency planning. The state police, Emergency Management Division and Homeland Security are in charge as lead agency for the State of Michigan for any emergency. During a radiological emergency, we, the Department of Environmental Quality Radiological Protection, will step in and be their counterpart for the radiological part. In no way will we let FEMA take over. Our state will run the emergency until the very end. Thank you.

MR. CAMERON: Okay. Thank you for that. And Bo, can you summarize so we can on and --

MR. PHAM: Yes. Thank you for that comment, by the way. So turning on to our conclusions, we found that the impacts of the license renewal in all areas were small. We also concluded the alternative actions that we discussed in some subsequent discussions after Dr. Miller's presentation, including the no action alternatives, may have moderate to large environmental effects in some impact categories.

Based on these results, our preliminary recommendation is the adverse environmental impacts of license renewal is not so large that it would be unreasonable to forward the planning decision makers to leave that as an option.

This slide is a quick recap of our current status. The Draft, like I said before, the Draft Environmental Impact Statement was issued on February 14th. To go back to the question earlier about the 45 day period, the February 14th date is actually the date that the NRC issued or published our Environmental Impact, our Draft. Publicly it's not legitimate or it's not available to the public, per se, until the EPA recognizes it, checks it in the system, and publishes a Federal Registered Notice. And that was done on February 24th.

Now by regulations we are required to give a minimum of 45 days for comments from the time of issuance of the Draft, and we actually built in a 75 day period from the February 24th date. And like I said, even with that we have a little cushion for May 18th. So once again the comment period end date is going to be May 18th, and then we expect to issue the final impact statement sometime in October of this year.

This slide identifies me as your primary point of contact with the NRC for the preparation of the Environmental Impact Statement. It also identifies where the documents related to our review may be found in the local area. Palisades' Draft Environmental Impact Statement is available at the South Haven Memorial Library. All documents related to the review are also available at the NRC's website, www.nrc.gov.

And in addition, as you came in you were asked to fill out a registration card. If you did and you included your address on there, we will mail a copy of the draft and a final, final impact statement to you. If you did not fill out a card, I do encourage you that you do. And if you need to know how to do it, please contact, Cristina, could you raise your hand please? Cristina Guerrero will be out at the registration desk and they'll be able to give you the cards for the registration.

In addition to providing comments at this meeting, there are other ways that you can submit comments to, for our environmental review process. You can provide written comments to the Chief of our Rules and Directives Branch, at the address on the screen there. You could also make comments in person if you happen to be in Rockville, Maryland. We've also established, to make it easier, we've also established an e-mail address that you can write to us at palisadeseis@nrc.gov, there at the bottom.

This concludes my remarks and thanks again. Once again, thank you for taking the time to come this afternoon. And I suppose we can take a few more questions.

MR. CAMERON: Well, let's, I think what we're going to do is move on to the comments now, but I would just ask the NRC staff, you heard questions, concerns. After the meeting, if there's a possibility of talking to people. For example, we heard Kathryn, Corinne, others on, and Alice Hirt about the analysis of alternatives. You might want to talk to them, and I don't want to forget that Chester had some issues on sociological, so Dave I know you have a colleague with you. I don't know how much you can divide your time, but you might want to talk to them after the meeting.

And with that, we're going to go to hear from you. And we have to start with, three governmental folks. And we're going to start with Mary Ann Middaugh first, and then we're going to go to John Tapper, and then to Nancy Ann Whaley. Mary Ann, could you come up? And then after we hear from those three, we're going to go to Kevin Kamps, Ken Richards, and Don Henkel. Yes, please. And I guess that in order for this to really be heard, you're going to have to --

MS. MIDDAUGH: I'm pretty good at that.

MR. CAMERON: -- speak in. Good, good, thank you.

MS. MIDDAUGH: Politicians always want to be heard. My name is Mary Ann Middaugh. And the people of southwest Michigan voted to have me represent them in the Michigan legislature for six years, the maximum allowed under our Constitution. I served as Chair of the House Energy and Technology Committee when the electric restructuring was passed.

H-1 During our hearings and other deliberations, it was clear that Michigan needs nuclear energy and Michigan needs the Palisades plant as it generates enough power for 500,000 of Michigan's residents. Because Michigan is a peninsula, we're limited in the amount of energy, we can't come across where the lakes are, limited in the amount of energy we can import from contiguous areas.

Our committee looked at the environmental and safety record of this plant and the record of how the Nuclear Management Company dealt with any problems that arose. The record is excellent on both counts. And we, as elected officials, were kept apprised of all activities at the plant.

I've had an opportunity to review the NRC's draft environmental report and want to commend you on a very thorough job you have done. Your conclusion that Palisades has not added anything harmful to the environment, has protected the endangered Pitcher's Thistle, monitors fish, water and crops monthly in the surrounding areas, and has kept reports and permits current with Michigan Department of Environmental Quality matches our findings.

Palisades employs about 600 individuals with a payroll of about $60 million. We very much need the jobs that Palisades provides to this area. These employees are not only responsible while at work, they are also a very real asset to this area of the state. They are involved in their churches, schools, families and communities.

Palisades is also a good corporate neighbor. They pay a great deal of taxes to area governments, and are very supportive of the community and work together to make this area of the state a good place to live and raise a family. This is evident from the numerous letters and resolutions of support of re-licensing of this plant from area governmental bodies. I add my voice of support for re-licensure of this environmentally friendly electric generating plant. Thank you.

MR. CAMERON: Thank you very much, Mary Ann. We're going to go now to Mr. Tapper. And Mr. Tapper is a member of the Van Buren County Board of Commissioners. Mr. Tapper?

MR. TAPPER: Thank you.

MR. CAMERON: Your welcome.

MR. TAPPER: I'll make a quick comment because when I first talked with you earlier on, you elaborated five minutes. But I understand my five minutes started about ten minutes ago. Is that correct?

MR. CAMERON: No. I think we'll start it right now.

MR. TAPPER: Okay. Well, I'd like to tell you a little bit about myself, because I have been around Van Buren County all my life. I'm four 18's plus nine in age. I live in the house I was born in. And since '57, we've had a summer home along Lake Michigan between South Haven and the Palisades plant. And actually, with being around all these years, I had the opportunity to be in the County Board of Commissioners 30 years, well, I've served over 38 years, since '52. And actually, I remember when Palisades was in the thinking stage, because Consumer had us go down to Benton Harbor. We got on a DC-3 and flew up to Charlevoix to look at what they had up there prior to our resolution. And we did have a resolution way back then. Now I do have a resolution that we approved on March 22nd of '05, and I would really like to read it to you.

Report of the Administrative Affairs Committee. I'm a Board of Commissioners. I hope everybody can hear me. Okay, thanks. I-1

Whereas, Palisades has been in operation since 1971, safely providing electricity to Consumer Energy customers for those 34 years, and;

Whereas, based on Palisades' continued improved performance, particularly over the past four years since Nuclear Management Company has been operating Palisades, Consumers Energy has increased confidence in the plant's safety, reliability and predictability, and;

Whereas, to that end, Consumers Energy announced last summer that it would seek a license renewing for Palisades. Nuclear Management Company will apply for a 20-year license renewal on behalf of the Consumers Energy next month with the U.S. Nuclear Regulatory Commission. When approved, Palisades' license will be renewed through the year 2031, and;

Whereas, this means continued employment to the residents of Van Buren County who operate and maintain the plant, continued tax revenue from the plant that are, revenues that are shared by various governments, hospitals, schools, county government, government throughout the region. And this really is continued support for the emergency management activities and continued employment paychecks that bolster your local economy.

Now therefore it be resolved that the Van Buren County Board of Commissioners support Consumers Energy in their application process.

This was approved March 22nd, '05 and signed by all seven commissioners. And really our livelihood since this plant has been here, has certainly helped. Helped schools particularly, and not just the Covert region. Thank you.

MR. CAMERON: Okay. Thank you Commissioner Tapper. And if you want us to attach a copy of the resolution to the transcript --

MR. TAPPER: Sure.

MR. CAMERON: -- we can do that.

MR. TAPPER: Okay.

MR. CAMERON: All right. Thank you very much. And now we're going to go to Nancy Ann Whaley who's Geneva Township Supervisor.

J-1 MS. WHALEY: Hello. I'm Nancy Ann Whaley from Geneva Township. And I, like Mr. Tapper, live on the same land that I was born and raised on.

Geneva Township is located directly east of South Haven Township and it corners with Colbert Township on our southwest corner and their northeast corner. We are in the 10 mile range of the speaker system that gives us the alert warnings. And our western three tiers of sections are located in that siren system of Palisades.

I never realized until I became a board member of Geneva Township in 1987 and became acquainted with the operations and effects at Palisades Nuclear Plant on the structure and economic well being of Geneva Township, as well as the surrounding area. Palisades plant and people continuing support of our communities, organizations and businesses through usage, involvement and monetary support enhancing the overall community health and welfare.

J-2 Many Palisades personnel live in Geneva Township and are tax payers which benefits Geneva Township, South Haven Area Emergency Services, Lake Michigan College, South Haven and Bangor Public Schools, Van Buren County Intermediate School District, South Haven Hospital, South Haven Senior Services and Van Buren County.

J-3 Being a South Haven Area Emergency Services Authority Board Member, I have watched as Palisades has contributed much to our fire and ambulance service in the way of training, equipment and support. This joint effort for the safety of our citizens and Palisades' personnel is a tribute to working together to make our community what it is today.

J-4 Over the years, we have been privileged to reports by Palisades' personnel at our Township board meetings, keeping us informed on happenings, new procedures, updating of siren warning system and just being available to answer questions that arise in our public settings.

The seminars presented by Palisades' personnel to provide exposure for the local municipalities, businesses and industry to review the plant and safety procedures that are in place, as well as having contact personnel for our comments and questions is indeed beneficial. Mark Savage, Palisades' employee as well as property owner in Geneva Township, is always available to review any concerns that arise.

At the April 12th 2005 board meeting, the Geneva Township Board unanimously voted to support the license renewal by resolution which was presented to Mark Savage at that meeting. It is my strong belief that the negative personal and economic impact that all of us will feel if the operating license for Palisades is not extended will be a loss of great magnitude to this community. I'm asking your full support for the 20 year renewal of the licensing for Palisades. J-5

The resolution that was passed at the Geneva Township Board on April 12th, 2005 reads:

Whereas, Palisades Nuclear Plant has been in operation since December of 1971 safety providing, safely providing electricity to Consumers Energy customers for those 34 years, and based on Palisades continued improved performance, particularly over the past four years since Nuclear Management Company has been operating Palisades, Consumers Energy has increased confidence in the plant's safety, reliability and predictability, and to that end, CMS Energy announced last September that they would seek a license renewal for Palisades. J-6

Nuclear Management Company will apply for the 20 year license renewal on behalf of Consumers Energy next month with the U.S. Nuclear Regulatory Commission. When approved, Palisades license will be renewed through the year 2031, and this means that the residents of Geneva Township and surrounding areas are receiving continued employment for those who operate and maintain the plant, continued tax revenues from the plant that are shared by the various governments, hospitals and schools throughout the region, continued support for energy management activities, and continued employee paychecks that bolster local economies, and to date, the NRC has approved 30 license renewals for generating stations and is reviewing applications for 10 others, and there are 103 operating nuclear plants in the United States that generate approximately 20 percent of the nations' electricity.

Therefore, be it resolved that the Geneva Township Board of Trustees supports Palisades' efforts in the application for a 20 year renewal of the operating license and their efforts to continue the enhancement of economic conditions in our area. This resolution was presented and supported by all Geneva Township board members. Thank you.

MR. CAMERON: Thank you very much, Nancy Ann. I realize that a lot of you that took the time to do a prepared written statement for us, and we really appreciate that. We are going to try to move through this so that we get to everybody, so if you are going to be longer than five to seven minutes, if you could just try to summarize and we will put the prepared statement on the record too. And that's not directed at you Nancy. You were right on time. But I just wanted to say that.

And now we're going to Kevin Kamps from Nuclear Information Resource Service. And Kevin, you have a long history here so, please tell us about that too.

MR. KAMPS: My name is Kevin Kamps, and I work for Nuclear Information and Resource Service in Washington, D.C. But I'm from Kalamazoo, Michigan and I'm still a board member of Don't Waste Michigan representing the Kalamazoo chapter.

A-3 How many of you here heard about the near drop of the fully loaded dry cask at Palisades last October? I have a question for folks at NRC. When we were having the hearing in early November in this, down the block here, how come that wasn't brought to our attention? I mean, our, if we have any credibility left in the NRC and in the company, if we had any trust left in the company and in this government agency that's supposed to protect our health and well being and our environment and our safety, it's gone. It's absolutely gone. And NRC's response in the press is, it was not a reportable incident.

A-4 The potential consequences, according to NRC's own documents of that incident, if the cask had dropped into the pool and damaged the pool and drained away the water, there could have been a radioactive inferno in the waste. And thousands to tens of thousands of people could have died downwind. Those are NRC's own numbers. I'm not making this stuff up. So it just is a real betrayal of the public to have on our part, to have taken part in good faith and at that very moment be kept in the dark about something as significant as that. So the outrage we'll try to control to an extent, but it's, it's deep burning at this point in the local community.

A-5 What I'd like to address in regards to this proceeding today is radioactive waste, speak of the devil, and reactor accidents. The NRC says in its Nuclear Waste Confidence decision that a repository for commercial irradiated fuel will open by 2025.

And it's appropriate to bring this up because the Bush Administration yesterday introduced a bill to get rid of any remaining impediments to opening Yucca Mountain. That means public health protections and safety regulations, that kind of thing. Just get rid of those. But the problem is that Yucca's in complete disarray. The last date DOE gave for its opening is 2012. They won't give dates anymore. They won't give cost estimates any more. It used to be $60 billion, but they won't give that kind of prediction.

So the state of Nevada's challenging this NRC Waste Confidence decision in Federal court. So how NRC can dismiss this issue at Palisades is just really beyond me, especially given the irony that Palisades license is up in 2011, and that's the very year that Yucca will be full. Will have reached its legal limit long before it opens because there will be that much commercial waste in the country, 63,000 tons of it. Quite a bit of that at Palisades, its fair share.

A-6 So from 2011 to 2031 all waste made at Palisades would be excess to Yucca's capacity. So it would continue to sit at Palisades with nowhere to go, unless a second repository's opened, this
A-7 time in the east. So would that be in Michigan or Wisconsin perhaps? So it needs to be pointed out that Palisades' current dry cask storage pads are in violation of NRC regulations. We raised this during the NRC licensing proceeding on this extension and were rejected. But our expert

witness on this matter is none other than Dr. Ross Landsman from NRC region three, whose job it was to inspect those pads and the casks on them. And he warned NRC since 1993 that the cask close to the lake, the pad close to the lake is in violation of safety regulations, specifically earthquake regulations. If there's an earthquake, the -- could open up, the lake could pour in, and one of those casks or more than one, could end up in the lake under water. And what could that mean? If water infiltrates the cask there's enough fissile material inside to sustain a nuclear chain reaction. So we could have a nuclear reaction in Lake Michigan.

In another scenario, the sand could open up in an earthquake and casks could be buried under the sand. Overheating could occur. The cask could be damaged. Radioactivity could escape. And it would be a matter of time before it hit the lake. NRC now says in another Orwellian twist that Dr. Landsman's allegations against the newer pad built in 2004, also that it violates earthquake regulations are under review. Those allegations are under review. They have been for years. The incredible thing is that while under review, the storage pad is used for storing waste. More and more waste as time goes on. The cask dangle that happened last October, was a part of that campaign to move dry casks to that newer pad, seven of them. A-8

So we've got two pads at Palisades, both in violation of NRC's safety regulations, and just yesterday we filed an emergency petition to the NRC to enforce its own regulations and stop storing waste on those pads. So the question is, where is Palisades going to store 20 more years worth of waste? A-9

In terms of reactor accidents, again I will point to NRC's own numbers. They haven't updated these since 1982, so of course the number of people has grown in this region, the economy has grown in this region, so these damages from a severe accident at Palisades would be much worse now than what's given. But NRC calculated that a severe accident and catastrophic radiation release, and this was a 1982 report, a radiation release from Palisades would kill 11,000 people downwind, injure 7,000 people, and do over $50 billion in damages. That's 1982 figures, so if you adjust for inflation, it's over $100 billion now. And of course, if there's a major radiation release from Palisades, that's it for Michigan's tourism, that's it for its agriculture, and that's the reason that our volunteer pro bono citizen's effort to try to stop this 20 year extension has been so determined and will continue to be so at every turn, because we care a lot about the future of this state. A-10

AUDIENCE MEMBER: And our homes and our families.

MR. KAMPS: Amen. And I'd like to raise a point. In the back of the room, there's a summary of the findings of this EIS and one of them referred to, it's a contradiction with NRC's own report. It said historic and archaeological impacts would be small, but right in the beginning of this report it says that they may be small, but could be moderate for historic and archaeologic resources. A-11

And when you read the details in here, NRC actually verifies exactly what we raised last July 28th at this very podium and again during the licensing proceeding, but we got thrown out of that, that Native American sites very well could exist, very likely do exist, NRC is now saying that, at Palisades, but no site survey is going to be required. They can do 20 more years worth of routine radiation releases. If forced to build new dry cask pads that comply with safety regulations, that could be built right on top of a Native American archaeological site, burial grounds, village sites. It's not exactly far fetched when NRC admits that there are 15 such sites within a mile of Palisades or its transmission lines, including one 0.3 miles away, which I believe is the Brandywine in Palisades Park, exactly what we pointed out here.

So my question is, how in the world did we get booted out of the NRC licensing proceeding on that one? But --

MR. CAMERON: Kevin, can I ask you to --

MR. KAMPS: Yes.

MR. CAMERON: -- give a summary of this? Thank you.

MR. KAMPS: Yeah. Instead of five or seven minutes, of course, I could go on for five or seven days about this stuff. But I'm glad that there's a good turnout today and I look forward to hearing other concerned local citizens.

A-12 And the last thing I'll say is NRC said that, you know, this license renewal may be granted but there are other factors out there that may end up, you know, deciding whether or not this place will operate for 20 more years. I'd like to say, yeah, there really is. One would be a severe accident at Palisades that would kind of take care of it right away for all of us.

A-13 But another thing is, this coalition of ours, which is 25 group strong including Michigan Environmental Council, the biggest coalition of environmental groups in the state, 75 of them, 200,000 Michigan residents. The coalition's still growing, and we plan on fighting this at every turn and that's the factor that's going to stop this from happening. Thank you.

MR. CAMERON: Okay, thank you. Thank you Kevin. Ken, could we have you come up and talk to us?

MR. RICHARD: Hello. My name is Ken Richards, and I've been a resident of South Haven my whole life.

AUDIENCE MEMBER: We can't hear you.

AUDIENCE MEMBER: Use the mike.

MR. RICHARD: My name is Kenneth Richards, and I've been a citizen here in South Haven pretty much my whole life. And back when Palisades first went into dry cask storage in the early '90's, we formed a group called Palisades Conversion Group because, basically what they're doing out there is they're boiling water to make electricity and as Ralph Nader said, there's a lot of ways to boil water and make electricity.

So, having worked in two occupations within the nuclear field, laborer for J.A. Jones Construction Company in '71, '72 on the Donald C. Cook Nuclear Power Plant, then at the Palisades Nuclear Power Plant, Decon-Tech for Essential Services Company --

AUDIENCE MEMBER: Louder.

AUDIENCE MEMBER: We can't hear you.

MR. RICHARD: -- during a refueling outage in the '90's, I have seen construction of and then finished plants during tours. The plants then new and impressive, then again many years later aging, much obsolete, often highly contaminated equipment, malfunctioning devices such as the reactor containment hatch door inoperable for some time while I was de-conning when Consumers Energy operated the plant. B-1

Things get old, dilapidated with time especially when they are neglected. I'm sorry, my glasses, I have to back off to read here. Things get old, dilapidated with time, especially when they are neglected, worn out, under the influence of radiation, outdated or used up such as the Palisades plant's fuel pool, now double racked. Steam generators replaced highly contaminated previous units within their own mortuary on the plant site. Along with approximately 30 V.S.C. 24 and 34 dry storage casks in use for above ground spent fuel assembly storage, also on site.

A cut rate move Consumers Energy Company took when their fuel pool was filled to maximum capacity. Well passed its original design capacity threatening a shut down of the plant. Breaking another promise made when the plant was first built, that no highly contaminated radioactive materials would be on the plant site outside of its high level containment structure. For purposes other than refueling and eventual removal of spent fuel assemblies to a national depository. B-2

After 38 years of operation, Palisades Nuclear Power Plant and its reservation is showing its age and effects of embrittlement. Its pressure reactor vessel being protected with old, many cycled fuel assemblies, a case in point. Years now, no vessel replacement or further shielding in sight. Or 2007 says the NRC, 2011 say others. 2014 say Palisades' lawyers. This should have been replaced ten years ago. As P.R. spokesman Mark Savage told the local press back in 1993 when the problem surfaced during an interview with the South Haven Daily Tribune. B-3

Once they finally got to admit, there was a metal condition called embrittlement affecting the reactor.

B-4 One of the biggest complaints from plant critics is the operators have been less than forthcoming when problems surface. Make excuses, rosy predictions they know will never come to pass. Or lie to anyone listening when the information might or will be perceived as contentious, placing public trust in jeopardy.

B-5 Much of the same thing can be said of the NRC during these current rounds of scoping meetings concerning the re-licensing endeavor. Long time followers of this issue have seen or heard it all from a very different NRC under past presidential administrations. The difference between now and say, the early 90's, cannot be denied. This is a very business friendly NRC, not public or environmentally friendly.

B-6 Yesterday I received my copy of the Generic Environmental Impact Statement for License Renewal of Nuclear Plants Supplement 27 regarding the Palisades Nuclear Power Plant.
B-7 Reading through both the manual and its cover letters, I see, despite the potential radioactive hazards, the NRC insists the environmental impacts of the Palisades Nuclear Power Plant and the radioactive materials about its reservation is always regarded as small throughout this report. But when I turn to the alternative energy sources, which should be pursued at the Palisades Plant site, their impacts are often referred to as large. Which all considering, they would be, taking into account the enormity of the electrical power the plant puts on the grid, for alternatives to equal out in their current forms at this site.

A rather particular assumption bracketing both the plant and the NRC's positions well, yet ignoring the simple fact that if all the resources used to continue operation of this plant were put into renewables and other forms of electrical generation throughout the state, it would turn the argument on its head.

B-8 What my real concern here is the fact that the GEIS report does not take into consideration of dry cask storage or other highly radioactive contaminated things such as the former steam generators on site. Many would argue the Palisades reservation is already a defacto high level
B-9 nuclear waste dump. Which to their, our Palisades Conversion Group and my viewing of this issue, a large impact on this fragile lake shore environment. More to the point, potential impact should things not go as planned or designed or promised, which over the last 38 years, time and time again have been broken.

With an additional 20 years worth of above ground dry cask storage, along with other contaminated equipment, which is sure to be replaced should this plant be pushed so far past its original design capacity, which it already has by years now. Counter to the GEIS's insistence that no changes to the plant need to take place in the additional 20 years.

Isn't the reactor head soon to be replaced? In July perhaps? The pressure reactor vessel long in question operated in such a patchwork method since embrittlement was discovered more than ten years ago. How long before it's replaced? Annealiated as once promised in court or a neutron thermal shield installed? Or the reactor replaced? B-10

And yes, dry cask storage casks piling up on site. I'm sure we'll all hear about Yucca Mountain or the Goshutes, Skull Valley Indian Reservation taking all of this off our hands for the umpteenth time in the last 20 years. There are now over 20 to 30 dry casks on site. Will anyone here give us an exact number? Or are you going to just dodge the question again, insisting it's a Federal issue, none of this re-licensing businesses concern. B-11

This is a local community concern for we will have to live with and care take all of this waste for generations to come. In '93 we were told these experimental, cut-rate dry storage casks would be gone in '98, time and time again by Mark Savage, the plant spokesman.

Now we're told by the NRC, they're licensed to store --

MR. CAMERON: Ken, I'm going to have to, I'm going to have to ask you to summarize. I'm sorry, Ken, we can attach your full statement to the record.

AUDIENCE MEMBER: Go on for years.

MR. RICHARD: Well, you know, you literally could go on for years because this thing has and it keeps piling up a good record for anybody that really takes a look at it.

MR. CAMERON: Okay. Thank you. Thank you very much. Is Mr. Henkel, is it --

MR. RICHARD: Do I hand these to him?

MR. CAMERON: Yes. Why don't you do that and we'll make sure that we get a copy of them as a formal comment for our purposes. But they will be attached to the transcript. So Mr. Henkel, do you want to still talk to us?

MR. HENKEL: My name is Don Henkel. I've had a cottage at Palisades Park Country Club for about 40 years. We're probably about the closest of anybody to the nuclear power plant. Before 9/11 I had many opportunities to walk in front of the power plant, to enjoy the beach area, et cetera. Our park is 100 years old so, both our cottage and myself and the park have preceded the nuclear power plant by a long period of time.

I am convinced that the way of producing electrical power in this country needs a great deal of attention. There's no doubt in my mind that coal burning and so on adds a great deal of pollutants that nuclear energy does not incur. But that's as long as the genie is in the bottle.

And for many years now I've heard on Saturday morning the sirens go off and this rather metered voice, terrible voice comes over, this is a test, this is only a test. And then at the end of that there's a cow-lunk, like somebody's dropped a hammer or something like that on the floor. And I don't think too much about it because I've experienced this for many, many years. But upon occasion I think, well, what if it were not a test. And that's of course when the genie comes out of the bottle.

E-1 One time I was sitting on the deck of my cottage, which is right on the shores of Lake Michigan, a stone's throw from the, from the plant and of course, this was after 9/11 and a no-fly zone was instituted. And all of a sudden a Japanese zero comes zooming down the lake shore there about 50 feet over the water. It of course flew right over the plant on its way up to an old plane show someplace up north along Michigan.

And I thought to myself well, how easy it would be for somebody, a plane to come on, and you know, I was really surprised that the accident report didn't include sabotage and other things along that line. So that's, that's kind of a problem. I'm a boater, and I boat past the plant many times from South Haven down to Palisades Park where the cottage is. And now it's not a no fly zone, but a no boat zone. The parameters of the property are 3/4's of a mile. And I looked at my boat and I said, boy, those casks are so easy. They're right,, right over there. So I think that somehow or another we need to entrust the issues of, of license renewal for just 20 years because we're really looking, according to what I read, 10,000 years down the pike.

E-2 And sooner or later human beings probably are going to make some errors. And with a gas-fired plant, right across the road you can -- facilities, as the Palisades Nuclear Power Plant that I kind of wondered, why in the world don't we go to a plant already on line there, already ready to deliver, as opposed to the aging Palisades Nuclear Power Plant. Thank you very much.

MR. CAMERON: Okay. Thank you Mr. Henkel. I'll, I am going to ask Viktoria Mitlyng who is one of our Public Affairs Officers from Region three to just summarize what the NRC's stance is, I guess, on the crane drop. And do you want to talk to us for a little bit up there Viktoria?

MS. MITLYNG: Good afternoon everyone. Can you hear me? Yes? My name is Viktoria Mitlyng, and I'm Public Affairs Officer for the NRC. From my accent you could probably tell I'm not a native to this country. Originally, I'm from Kiev which is about 40 miles from Chernobyl.

One of the reasons that I work for Nuclear Regulatory Commission is because I can stand here and tell you what happened. In my former country, I couldn't do that. So when Kevin was

talking about the NRC losing credibility because the public wasn't informed about the crane incident, it got me a little riled. My job is not to get riled, but I was.

The inspection reports that include information about all the findings at the plant are publicly available. There was so much information in our inspection reports produced by Resident Inspectors, by Specialists, that it is impossible at a meeting to come for us and give you a summary of what happened. It's not an expectation we can meet. Other we literally would spend our time sitting here and telling you, telling you what happened, or our Resident Inspectors instead of inspecting the plant. That's not possible.

So I'm hoping that if you're interested in what's going on at the plant, you can take a look at the reports that are publicly available. You can call me anytime and I will let you know what is going on and any information that you want provided about what the NRC is doing.

Now about the cask. I'm not going take long. I'm just going to say that the cask was secured in place. It was not an issue of the cask being about to get dropped. It was a procedural error. And that's why the NRC wrote it up, is because the operators were not supposed to manipulate the grade according to their own procedures, and they didn't. I have a picture of the cask if anybody's interested in taking a look at it. And it is not about to drop, to drop and cause a nuclear disaster.

So the very real issues that people are bringing up here that we want to hear about, however, there are certain things that I really wanted to respond to and one of them is public confidence and openness. The information is out there. And our job is to protect public health and safety, and we take it very seriously. I take it seriously for personal reasons, because, you know, half of my family is gone from leukemia, cancer, et cetera. So I would not stand here and tell you anything that's not true because it would be like, you know, shooting myself. There would be no reason for me to be in this country. And people I work with I trust. So that's what I wanted to say. If you want to talk to me further or you want to hear Russian jokes, come and talk to me after the meeting.

MR. CAMERON: Okay. I don't want to get to, I don't want to get into a long running discussion because we have to hear from, from people on this. Okay? We heard Kevin's viewpoint. We heard from the NRC, which I thought was important on this recent event to hear that.

MR. KAMPS: I just got a quote from the very document that Viktoria encouraged me to read.

MR. CAMERON: Okay.

MR. KAMPS: That -- from the NRC. It took several months to get, but I've got it right here. I'd love to read from it.

MR. CAMERON: Well, let's go through the rest of these people, Kevin, and hear from them. And Kevin is here with a report from the NRC. If people want --

MR. KAMPS: Yeah, I'll just read it real quick. It'll take me 10 seconds. This is an NRC inspection report that Viktoria encouraged me to read.

MR. CAMERON: Kevin, if you, and this, again, is something that is, you know, we don't know what the context is. If you have 10 seconds, let's go 10 seconds from this. I just want to keep --

MR. KAMPS: What is the context? The context is the very incident she just described.

MR. CAMERON: Go ahead.

MR. KAMPS: The NRC Quarterly Inspection Report.

MR. CAMERON: Okay.

MR. KAMPS: Coming out many months after the incident occurred, so we're just supposed to wait I guess. If we wait long enough, that's okay.

MR. CAMERON: Okay. Kevin, go ahead.

A-14 MR. KAMPS: Well, got this through 4F everybody. This is the NRC inspectors writing. Therefore, the on scene inspectors concluded that working outside the bounds of the approved work package and manipulating the brake release on the crane represented an increase in the risk of a load drop, the load being the fully loaded cask on the crane. This increase in risk is directly associated with the reactor safety cornerstone objective of the spent fuel cooling system as a radiological barrier. What does that mean? The pool water could have drained away. What happens then? The waste catches on fire. What happens then?

MR. CAMERON: Kevin, Kevin, you read, you read from that. Okay? And I don't, you know, obviously it is an important issue. The report, you guys can do this later, okay? The report is there for people to read, and Kevin read from one part of it. Viktoria gave a summary of it, okay? And John who's our resident, I don't know if there's a bottom line you want to add to this, but I just want to conclude it.

MR. ELLEGOOD: Yeah, I'd like to conclude this, and we can talk afterwards. We wrote that because you cannot up and manipulate equipment without the proper procedures in place, without the right management oversight understanding what you're doing, without understanding the consequences of what you're doing. In this case, the worker went up there. Prior to going up there he had been briefed. It had been discussed. I have been in the meetings that they would not manipulate any components on the crane. It was to be an

inspection of the crane to understand exactly why the brake engaged, understand if there was any damage at all done to the crane, and understand what they needed to do to proceed to lower the load safely.

The individual up there in communication with an off site vendor decided to manipulate components of the crane and he simply should not have. It's very tough to quantify the change in risk when you've got an individual going up there. I have no idea how far he might have gone, how much he might have slipped. I judge that was an increase in risk. However, at all times there were two brakes fully engaged on that crane. Either one of those could support the full load. Looking through the documentation as to brake failures in cranes, it's about one every 10,000 events for a single brake, probably more than that. Therefore, with two brakes you've figured out is about one to the minus eight. With the guy manipulating it, there's an increase in risk. I don't know exactly how much. Maybe a couple of words of magnitude. One in a million chance. We took it seriously. We wrote a non-cited violation, and we remained observant of the licensee's activities in repairing cranes, maintaining cranes, and in crane operations.

MR. CAMERON: Okay. Thank you very much John, at the plant. And we're going to go back to license renewal now, and we know that there's concerns about these issues so it's important to discuss them. We're going to go to Mr. Dal Monte right now, and then to Mr. Mitchell, and then to Michael Martin. Mr. Dal Monte, do you want to come up? All right.

MR. DAL MONTE: Good afternoon. I am a resident of the South Haven area. I, we select this area for the end of our life. So I retired. I was working in Chicago, and then I came here. And now I have a little time to go overseas. My profession is an Electrical Engineer. I am from Illinois, and today we covered some of my concerns regarding the operating license renewal of Palisades Nuclear Power Plant.

My first concern, and more important I think, is in relation to the spent fuel. Everybody know D-3
that right now the spent fuel is stored outside, next to the power plant. So this keeps accumulating and there is a possibility of, theoretically send it to a central, national central depository. But it was impossible in 40 years to obtain or to realize this central depository. And the reason for that is not political. It's not because people are not doing their work. It's just because they, they waste half their -- long, long time, I mean. You have to keep it under control, under storage for at least 10,000 years. So nobody can guarantee that even the more stable place can guarantee that. So this is, if we continue doing that we are going to keep this material in that place forever. That's what we have to understand. I mean, this is a fact.

What, what, why we are scared? Because we are increasing the possibilities of an uncontrolled releases of radioactive material. The plant has a bigger accident and can have uncontrolled releases, but this other thing we're allowing here can also prove to have accidents by sabotage,

by error, human error, by many things that, one important thing in life is imagination. So with a little bit of imagination, we, we can figure out that this is not way to go. It is not the way to go.

D-4 Consequently, so I will leave this point for the time being and I continue that in this situation my recommendation is that, I request that no approval of operating license renewal be given unless all existing spent fuel is removed from the site and sent to a national central depository.

D-5 My second concern is regarding the equipment refurbishing, refurbishing of our equipment. I have low opinions. A plant with 40 years is ready for a good refurbishing. You can tell that, you have done a wonderful job, but I don't believe it. And your report, the NRC is saying that they considered, I don't know, I don't think, this is requested by the licensee, but the NRC I don't know really, what he's, he's going to do, but it doesn't look like he's going to request --

MR. CAMERON: Mr. Dal Monte, you've raised two very important points, but I have to ask you to summarize now. Do you have another important point to tell us?

MR. DAL MONTE: Yeah.

MR. CAMERON: And if you could just state that and then we'll have to go on --

MR. DAL MONTE: Sure.

MR. CAMERON: -- to the next person. Thank you.

D-6 MR. DAL MONTE: Okay. And my second concern is related a little with the first. The analogy that is used at Palisade has been following -- first. Through the use of a large amount of spent fuel waste, which is highly radioactive and this toxicity for a long time, 10,000 years.

Second, the waste contains plutonium which if enriched could be used in the manufacture of atomic bombs. Third, it is a low efficient use of the fuel, uranium. If continuing with this old technology, the amount of the available uranium in nature could be exhausted in a short time.

The Nuclear Power Industry is in the process of producing a new generation of reactors. General Electric Company, Western Electric Company, Westinghouse Electric Company are doing that using full fuel recycling. These reactors that could be approved by 2015 will not have the above mentioned drawbacks of the old reactor technology.

The spent fuel, the spent fuel in this reactors would be reduced in amount and would require shorter time in storage, 400 years. Therefore a Central depository could be readily found. It would use the energy content in the fuel much more efficiently. The uranium available in nature could last for many centuries. The plutonium in the waste is not usable for manufacture of weapons.

MR. CAMERON: Thank you. Mr. Dal Monte, I'm going to have to ask you to --

MR. DAL MONTE: But, I, I would just to say in regard to this concern, I recommend that any approval of operating license renewal of existing nuclear plants be in moratorium until the year 2015. Thank you for your, for your time. D-7

MR. CAMERON: Thank you Mr. Dal Monte. Thank you very much. Do we have a Mr. Mitchell? Lewis Mitchell? Mr. Mitchell, oops, are you okay? All right. This is Mr. Lewis Mitchell.

MR. MITCHELL: Thank you.

MR. CAMERON: Your welcome.

MR. MITCHELL: My name is Lewis Mitchell. I'm a native of South Haven. We were gone for about 30 years and moved back. I'm retired from this, weekly newspaper publisher. We sold our paper in Illinois and moved back home and found a place out by Bangor, which is directly east of Palisade plant.

I knew about the plant when we bought the place. I wasn't concerned a bit about the plant being there, and I'm still not concerned about it. I believe that nuclear power is one of the best answers we've got to getting power in this country. With all of these other things that have been named, they either don't work fully or they're more expensive and they're harder on the environment. I personally am in favor of the nuclear power. And by the way, I'm also one that says thank god for the atomic bomb, because I was in the 77th infantry division and I saw the coast of Japan that we were supposed to hit. And the reason, one of the reasons I'm here today is because they dropped that bomb. And I'm not the least bit ashamed to say so. K-1

Heard a lot of ifs today. If this, if that, if the other thing, and having been in the newspaper business, I'm a little more inclined to rely on some facts. Not if this happens or if that happens. I've never been in the plant. I've heard people talk about the condition of it. I've never been out there, so I do not know anything about the condition of that plant, whether it's good, bad, brittle or whatever. I'll leave that up to the people that know, the people that are experts. I think the NRC has a whole staff of experts and I'd rather trust them than somebody that's not on the site making inspections and so forth. K-2

Talk about this crane hanging up. I've been around machinery enough to know that there's things like that do happen, and that things can be secured and there's no danger from them. K-3

And this, heard a lot about alternate forms of generating electricity. And I've read quite a bit about it and nothing I have read has convinced me there is a better way. I'm local, sometimes a K-4

K-5 lot of these people from far away come in and tell us how we're supposed to do things. I don't particularly appreciate that either. In my opinion, Palisades is safe and I want to see that license renewed.

MR. CAMERON: Okay. Thank you very much Mr. Mitchell. Thank you. We're going to go to Mr. Martin, and then Mr. Norm Knight and Mr. Milan. Mr. Martin?

L-1 MR. MARTIN: Mark Savage if he was still here can well attest that I've been a gadfly at Palisades for 20 years now. And, thank you, I don't plan to be for another 20. It astounds me that this proceeding can go on like a runaway train in light of the fact that the industry has been allowed to run for 50 years with no high level waste facility, guaranteed or otherwise. Different things about Yucca Mountain are interesting in that they have gone on and approved almost everything that the opponents have suggested, seismic, water leaking into the -- underneath it, and other things. And then most recently, we hear that the original loading of it, if it were carried out would cause overheating and make --, if they were to use it, to have that capacity. And if it had opened 10 years ago when it was supposed to, that capacity wouldn't have taken care of what waste we had at that point anyway. So now it's, maybe a quarter of what we have, if they were to use it. And if they don't use it and the Indian Reservation is brought up as an alternative, it's, it will be interesting to see how the EIS has arranged for that. Maybe there's an -- under it like the Mississippi River for all we know. That sure would be a mess.

And the next part of what I have to say, it's interesting when you go west on the old Route 66 area, we see all the old barns painted with the taverns, and Missouri taverns and Arkansas, and so forth. And it seems back in the early 70's, Oklahoma Power Company decided they were going nuclear. And when they did this, there was a local woman a few miles away who decided that this would not happen and she decided to intervene. She mortgaged her farm, sold her nursing home, and we had quite an interesting intervention on that.

And at the time I worked for a newsman who had been a part of the Manhattan project and went around the country with a brief case locked to his wrist. Had a lot of secrets in it, I imagine. And after that he became an oil well person, drilled a lot of wells. And at the time I was working with him during the intervention and on his newspaper, he candidly admitted to me that he had drilled a well on the side of this Black Fox Nuclear Plant that they wanted to install just east of Tulsa. And when he drilled this well, it went so far until all of a sudden they were drilling into nothing. And they kept adding more divisions to the well, and it still struck nothing. And finally, they just hooked the drill point to a cable and they never did find bottom there. That was where the August nuclear industry was going to put its nuclear plant.

And you've heard of these places where the ground gives away in Florida and stuff. Here's one that could have taken the whole nuclear plant. And as it finally turned out the plant was turned down. They didn't really need that power to begin with. And it's kind of a situation where we're talking about that if we conserved a little bit, we could do without Palisades as well. Thank you.

MR. CAMERON: Okay. Thank you Mr. Martin. Is Mr. Knight here? Yes, Mr. Knight.

MR. KNIGHT: Thank you.

MR. CAMERON: You're welcome.

MR. KNIGHT: I am Norm Knight. I'm from Kalamazoo, Michigan. I've probably been involved with nuclear power more than anybody else in this room. I was involved with the first, dropping the first bomb on Okinawa, not on Okinawa, but from Okinawa to Hiroshima, and three days later on the second one over in Nagasaki. So that I knew these pilots, Mr. Tibbets and Mr. Sweeney on a personal basis and was involved with that for some time.

However, I was released from the Marine Corps and was involved with the studying about nuclear power about that time, and took my training at Edgewood Arsenal in Maryland under a fellow by the name of -- Joe Stillwell, the general from the far east. Since that time I've been involved with pharmaceuticals. I was an Upjohn person. I'm a chemist involved with chemistry. And I can remember one of our -- tests for sodium was to go ahead and mix it with uranium oxide. And then you wait to sodium urinate. Well, that was okay, fine.

But I've been a proponent, and I'd like to thank Mr. Mark Savage for the wonderful job that he's done over there at Palisades. And in the winter time, I also winter out in Arizona. At that point I'm about 20 miles from the Palo Verde Nuclear Power Plant, which is the largest one in the country. It supplies most of the electricity for Phoenix. I have some pictures which I forwarded to Mark Savage, and have some of them here, which involves replacement of the steam generators. These came up, these were too large to come through the Panama Canal, so they shipped them around South America and up through Mexico, and from there they were transported by fazoli trains up to the Palo Verde Nuclear Power Plant. And I still think nuclear power is the way to go. I think today, approximately 70 percent of the power that's distributed in France is by nuclear power. Why we can't go ahead and listen to these people even if we can't speak French. But, I would like to thank everybody here. I enjoyed your program very much. And I'm a proponent of nuclear power, still. Thank you. M-1

MR. CAMERON: Okay. Thank you Mr. Knight. Mr. Milan? Corinne? Can you just point that at you?

MS. CAREY: Great. We'll do that. In fact, while the other people involved in my presentation come
up --

AUDIENCE MEMBER: Can't hear you.

MS. CAREY: Oh, well, I, just a minute.

MR. CAMERON: And Corinne, it's fine to do a little theater, but we do need to watch the time.

MS. CAREY: Yeah. Oh, yes. We will. Yes.

MR. CAMERON: All right.

MS. CAREY: If the other people involved in my presentation will come up please. The Raging Grannies? And we've invited a few grandpa's in the meantime also.

MR. CAMERON: All right.

MS. CAREY: Yeah.

MR. CAMERON: Here we go.

F-3 MS. CAREY: All right. Okay. Now, we do want to say that one of the important points, and the word I haven't heard, is sustainable. We have not talked sustainable power and energy. And in the 21st century and beyond, we need sustainable power, not the fossil fuel which nuclear is also. There's a limit to uranium involved, so it's about time that we began to think for our great great grandchildren. And we have, anybody else? This little guy's going to help us here. This is an adaptation of the Raging Grannies presentations that they have given all across the country in various ways.

Oh, give me a home, where the rivers don't foam, and the squirrels and the chipmunks can play. Where lakes all have fish, you can put on your dish, and the skies are not smoggy and gray. Home, home, on the earth, you're beauty's beginning to fade. We've got to act fast, our -- won't last, our home you just can't throw away.

There's nuclear waste, are inclined to escape, and into the ground they are dumped. We don't want PCB's, in the birds and the bees, and dioxins on our babies rumps.

Oh, give me a home, safe inside the ozone, there is danger in those cosmic rays. Oceans up to our necks, from the greenhouse effect, please don't wash all this beauty away.

And I know that's a silly, superfluous approach. Thank you. I do want to encourage people to find out that radioactive releases from nuclear power plants in the Great Lakes basin, what are the dangers. There are copies of this at that table, and other things. If there's more than one, you are free to take it.

On this table are some other things also. In fact, this gives you quite an interesting map. Some other things, including those thick books, like the one I got from Bruce. Now Bruce is the nuclear facility, I've heard it's the world's biggest. They have, is it nine or 11, reactors in their complex, 50 miles from Michigan. Right across from the thumb on the little pinky finger that sticks out of Canada there. And that is their Yucca Mountain in progress.

Luckily, the wind doesn't very often blow to, on us from the east, so we usually don't concern ourselves with the fact that there, we could be downwind from that. We are downwind. I'm from Grand Rapids, and we are downwind from Palisades obviously. 50 miles was the intervener zone. It goes through Jennison, so I wasn't able to be one of the interveners. I'm another 10 miles in, but that's not far enough if a dangle drops, or any of the kinds of things that can happen in a Chernobyl situation. I would suggest that particularly you pick up one of these. It gives you several interesting articles, including the one that's current about the British report on finding, they call it the Queen's --. Depleted uranium measured in Britain's atmosphere. If it's measured in Britain's, what about the U.S. Who's going to do that? Who makes those studies? Who's going to pay for that? The taxpayers? The nuclear plants? The NRC? How do we know what's going on? I understand one of the problems in our intervener court, court suit is that we don't have specific data from Palisades. Well, who's going to pay for that? Taxpayers? Nuclear plants? Not likely.

Another thing back there at this table is the summary report. And not only is it several pages long, it's based upon U.S. Nuclear Regulatory Commission Freedom of Information Act response documents, and so on. But you can have your very own picture of the cask. So it's back there on the top, stack back there.

I was, I have an encore ready if you'd like.

MR. CAMERON: I heard, I heard no. I heard yes. But thank you. Thank you very much Corinne. Kathryn, Kathryn Barnes? And we're running a little bit late over here, but we'll be done soon.

MS. BARNES: I want to say no matter where you stand on the nuclear issue, if you think Palisades is great and you like nuclear energy, or if you're opposed to it, we're all in the same boat, all of us that live here in this area. And that is that. What happens there is going to affect us. It's not only going to affect us, but it's going to affect our children's children's children. You might be the last person in your lineage if that thing blows because you'll never have any, any offspring with normal DNA, if at all, you survive it. If at all, that you can reproduce. C-5

What happened in Chernobyl was disastrous. Kevin Kamps, who is one of my good friends, brought children from Chernobyl over here. I worked on the U.S., U.S.S.R. Reconciliation Project to stop the nuclearization and the cold war, and we, we were successful. And when I C-6

see these children from Chernobyl whose beautiful souls with their sunken eyes, and they're severely handicapped, and I see American kids who are bright and bouncing around and having fun, Corinne and I ran the Children's Peace Camp and we had American children and Chernobyl kids. The, the contrast between the children was so immense, yet they're all innocent beautiful little children. The only difference is Chernobyl blew and Palisades hasn't yet.

C-7 And I am convinced that because it's of the geology, the problematic problems, the history, the track record at Palisades, the possibility of terrorism, the probability of increased nuclear waste problems, that it's only a matter of time something's going to happen there. And I don't think the risk is worth it. Even though right now were in that, were in a crossroads. And you can take this day and live in this day forever. You could live here. But if after a disaster, you couldn't.

C-8 And there's so much to lose. It's not just your lives, your children's lives and the possibility of grandchildren, great grandchildren, but it's a life in this area. It's the soil. It's our relationship with Canada. Do you think Canada would every forgive us for the fall out? Do you think that we could ever restore the Great Lakes, our water table, if something happened there? And the, and the, the mounds of nuclear waste got into the Great Lakes that's stored there? I don't think you can get it back people. Not with radiation, and not with the huge contamination that an accident would cause.

C-9 And it was only built for a certain amount of time. The engineers that designed that place built it, they thought it would last that long, and the licensing is, is beyond that point. I believe that so far these band-aids have, people have been very lucky that we haven't had accidents with stuck valves, leaking coolant, all accidents that have happened at Palisades over and over again, they've always been able to fix it in time.

C-10 I know someone that worked inside of Palisades. He said he wouldn't work in the Michigan anymore. He works in another state. I won't mention his name. I won't mention what state he works at, although the NRC and other people have tried to find out. He told me that Palisades is the most likely to blow of all the nuclear reactors in the United States. He said it's a well known fact in the nuclear industry. And I said well why, you know, like at DC Cook I know that for ten years they operated with a cooling system that wouldn't function in the case of a melt down. I said are they trying to cover something up at Palisades? He says no, it's just the way they run things. He says they don't report things. He says there's so much that goes on that people don't know about. He says the NRC doesn't know about it, and I don't know what he was talking about. I tried to get more information out of him. He wouldn't talk, but that bothers me.

And I think that a lot people are in the dark and I'm one of them. And I come here. I take time out of my life, and like Kevin and other people, we're doing this without any monetary reward. We're using our own gas money which is expensive and everything else, and I hope somehow

that something I'm saying makes a difference, you know. That something is going, that somehow that something I say or write or do is going to forestall a big disaster. And I don't know if it, if it means anything at all. I don't know if everything I say is futile, if anybody's listening, if anybody cares. But I know that if it blew, then your little plant that's full of holes, if it blew, that people would understand what I'm talking about because you can't get it back. An acceptable risk, as far as you're dealing with something this big, if you can shut it down, go to natural gas, Consumers Energy is already --, then do it. Why not.

MR. CAMERON: Okay. Thank you Kathryn. We have two final speakers. Alice Hirt, could you join us, and then we're going to go to Paul Harden. And then we're going to ask Rani to just adjourn the meeting. Here's Alice Hirt.

MS. HIRT: Thank you. I'm going to be very brief. I, responding I think to David Miller or whoever said that the consequences of the daily releases into the environment of radioactive nuclides is small, I don't know what small means. I know cells are small. And I know that the newest report by the National Academy of Sciences has said that there is no safe threshold for radiation. Not one bit of it. So how do you determine, this is new information. You didn't have that information when you licensed this plant 40 years ago. So this should be considered in your re-licensing process. It's new information. Are you talking about a small person, or a small cell, you know? I'm a small person and I don't want one of my small cells injured. So I think that information needs to be considered in this license application. So please look at that information. G-1

Now the other thing is the issue of embrittlement, and the question was have you considered an accident based on the fact that Palisades is quite embrittled. When Palisades was licensed 40 years ago, the issue of embrittlement I don't think was considered because you didn't really know that that's what was happening or would happen. So in my understanding, this is, if there is an accident, the result, as a result of embrittlement, it would be a beyond design accident, if that's the correct terminology. So that's an accident that you're not considering, but that's new information since this plant was re-licensed 40 years ago. So I think you need to look at what would happen if there is an accident as a result of embrittlement, since you didn't know that when you licensed this plant 40 years ago. G-2

My last thing, in yesterday's New York Times, I don't know if you all saw it, but maybe some of you from the NRC might get red ears when you read this article, because it is, after consulting with the industry, the Nuclear Regulatory Commission weakened security regulations it had proposed for reactors, government auditors said in a report to be released Tuesday. This is a GAO report. The audits said the process, quote, created the appearance that the changes were made based on what the industry considered reasonable and feasible, feasible to defend against rather than assessment of the terrorist threat itself. The report, by the Government Accounting Office, stopped short of saying that the Commission had made changes, quote, G-3

based solely on industry views. This cozy relationship between the NRC and the industry is what really bothers all of us.

MR. CAMERON: Okay. Thank you Alice. I would just ask Juan if you want to talk to Alice afterwards about the embrittlement issue. And Dave, I think the Draft Environmental Impact Statement might address the -- 7 report that Alice mentioned to us. So if you could talk to her about that.

And finally, I think Corinne or someone put a copy of a Wednesday New York Times article on the table over there that talks about a hearing, a Congressional hearing yesterday that provides further amplification on what you mentioned. Okay.

Let's go to our final speaker. This is Mr. Paul Harden, who's the site Vice President at Palisades.

MR. HARDEN: As Chip mentioned, my name is Paul Harden. I'm the site Vice President at Palisades. I'm also a Nuclear Engineer, so I happen to understand the topics and the issues and discussion here very, very well as we discuss them.

N-1 First, I'd like to focus my comments on the purpose of the meeting, the Draft Supplemental Environmental Impact Statement. And I'd like to commend the NRC on the scope and depth of the report. It's very comprehensive and a lot went into it. A lot of views have gone into it. Nuclear Management Company will also have comments on it. Our preliminary review showed, has come up with no issues of significance, but as we complete the review we will also submit our comments.

N-2 Before I address a few of the facts, I'd like to talk about regarding environmental impact to operating the plant, I'd first like to state that not everyone in the public is ever going to agree on whether nuclear power is a good or bad thing. Not everyone in the public is ever going to agree whether the method that this country has chosen to store fuel is a good or bad thing. The diversity of the people, the diversity of the views, and our freedom to express them, that's part of what makes this country great. So I think it's okay that there are differing views out there. But I would like to address a few facts regarding the environmental impact of operating Palisades Nuclear Plant.

Environmental responsibility is built in to the design, the operation, the management and the regulation of nuclear power plants. There are multiple redundancies. There are multiple levels of safety. There's defense in depth, and there's a regulatory agency that's very, very intrusive into how we do business to insure that environmental responsibility.

The employees at the plant, they're also residents. We raise our children, my baby in the back of the room, here in South Haven and we have a vested interest in also insuring that the plant is

environmentally responsible. We continuously monitor radiation levels at the plant. We continuously monitor the release paths from the plant. That's not all we do. We go on to verify it. We sample soil. We sample fruits. We sample fish. We sample water from surrounding areas as an additional validation that we are maintaining the environment safe.

And there are multiple regulatory agencies, not just the Nuclear Regulatory Commission. There's Environmental Protection Agency, and there's the Michigan Department of Environmental Quality all of which enforce strict regulations and review what we do at the Palisades Nuclear Plant to insure that we are safe to the environment.

Consumers Energy and Nuclear Management Company are convinced that Palisades can be operated safely with minimal impact or adverse impact to the environment. That's why we're investing millions of dollars in the plant in upgrading the plant and the equipment today as we proceed forward with our license renewal process.

We're satisfied the continued operation of this plant is an environmentally responsible decision, and I'm also quite gratified that the Draft Supplemental Environmental Impact Statement has come to that conclusion. And we look forward to a long and prosperous operation and a very safe and environmentally sound manner at the Palisades Nuclear Plant. N-3

MR. CAMERON: Okay. Thank you very much Mr. Harden. I'm going to ask Rani Franovich to just --

MS. FRANOVICH: Are there any more comments?

MR. CAMERON: No.

MS. FRANOVICH: Okay.

MR. CAMERON: We're good.

MS. FRANOVICH: I just wanted to again thank you all for coming to our meeting. I mentioned at the beginning of the meeting, and I really mean it. Your comments, your participation is really important to our process. It helps us to insure that we didn't miss anything. So thank you for your input.

Excerpts of Transcripts of the Evening Public Meeting on April 5, 2006, in South Haven, Michigan

[Introduction by Mr. Cameron]
[Presentation by Ms. Franovich]

[Presentation by Mr. Bo Pham]

MR. CAMERON: Okay. Thank you, thank you both. Thanks, Rani.

Are there any questions on the review process with the NRC? And please just introduce yourself too.

MS. BARNES: My name is Kathryn Barnes. I have a question. You mentioned biocides. I was wondering what biocides are used at Palisades and for what purpose.

MR. PHAM: I don't have the, I just gave that as an example. I would have to probably get back to you on that on the specific biocides. But that's just an example of, you know, things that are released and the known release into bodies of water if any that we document in the generic environmental impact statement.

I do not have, I don't have the specific on that right now.

MR. CAMERON: And Kathryn, if we have more information we'll get that to you. John.

MR. ELLEGOOD: Just real quick, a lot of licensees use some sort of biocide to limit the growth of clams in service water systems. Palisades is no exception to this in terms of biocides that would be used --

MR. CAMERON: Thank you.

MS. BARNES: Do you know what it is.

MR. CAMERON: Now what --

MS. BARNES: I, I was wondering what kind, what kind of chemical components --

MR. ELLEGOOD: I'd have to get back to you --

MS. BARNES: Hydrocarbons or?

MR. ELLEGOOD: We'll get back to you.

MR. CAMERON: We'll find out specifically for you. Process, did you have something, you don't, okay.

MR. SCHAAF: I don't have the specifics off the top of my head but we, that's one of the things we, we did talk about in the supplement. It, it'll be identified in the supplement to the GEIS and

also those are, those releases are permitted by the State of Michigan and, and the permit includes conditions on which materials are, are able to be released. And at what, what concentrations.

MR. CAMERON: And if Kathryn wants to see the specifics she can find that in the draft environmental impact statement.

MR. SCHAAF: The permit is available in our document management system. The utilities are required to submit a copy of, of their permit when it's renewed. These permits are renewed on a, on a five year basis.

So we can identify the accession number in our document management system if you're interested in that information.

MR. CAMERON: Okay. Thank you very much. Process questions? Yeah, and.

MR. RICHARDS: One of the things, Ken Richards, one of the things I was looking through the manual for was the plant's original decommissioning date. I found decommissioning dates in there but I've always been curious what was the original decommissioning date for the Palisades Plant.

When it was first built we were told 20, 25 years.

MR. CAMERON: Right.

MR. RICHARDS; They'd be building another plant after that. They even worked on it, and it's been like 38 years and now they want to go another 20 years with this. But I'm wondering what was the original decommission date. And I've been all through this thing --

MR. CAMERON: Okay. We're going to try and see if we know that.

MR. PHAM: I don't have, I don't know what the intention was for the original decommissioning date. However, as Rani said in her part of the presentation that when the NRC licenses a nuclear power plant the, the life of the license is for 40 years --

MR. RICHARDS: 40 from that?

MR. PHAM: Yes. And that's, that's also based on economic reasons not on plant aging.

MR. RICHARDS: Well, what does that --

MR. CAMERON: Okay. Can we, we need to get everybody on the transcript. Could we follow up on this.

MR. RICHARDS: Well, when did they issue a 40 year permit? Because I remember back in the late 60s, early 70s they were talking 20, 25 years. Now they're saying 40.

MR. CAMERON: And I think the very simple answer is when we, when we gave this license to Palisades originally what was the length of the license time.

MR. PHAM: The, 2011 is the --

MR. CAMERON: Okay. Carry on.

MR. RICHARDS: That's the current --

MR. CAMERON: All right.

MR. PHAM: We haven't, we have --

MR. CAMERON: Let's, let's, do you have anything else then?

MS. FRANOVICH: That's, that's the length of the license. Now maybe the utility at time has talked about closing before the license ends. Maybe that's the information he has.

MR. CAMERON: Okay.

MS. FRANOVICH: And that would be their decision, it would be a business decision.

MR. CAMERON: Yes, sir and please introduce yourself.

MR. ADAMS: Duane Adams. My question is what was the design during the 60s when, when this was on the planning books. You design a piece of equipment to last a certain period of time.

What was that in that original document and is it in this document that you just issued? Because normally the plants are built to last a certain period of time much like cars are.

MR. CAMERON: All right.

MR. PHAM: I think the answer to that would be that when the plant, the plant was, I don't, I don't think this plant was specifically designed with components lasting a certain period of amount of time.

Everything that the NRC does basically is to ensure the health and safety of the public and so we had ongoing safety programs to ensure that the plants are operated safely.

And part of that is the equipment managing process in which we look at the safety equipment and make sure they're operating and, and they're going to be sustainable throughout the life of the plant.

MR. ADAMS: But there are certain components you cannot look at.

MR. CAMERON: Okay, sir, sir. We need to get all comments on the record and maybe Rani can provide a little bit more on that question.

MS. FRANOVICH: Yeah, with the, with the license being for 40 years the utility may have purchased certain components that may have a life of 40 years or less in which case they replace or refurbish those components to ensure that they perform their intended functions during the extended period of operation.

MR. CAMERON: Okay.

MR. ADAMS: All the components have --

MS. FRANOVICH: No.

MR. CAMERON: Sir.

MS. FRANOVICH: No.

MR. CAMERON: Sir, we need to get you, you know, on the transcript so.

MS. FRANOVICH: Those that may have a design life for 40 years or less may be replaced or refurbished to ensure that their intended functions are performed. That's what we inspect.

MR. CAMERON: Okay. Thank you. Let's go to one other question here and then go to, to the draft EIS.

Yes, sir.

MR. HANNON: My name is Robert Hannon. I just want to, I, I think what the gentleman is getting at is I'd like to ask the engineer, there was an engineer over here. The major components of that plant I think what the guy was trying to get at is anything that's built like that the critical stages of when it's break, it's break in point and when it ages.

And I'd just like to know from the engineer if, if indeed that is, that's correct. Just a yes or no would be fine.

MR. CAMERON: And the question is whether the critical point is the break in period and then in, as it gets --

MR. HANNON: As it --

MR. CAMERON: -- to its end of its useful life --

MR. HANNON: Yeah.

MR. CAMERON: -- aging.

MR. HANNON: Exactly.

MR. CAMERON: All right. John.

MR. ELLEGOOD: What you're thinking of is with components you typically have a infant mortality and, and
a life mortality of the component when it fails.

At the power plants they do routine inspection surveillance as preventive maintenance activities on components a lot of predictive maintenance to determine if that particular component is nearing it's end of life and try to replace it for pro actively before it fails.

As part of the license renewal process there was an extensive evaluation of the aging management programs to make sure that they were in place and licensing was doing additional inspections above and beyond what they had historically been doing to find out those types of issues.

For example a pipe a certain wall thickness eventually is going to erode, make sure they have a process in plan to determine the remaining wall thickness and replace that pipe if necessary.

So the answer becomes they had an ongoing program and the license renewal process adds additional inspection activities and aging management activities to replace components before they fail.

MR. CAMERON: Thank you very much, John.

We're going to go to Dr. Dave Miller to talk about the findings in the draft environmental impact statement now. And then we'll go back to your questions.

[Presentation by Mr. Dave Miller]

MR. CAMERON: We're going to get a bunch of questions so if you could just --

DR. MILLER: Oh --

MR. CAMERON: Maybe we won't get a bunch but we'll get some questions --

MR. PHAM: Chip, I just wanted to follow up with Kathy on her question and, and we verified in our document that the State of Michigan does license Palisades to, to use Chlorine, Bromine and Amine as far as their permit for biocides.

MR. CAMERON: And if you could when after the meeting why don't you point out where that is to her so she can see the content. But let's go, thank you, Bo.

Let's go to see if there is questions on the, the analysis on the presentation you just heard. Any, any questions on, on that. Yes. And just please introduce yourself to us.

MS. MORGAN: My name is Jeanise Morgan. I was wondering what does it take to get denied or, you know, the license denied. And has this group ever done that?

MR. CAMERON: Okay, good, thanks Denise.

MS. MORGAN: Jeanise with a J.

MR. CAMERON: Jeanise, I'm sorry. Jeanise, two questions is what does it take for a denial. That means all the different parts of the analysis and what is our history in terms of denial, how do we modify applications that come in.

Bo, do you want to start us off on that?

MR. PHAM: Yeah, the first part of that question what does it take to deny a request is basically the standard that I had, that I put up before is we look at the environmental impact to see if it's large enough to the point where it would be unreasonable for us to leave -- as an option.

Now that sounds like a very subjective measure I realize that but it's, it goes back to for example the hypothetical example that Dave used on the fishery on the lake for example.

MS. MORGAN: Can you give me a real example of one that you denied?

MR. CAMERON: Let him, let him get there and we'll go to that.

MR. PHAM: So that's the answer to the first part --

MR. CAMERON: That's why it's, it's not a complete answer in the sense that that's only the one part of the review the environmental part of the review.

MS. MORGAN: I understand that but I just want an example have you ever --

MR. PHAM: From a, yeah, from an environmental perspective if a resource is impacted to the point where it cannot be sustained is the general answer on that, okay.

MS. MORGAN: Is that --

MR. PHAM: The second part of, the second part of your question has it ever been denied. No, the NRC has never denied. We have, we have returned applications to applicants because of lacking of information or inadequate formatting of the information that they provided us. I remember, the process isn't a go no go process.

The applicant submits their application. We review it for consistency with our standards and if it contains the adequate information that's required per regulation.

Now if it doesn't to the point where it's not, it's not quite at the, you know, at the effort where we should be putting the effort into doing the review without adequate information then we will return it to the applicant and have them look at it again or review it for quality of purpose prior to trying to, to trying to submit such a document.

MR. CAMERON: And Rani, do you have anything to add to that for Jenise?

MS. FRANOVICH: Did that answer your question or are you satisfied with that answer?

MS. MORGAN: I was hoping for a good example of one you might have stopped because it just seems to me there would be one that would need to be shut down.

MS. FRANOVICH: Okay.

MS. MORGAN: And I'm sure you have a lot of years under your belt to say that there would be one that was just so bad it shut down.

MS. FRANOVICH: Well, to tell you the truth when applicant comes to the NRC with a license renewal application they have advanced invested a substantial amount of time and money in putting together their application to demonstrate to the NRC that that plant will be safe to operate and will not adversely impact the environment.

If an applicant cannot do that then they will probably decide not to apply for license renewal because it's costly endeavor.

So if an applicant feels they cannot demonstrate that to the NRC they will not pursue license renewal.

MR. CAMERON: Okay. That, I think might give Jeanise an idea of why a lot of the applications end up being granted --

MS. FRANOVICH: The applications will be typically accepted by the NRC we have returned applications that we felt were not adequate or sufficient for us to conduct our review.

MS. MORGAN: But 100 percent of those have been okayed then? 100 percent?

MS. FRANOVICH: Well, when we, when we get the application we review it. We typically will ask a number, a large number of additional questions. When I was project manager for license renewal for Catawba and McGuire we had 273 requests for additional information.

So the application comes, the staff looks at it. The staff almost always is not satisfied with that which is in the application. So we engage with the, with the applicant to get more information so we're satisfied that continued operation of the plant will be safe.

MS. MORGAN: I guess it's just hard to believe that never one has never been, you know, denied like that.

MR. CAMERON: Okay.

MS. BARNES: Wasn't there two --

MR. CAMERON: We're going to go, Kathryn please just don't just speak out we need to try to get people in turn --

MS. BARNES: I think --

MR. CAMERON: -- and get them on the record and we're going to go to this gentleman over here. Please introduce yourself, sir.

MR. KAUFFMAN: Maynard Kauffman. And I have a question for Dr. Miller and ask if you really want to stand by those figures that you cited on wind energy 125,000 acres for I presume the kind of megawatts the plant currently produces. P-1

If you, if you, if you do the calculations here I know there's been machines that put out four megawatts each and there could be, you know, maybe you'd need about 200 of them or so to do that and that would be about 500 acres per machine. And that makes it look as if wind is really impossible but it's not. And I think there's a fallacy in there.

MR. CAMERON: Okay. Dave, do you want to address that and we're going to go to, to another questioner.

DR. MILLER: Yes. The, the information I provided to you is in the generic environmental impact statement and you'll see that in the references.

And I would encourage you to provide us as a part of you comments any additional updated information that you might have on that because that is exactly the kind of thing we would look at.

MR. KAUFFMAN: All right, I appreciate that.

MR. CAMERON: Thank you, thank you Maynard. Yes, ma'am.

Q-1 MS. ADAMS: My name is Sandra Adams and I'm curious as to where Homeland Security and terrorism falls in this environmental impact. Are you going to discuss that tonight or are you going to discuss that later?

MR. PHAM: Security is part of an ongoing review process at the plants. So emergency preparedness and security are part of the everyday items that we look at at the NRC. And there are processes in place that look at the adequacy of the security of the plant. So therefore it's not part of the license renewal process. So we look at more than aging management of equipment. And in our case our team looks at the environmental impacts of it.

And so no we will not address that tonight because it's beyond the scope of --

MR. CAMERON: And as Bo pointed out and I think Rani did in her presentation it's considered an everyday issue that we need to look at. Yes.

MS. ELLIGIN: My name is Mary Ann Elligin. I'm with the Michigan Department of Environmental Quality and to answer, was it Jeneane,

MS. MORGAN: Jeanise.

MS. ELLIGIN: Jeanise's question we had Big Rock Point out just a couple years ago. They went through this study prior to putting it down to the NRC and submitting it and they decided they could no longer operate under this kind of condition.

And so the plants themselves are wise enough not to pay to go through the NRC process and to take themselves off.

MS. MORGAN: Yeah, I knew about that.

MR. CAMERON: Okay. Thank you, thank you very much. Let's go over here. Yes.

MS. TIDWELL: Hi, I'm Carol Tidwell. I just have a question about the Argonne National Lab. Is that related to the government? Is it part of the government --

DR. MILLER: Argonne National Laboratory is one of a number of national laboratories. The, the structure is such that the Department of Energy owns our facilities but we are operated under contract to the government by the University of Chicago.

Other labs are operated by other consortiums typically universities but sometimes they're corporations of some sort.

MS. TIDWELL: So is there, is there a private not connected to the government agency that reviews these plans/

MR. PHAM: Yes, actually we are using a contractor Earthtech that is doing the review for one of other plants as well.

MR. CAMERON: And you might want to note that whenever, for any contractor that we use to help us with this there is a specific conflict of interest review that has to take place to make sure there's no conflicts between who is doing it and the work they're doing. So is that right, Bo?

MR. PHAM: Yes. The answer is yes we are using commercial contractors.

MR. CAMERON: Okay. Did you want to add anything, Rani?

MS. FRANOVICH: I just wanted to affirm what you said, Chip. We cannot use a contractor that is for example engaged in doing work for the very applicant that has requested license renewal.

MR. CAMERON: Okay. Let's to Mr. Hannan and then Kathryn.

MR. HANNAN: I, you mentioned the amounts of radiation that are admitted or released annually was small. Does radiation accumulate in the body over time? And has anybody ever tested people who live in Covert medically to see the amounts of radiation that, that are in their bodies?

MR. CAMERON: Okay. Two, two good questions. And one of them is the accumulation and the second one is whether there has ever been a health study done --

MR. HANNAN: Yes.

MR. CAMERON: -- on, on radiation here.

MR. PHAM: I'm going to try to answer this man and Rich can help me in the back there.

But to answer the question yes radiation does accumulate in the body. The amount of radiation released from the plant is in our definition per the EPA standard. We don't look at specifically at the content but at the dose that's received from the population and that's the standard we're, we're looking at.

The second part of your question I believe you were asking is anybody looking, looked at the accumulation, Rich, which could you provide additional information on that.

MR. CAMERON: Okay.

MR. EMCH: Yes, I'll be happy to. My name is Richard Emch and I'm a health physicist and I work for the U.S. Nuclear Regulatory Commission.

To get back to the first question, sir, about, about accumulation in the body. Yes, there is, there is some chance of accumulation in the body. And in fact there are certain radio nuclides that you have in your body all the time no matter how far away from a nuclear power plant you live, okay.

In addition to that though I wanted to point out the dose models that are used where we calculate doses and let's say you receive a certain amount of -- or something like that from the plant the dose models that we calculate have what we call a 50 year dose commitment.

In other words we're saying when we calculate the dose we're saying the dose that you're going to receive from this amount of radioactive material, we're, we're estimating what that dose is going to be over a 50 year period.

We're assigning it all in the one year but it's estimated over a 50 year period.

The second question I believe was about health effects about monitoring of heath effects.

MR. CAMERON: And whether there's ever been a study of health effects in Covert --

MR. EMCH: In 1990 the, the Congress commissioned the National Cancer Institute to do an evaluation of, of available data about cancer incidents around nuclear power plants. And then they also looked at control, what we call control counts and Palisades was one of the plants that they looked at.

And the conclusion was that they saw no increased incidents, no, no evidence of increased incidents of cancer from living near a nuclear power plant. And that includes Palisades.

Beyond that what I would like to point out and I'll give you an example of why that's the case.

Earlier Dave said that the doses from, were very small. In reality the doses are less than 100th of one milligram per year maximum dose for an individual living or working near a power plant.

For usefulness of comparison the standards, the EPA standard is 25 milligram per year from the entire fuel cycle. The, if you go to the dentist and get dental X-rays you're probably looking at 5 to 20 milligram. You take a cross country flight you're probably looking at 2 to 5 milligram. Just by being an inhabitant of planet earth you're getting in the neighborhood of 300 milligram a year from all sources including radon.

So you can see that the doses, the difference in doses here we're talking this much versus this much.

That's, that kind of thing is not going to show up in health studies. And so as far as I know there's been nothing specific done in Covert.

Now we did talk to the state agencies to, to the State of Michigan about this and they indicated that they were aware of no problem. So we did look at that as well.

MR. CAMERON: Great, thank you. Kathryn. Let me get you this microphone.

MS. BARNES: Yeah, two things. First of all I believe that there was a couple of the reactors in the State of Maine. The Yankee Row and another one that were trying to get re licensed and they were denied a re licensing. And also I have heard, read that the level for nuclear power plant workers is higher as if they're super human. In other words their level for milligrams per year is higher than an average person.

And I also read that the, the standards for how much, how many milligrams per year a person can have was increased. And I wonder how that's justifiable. I don't believe there their physiological beings are any different than anybody else's. So two things.

MS. FRANOVICH: Actually I counted three.

MR. CAMERON: Okay. And the first one in terms of --

MS. FRANOVICH: Yankee Row and --

MR. CAMERON: -- Yankee --

MS. FRANOVICH: Yankee Row was considering license renewal back in the early to mid 90s before we actually even finished our rule and realized that they really could not demonstrate that the plant could be run safely. It didn't generate a large number of megawatts.

And so they made a business decision to not go through license renewal. In fact I think they actually shut down and are decommissioning.

As far as Maine Yankee goes they did not ever file for license renewal either. They also decided to shut down the plant. It was a business decision. They did not produce a lot of electricity to, either. And so they decided to shut down and they are decommission those, that plant.

So no those plants never did come in for renewal. One of them I know did consider it and decided for economic reasons not to.

The second question or second comment.

MR. CAMERON: Question is the standards for the radiation doses that workers at a plant can get, are --

MS. FRANOVICH: It's a different standard --

MR. CAMERON: -- higher than the standard for the general public is, is what Kathryn was saying --

MS. FRANOVICH: I believe that's the case --

MR. CAMERON: -- is that, is that true and why. Do you want Rich to do it or do you want to do it?

MS. FRANOVICH: I'm going to let Rich comment on that but I think she also made an assertion that they receive higher levels than the general public.

MS. BARNES: No, that the level was increased for the general public --

MS. FRANOVICH: The standard was increased.

MS. BARNES: Yes.

MS. FRANOVICH: Okay, Rich.

MR. CAMERON: Okay. We got an answer over here, Kathryn. Richard.

MR. EMCH: Okay. I'm a little confused. I'm going to try it and if I don't quite get it you let me know, okay.

I am not aware of any increase in radiation standards for either members of the public or for occupational workers ever. I, I don't ever remember seeing that. Occupational workers are limited by Part 20 to five rem, I was talking earlier about millirem. Now I'm takimg rem, five rem per year for an occupational exposure limitation.

And as I said before the 10CFR, I'm sorry 40CFR190 which is the EPA regulations, we have a set of regulations ourselves but they're, but they're supposed implement the, the EPA regulations.

The EPA regulations are, must be less than 25 millirem to any member of the public from the entire fuel cycle and that includes Palisades or, you know, if another plant was nearby it would be both plants are included.

Did I cover what you were asking? I'm not sure I did but.

MR. CAMERON: Why are they higher?

MS. BARNES: So there is, there is a different standard, there's a different standard?

MR. EMCH: There's a different standard for members of the public and for --

MS. BARNES: Right.

MR. EMCH: -- occupational, for workers yes.

MS. BARNES: Right. They're stand, they can tolerate supposedly more radiation than average people.

MR. EMCH: Actually in fact biologically no. They're just very healthy members of the public, okay. And, and in fact a member of the public could get five rem and you would probably see no, no health impact on them either, okay.

But the belief is because the worker makes a conscious decision to work at the plant and, and undergo whatever risk there is just like working at, if you're a fireman or a, or a policeman or whatever there's certain risks inherent with your job.

But occupational worker like at the plant makes a decision that he's going to incur those risks, okay. The plant does a good job of trying to make sure that he gets a very low dose.

When we're talking about members of the public that's a different story. You folks aren't volunteering for anything in terms of radiation exposure so that's why the standard is so much lower for members of the public.

MR. CAMERON: Okay. Thank you. And I just want to go the State of Michigan to add anything that she wants to on this. We're going to take a couple more questions and then we're going to go to Bob Palla so we can hear about the severe accident aspect. Go ahead.

AUDIENCE: I just want to back Rich up. As a radiation worker I have protective clothing and I also have other protective features that we have available to us. These are not available to the public. So politically we have determined that the public needs a lower dose because you are not aware of what you can do to help your dose. And you're not aware of that you're getting the dose.

So the State of Michigan chose an even lower one than the DPH standard and we have our own administrative limits for our public.

MR. CAMERON: Okay. Thank you. Thank you very much. Let's go over here and then Ken and then Maureen. Go ahead.

MR. ADAMS: Wade Adams. I have a couple of questions actually. One goes to the lady over here. It's my recollection that Big Rock went, went into service about 1959 or 60 about 11 years
R-1 before Palisades. And it's my recollection that Big Rock has not been running really as a power plant for some number of years here now. And it's got a lot of trouble.

So that means that if you go ahead and, and renew this you'll be, this reactor will be far exceeding the line time of the Big Rock Plant in terms of production.

R-2 My second question is to the health scientist. Is there any level of radiation where you cannot achieve an increase in incidents of cancer.

It is my understanding that there is a linear relationship and there is no threshold between the incidents of cancer and your exposure to radiation, the lifetime.

MR. CAMERON: All right. I don't know what we can say about the Big Rock comparison to, to this plant. I don't think we'll be able to say anything about that.

But, Rich, can you talk about the, the, you know, the linear no dose threshold and maybe you can go up there and do that and then we're going to go to this young lady here and over here and then we'll go back to a presentation.

MR. EMCH: It wasn't actually part of what I was supposed to answer but I think you're, you're assumption is correct, sir, if the, if the, if Palisades is granted a renewed license I'm sure they will operate longer than Big Rock Point did.

MR. CAMERON: Can --

MR. EMCH: I'm sorry, can you not hear me?

MR. CAMERON: We want to go to the --

MR. EMCH: To what I'm really up here for?

MR. CAMERON: Yeah.

MR. EMCH: Okay. Fair enough, all right. Yes, sir, you are correct. And in fact the NRC does stand by what's called the linear non threshold theory. You've seen it probably in a number of places. It was mostly recently reconfirmed in something called the BIER 7 report which I earlier today somebody mentioned to us.

And basically this theory is that there is, that there is some but there is no actual threshold that this is some amount of risk associated with any amount of exposure. Okay, very simplistically, okay.

What I was, and, and the NRC follows that, that theory as do most of the, the low radiation protection community does. And, and that's part of why the, the, those limits that I was talking about for the public are as low as they are.

Earlier when I said that there was I think I think I mentioned something about no recorded or no health effects below five rems or something like that I was talking about things that had been reported or things that had been found in the studies.

But again back to the very basic philosophy. The NRC's philosophy, the NRC's theory our, our regulations are based on the concept of a linear non threshold theory, yes.

MR. CAMERON: Okay. Thank you and there is a discussion of the BIER 7 report in the draft environmental impact statement.

Do you have a quick follow up, sir, because we really need to move on.

S-1 AUDIENCE: Well, I wondered if I, I presume that you couldn't calculate an increase number of cancers that would develop because of the increased exposure to radiation in the locality of this plant.

And second the study you cited that was commissioned by the National Cancer Institute was a bonafide epidemiology study that, that really looked for a hot spot.

MR. EMCH: What they did was they looked at all of the available data from various counties, the counties where these, where these plants were located, control counties that, that would presumably not have any effects from them and that we can certainly give you that information.

It's, it's full of information like, I don't want to get into it because it actually, some of it I have trouble understanding.

But I'm a health physicist not an epidemiologist, that's why I have some difficulty with part of it.

I'm sorry, what was the, there was another part of it or? Oh, yes, yes.

Actually these the, the international committees like the international, I can never remember, it's commission and radiation protection, I believe it is, they have, there's a publication ICRP-60 that does have coefficients that you can, that you multiply these coefficients times a dose.

If you say this person got a certain dose you can calculate it times those coefficients.

Now if you took, those coefficients are really intended to be used for population dose. But if you took those coefficients and multiplied them times a number like .01 milligram per year it's, it's not worth doing. It's so small.

MR. CAMERON: Okay. Thank you, Rich. Yes.

T-1 MS. OVERHEISER: My name is Liz Overheiser and I have two questions involving the last point on the board there.

That includes, well, yes I guess, all of, and when you consider those solar and wind power would that be like a centralized like field of windmills and --

MR. PHAM: Yeah. The, the model --

MS. OVERHEISER: -- sun panels.

MR. PHAM: Again the modeling assumption, can you hear me okay.

The modeling assumption is that Palisades produces a certain amount of megawatts right now, 780 plus some change.

The, so what we look at as an alternative is a, that we're going to replace that we need something to provide the same capacity.

And so whether the, the wind farm is separated into several different areas or all centralized in one location. The bottom line is you, we have certain, some [thumb]rules that we have for X amount of, a certain number of, of megawatts per acreage for the wind farm production.

So in the end aggregately you're going to need that much acreage, you know, even if it's in one place or all separated.

MS. OVERHEISER: Well, I'm --

MR. CAMERON: Okay. Do you want to a follow up there, go ahead.

MR. OVERHEISER: I'm worried about like the environmental effects. Is that moderate or large considering that it would be all in one place.

MR. CAMERON: And there's a, there's a good, a good point is that conceivably there would be different environmental effects depending on whether it was centralized or decentralized. Good comment also but Dave can you talk to, to that in terms of how we considered that in the draft? Thank you.

DR. MILLER: It, it does depend on what alternative source you're talking about. Now for instance the gas, coal, they have to be in one place to replace that base load.

The, the combination of alternatives that we look at which would mean drawing from more than one single source to make up that amount would therefore be a smaller incremental part compared to the overall whole.

I hope I'm getting to your question. Because, because the impacts then are looked at. So for the one where you'd need a coal plant on an entire site that would look at consuming that entire site.

For the kind of individual piecing together of different sources of energy then it's fractioned by the amount they contribute. So that's how the impacts are evaluated. Does that get to what you're after?

MR. CAMERON: And maybe, maybe we should also consider that as a comment.

DR. MILLER: Yeah, I was about to say --

MR. CAMERON: Yeah, okay --

DR. MILLER: -- I mean that's something we, we are going to take away with us today. It's a simple answer and current modeling in what we looked at in alternatives. Yes, it's all collectively or is all centralized in one location.

MR. CAMERON: Okay. Let me, let me try to, I know we have two people here we haven't heard from, from you. So let me, let's just do some, try to do this quickly so we can get --

MS. ANDERSON: Elizabeth Anderson. I would like to ask Rani this question. You know, because -- if you really feel that a place should be shut down are you allowed to deny the license renewal or are you only allowed to give recommendations?

MS. FRANOVICH: If we feel that a plant needs to be shut down license renewal is not even a consideration. We will issue an order to shut them down when we feel it is necessary.

License renewal is should they extend operation from the end of their current term, which is a 40 year terms, for another 20 years.

If we have a concern about utilities performance today to the point where we're not comfortable with letting them continue to operate we won't wait for license renewal to take action.

MS. ANDERSON: This recommendation --

MR. CAMERON: The NRC is not an advisory body. They're a regulatory body and if the regulations are, are violated and the plant needs to be shut down we have the authority to --

MS. FRANOVICH: We have the authority to issue an order to shut the plant down. We have a number of other tools in our toolbox to either impose additional requirements if we feel that there are safety issues at the plant and to enforce existing requirements to demand information.

I mean we're a regulatory agency. We, we determine whether or not a plant is safe enough to operate. And if we don't think that they're safe enough to operate irrespective of license renewal we will take the actions that --

MR. CAMERON: Okay. Thank you for that question too. And Ken and then with Corrine and then Bob are you ready.

MR. RICHARD: I have a quick one for the health risk physicist. When you were answering her question you were -- alpha, beta, gamma radiation like it was altogether, it's all the same thing. And now you're talking about normal background; can you explain to me the difference between alpha, beta and gamma radiation

MR. CAMERON: We have them, we have them behind you right over here. Okay, Rich, you got a question, right?

MR. EMCH: Yes.

MR. CAMERON: Okay, good. And Corrine we're going to go to you and then we're going to go back to presentations.

MR. EMCH: As you pointed out, sir, there are a number of different kinds of radiation alpha, beta, gamma and neutrons. Actually if you look at some of the documents you'll find that we even attribute a different quality of factor to fission product fragments.

MR. CAMERON: Speak up, Richard, if you can.

MR. EMCH: Okay. And all, I mean all this is when, when I'm saying a dose I'm usually talking in terms of the whole body or total body dose, okay.

But we do also look at organ doses. We look at internal, you know, doses taken through ingestion and through inhalation. And, and when we do that that's when you really start, that's when the ones like the alpha and the, and the beta really start to come into play because they're really not dangerous at all outside of the body but once they get inside the body they can be, yes.

And those are included in the dose models, yes, sir.

MR. CAMERON: Okay. Corrine.

MS. CAREY: Yes. Regarding the screen that is showing up there. Which one of those is insignificant? Small, moderate, large. Because time and again I keep hearing reference to impact is insignificant.

MR. CAMERON: Can you just give us, why don't you discuss the individual items and explain those very quickly to Corrine and I think it will be obvious, Dave.

MS. CAREY: I wanted a specific answer --

MR. CAMERON: Right.

MS. CAREY: -- and I wanted to know if significance is a matter of a cumulative situation like radiation is itself and if so at what numerical point does insignificance become significant.

MR. CAMERON: Okay. We got a little bit more information on what Corrine's question is with that. Do you think you can --

DR. MILLER: I think I can.

MR. CAMERON: Okay.

DR. MILLER: And Corrine help me --

MR. CAMERON: Good.

DR. MILLER: -- if I don't get it.

MR. CAMERON: Okay.

DR. MILLER: We try to be very careful not to call anything insignificant in our evaluations. In fact we try to stick because of the definitions I provided earlier to small, moderate and large.

And if I use the term insignificant anywhere I, I should be corrected. But I, I hope that I didn't. I don't think I did.

In terms of quantification there are elements of these that simply aren't quantifiable but we use weight of evidence and multiple lines of evidence to come to the conclusion about whether it's a small, medium or large.

And we use those definitions that I had provided earlier and we would skip back to them if you like. That, that, to look at the impact to the resource that we're concerned about and, and in essence the semi quantitative magnitude of that impact.

MR. CAMERON: Okay. And if, if Corrine needs further information please, please talk to her. Bob Palla. Thank you, thank you both, Dave and thank you Rich and Rani. Bob.

[Presentation by Mr. Bob Palla]

MR. CAMERON: All right, thank you.

MR. PALLA: -- questions.

MR. CAMERON: Thank you. Any questions on SAMAs at all? Okay. We have one question, two questions and then we're going to go on to Bo for a wrap up so that we can get to you all for comments. And this is Kathryn.

MS. BARNES: Yeah, if you could give me an example of a severe accident that might happen and the SAMA that you would procure for it just as an example such as what would happen during a meltdown with the embrittlement issue.

MR. PALLA: Well, I'm, I'm not going to give you an example of an embrittlement issue because it doesn't, it doesn't really tie in very well.

But I guess an example that may be a little easier to understand is just that if you, if one looks at the risk profile of the plant, meaning the different types of sequences or scenarios that could lead to core damage one that always seems to get a lot of attention is called the station blackout sequence.

Basically you loss, it's a loss of offsite power. The plant is equipped with several diesel generators. In this particular type of an event they would fail. They fail to start or they fail to run but they are not available so the plant is basically sitting there without any power to, to supply the pumps.

So the way that this could be covered through SAMAs, and I'm, I'm flipping pages here just to find the ones that are applicable.

One of the SAMAs, SAMA 10 it's described in more detail in Chapter 5 and in Chapter, in Appendix G but this SAMA would involve modifying turbine driven auxiliary feed water systems so it can be operated indefinitely without AC DC or pneumatic support.

So basically by implementing that SAMA the plant would be able to continue to supply water to the steam generators which would remove heat from the reactor core.

This could be sustained for, for several hours and in the meantime in, in PRA space we always look at recovery of offsite power and there's a, there's a curve that describes the probability of recovering as a function in time.

But if you can extend the ability of the plant to cope with these station blackout events for, for several hours you increase the change of recovering power. And so then at that point the main line front, front, front line systems would be available and --

MS. BARNES: Is that with a --

MR. CAMERON: Okay, yeah. Let's, let's go to this gentleman here and then maybe you can get more into those examples with Kathryn after the meeting because it is, it seems very complex. But you did a good job of providing a simplified explanation.

S-2 AUDIENCE: Have you factored into your considerations the impact of an earthquake. And the reason I ask that is that, well, we don't have earthquakes here really. The largest earthquake in the continental United States occurred in the Midwest in the early 19th century. That could happen again. Have you taken that into consideration --

MR. PALLA: Yeah --

AUDIENCE: -- in your computations.

MR. PALLA: -- within the, I'll explain how we handle that and --

AUDIENCE: And that regards to both the reactor and as well as those waste storage containers that are sitting there on the shore of Lake Michigan.

MR. PALLA: Okay. So --

MR. CAMERON: Okay --

MR. PALLA: I'll, well, I'll begin by saying we did not look at the waste containers in this, in the, it's not in the scope of the SAMA analysis.

What we looked at is the impact on the plant. We, the way that this [was] done we have a probabilistic safety assessment that looks at internally initiated events. This is what I referred to as the PSA.

And then there, in the early to mid 1990s all plants were requested to perform an individual plant examination for external events. And this is done via a generic letter from NRC. It's not, it, it basically required every licensee to look at the, the vulnerabilities of the plants to external events in, including seismic events.

So those, the insights from the, that study were brought to bear in the process of looking for potential improvements to the plant. So we, we, we have quantified estimates in core damage frequency for internal events, we have some estimate of approximately how much a seismic event contribute relative to what an internal, internally initiated event would contribute.

And as part of this study we did in fact identify one seismic related change and there's a SAMA that involves replacing some under voltage relays with seismic requalified relays that these, these relays were judged to be a, kind of a soft spot so to speak in, in the design.

So this was an improvement that was identified specifically for seismic.

AUDIENCE: But what was your --

MR. CAMERON: Okay. Thank you.

AUDIENCE: -- decision on the --

MR. CAMERON: Sir. Now let's go to a quick follow up because we really need to move on so that we can hear from all of you. Go ahead.

AUDIENCE: I would like a quick question as to what sort of seismic event did you assume in this calculation. In other words on a Richter scale. And second why wouldn't you include the waste or the spent rod storage in this calculation because I don't think we can count on, on Yucca Mountain coming online because as I understand it there have been some conflicting information that's been presented on the Yucca Mountain situation and that might not be approved for many years. S-3

MR. CAMERON: And Bob can you try to put this into a little bit of perspective --

MR. ELLEGOOD: Let me --

MR. CAMERON: -- just because, John, can I just finish, thank you.

Just because the spent fuel pool or the dry storage and this may be where you're going, John, isn't considered as a SAMA doesn't mean that the NRC isn't concerned and take account of seismic in terms of that. And, John, go ahead.

MR. ELLEGOOD: Let me answer the seismic question for you. The entire plant is designed to survive seismic events. The earthquake for Palisades for safe shutdown or designed basis is a point 2G earthquake. That's not characterized in terms of the Richter scale because the Richter scale is more of a energy release during an earthquake and for seismic analysis it doesn't provide the right type of scale to use for the design activity.

In terms of how frequently are you going to get that size of an earthquake here that's going to be about every 15,000 years you would achieve an earthquake of about .2G which is the design basis earthquake.

The plant was designed for that as well as the original storage pads were designed for that size of an earthquake.

Does that answer your question.

AUDIENCE: Well, I guess I don't understand how you can say it's 15,000 years for this part of the Midwest because new information suggests that it's a rebound of the land --

MR. CAMERON: Okay, I think we've --

MR. ELLEGOOD: It comes from a series of government studies that calculated that particular turn frequency.

MR. CAMERON: And we really need to, to move on and if you can provide more information to, to that gentleman offline fine. But, Bob, thank you.

MR. PALLA: You don't want me to say --

MR. CAMERON: Do you, did you, did you want to add anything more?

MR. PALLA: Well, what I, what I would add is that from the risk point of view what we would look at in, in contrast to a specific G value for the design within a seismic risk study you look at the whole range of potential seismic levels. And it's, it's called seismic hazard.

Obviously you could postulate extremely high G levels but the probabilities of those things are correspondingly much lower. And in this individual plant examination that I spoke of this seismic analysis that, that I spoke of it relies on, on the seismic hazard curve for the site.

And you, you look at the ability of the various components and the structures to be able to withstand that, the, the spectrum of, of the loads. And at some point they don't, they would fail and, and this is all solved in a very complicated matter.

But the end result if you, you end up with some components that are generally thought to be the, the lowest prone to fail and they might give you the, via the greatest interest for looking at them in terms of reducing risk.

So we did go to the individual plant examination. We used it to help identify seismic related fixes that would have the greatest impact on risk.

MR. CAMERON: Great. That, I'm glad you added that seismic hazmat curve that looks at different G factors and probability. All right.

MR. PHAM: I'm sure Bob is available afterwards, sir, if you want to address the question some more.

MR. CAMERON: Okay. Bo.

MR. PHAM: Okay. So Dave and Bob has, have gone through the details of our analysis and right now I'd like to turn us to the conclusion in which we found as David and Bob both mentioned that the impact of license renewal are small in all areas.

We also concluded that the alternative actions including the no action alternative may have moderate to large environmental -- impact in some categories.

Based on these results our preliminary recommendation is that the adverse environmental impacts of license renewal for Palisades are not so great that it is not unreasonable to preserve the option for license renewal for the energy planning decision makers.

This slide is a quick recap of where we are right now. We issued the draft environmental impact statement for Palisades on February 14th, 2006. The comment period for the draft ends on May 18th, 2006. There are regulations require a 40, 45 day period from the issuance of the draft until the, until the closing of the comment period but we actually build in a 70, at least a 75 day period there.

So we expect to issue the final impact statement around October time frame of this year.

And then this slide identifies me as your primary point of contact with the NRC awaiting preparation of the environmental impact statement for Palisades.

It also identifies where the documents related to our review may be found in the local area at the South Haven Memorial Library.

The documents are also available online at the www.nrc.gov website.

And in addition as you came in today you were asked to fill out a registration card. If you included your name or address on that card we will automatically mail a copy of the draft and final environmental impact statements to you.

If you did not fill out a card I encourage you to do so as it, it's a good opportunity for us to include you in the part of the public outreach process that we have for the review.

And if you need to register please see Christina or Laura out front would be your best.

In addition to providing comments at this meeting there are other ways you can submit the comments for our review process. You can provide written comments to the chief of rules and directives branch at the address on the screen. You may also make the comments in person if you happen to be in Rockville but for many of you that's not the case so we provided an email address for Palisadeseis@nrc.gov.

All of our comments, your comments will be collected and considered.

And this concludes my remarks and presentation.

MR. CAMERON: Thank, thank you very much.

MR. PHAM: Thank you all again for coming.

MR. CAMERON: And thank you, Carl, those, those were very very good questions.

We're going to go to the comment part of the meeting so we have an opportunity to hear from you and we're going to go first to Mr. Tom Tanlzos who is the chair of the Van Buren County Board of Commissioners. And after Mr. Tanlzos we'll hear from one of his colleagues Richard Freestone and then Mr. Wayne Radell Covert Township supervisor. And this is Mr. Tanlzos, the chair.

MR. TANLZOS: Thank you.

MR. CAMERON: Thank you.

MR. TANLZOS: I'll use the microphone. My name is Tom Tanlzos, county commissioner. I represent South Haven Township, South Haven City and the northern half of Covert Township which includes the plant.

I'm also the chairman of the commissioners for Van Buren County.

U-1 On March 22nd we did pass in 2005, we passed the unanimous resolution in support of the license renewal of the nuclear power plant and I will submit that as a certified copy to you.

U-2 One of the things even though you might see it was an economic decision for the County, for the Township and the area, yes, these are all true benefits of having the plant in our area.

U-3 But if there was any concern that it was harming the environment or the residents of this county or this area we would not have taken such action.

So I would like to present this to you and on behalf of the Board of Commissioners that we unanimously support the license renewal application.

Thank you.

MR. CAMERON: Okay, thank you, Chairman Tanlzos. And we'll attach this to the transcript and also have this as a formal comment on your record too. So, Ron, I'm just going to give this to you right now.

How about Mr. Freestone. Is he still here?

MR. FREESTON: I don't have anything additional to add to what Mr. Tanlozos said. I'm also a county commissioner and support the renewal license. V-1

MR. CAMERON: Okay. Thank you, Mr. Freestone.

Mr. Radell. Covert Township supervisor.

MR. RADELL: Yes. My name is Wayne Radell and I'm the supervisor for Covert Township. Covert Township has supported Palisades Plant since its inception in 1965. The plant's very location is a direct result of the township's encouragement to construct and operate a nuclear plant in this area. W-1

Consumers Energy, it's predecessor, Consumers Power and the plant's current operator Nuclear Management Company have been good stewards of the environment. At no time since the plant's beginning operation in December of 1971 to the present has posed any threat or danger to the residents of Covert or the surrounding area. W-2

The Covert Township board has officially gone on record to support Palisades license renewal activities through a resolution of support enacted on March 8th, 2005. W-3

As the host township for Palisades nuclear plant Covert Township and seven other taxing entities received over $6 million annually in taxes from the plant. Over the years this tax money for the township has funded paving roads throughout the township, building water mains throughout the township, lighting intersections and increased fire and police protection for our citizens. W-4

Covert public schools receives the lion share of that tax money and provides first class school facilities and services.

W-5 Covert Township is very much in favor of Palisades Nuclear Plant's license renewal. It has been, there has been a partnership between Covert Township and Palisades since the beginning.

We look forward to that partnership continuing for another 20 years and longer. Thank you.

MR. CAMERON: Okay, thank you, Mr. Radell.

Now we're going to hear from Mr. Dale Lewis and then we'll hear from Mr. Maynard Kauffman and then Mr. Wade Adams.

Mr. Lewis.

MR. LEWIS: I just had an operation on my throat, nose last week so I can't speak very loud so I won't speak very long either.

X-1 Palisades is a great vehicle for industrial growth and growth in South Haven. At the present time during normal operations Palisades employees 600 people from their operations. And if you can imagine in your town, and I presume that most of you are from outside South Haven since I don't recognize too many of you, if you have something that, a plant that employed 600 people and that were to close down there would be great economic impact on the area.

So the nuclear plant right now, Palisades, is in a refueling outage where 900 more people come in to South Haven to work on the outage to repair things, to improve things.

You can imagine what that does to the hotels, motels in South Have. It's a great economic boost to South Haven.

If you were to close Palisades down and I haven't heard a good reason tonight for doing it, it would make South Haven a ghost town almost because there just wouldn't be the jobs that are there now.

X-2 And I have, as I say I haven't heard a word that says anything about a good reason to close Palisades down.

So and we as a city council, oh by the way, I was mayor of South Haven for four years and while I was mayor we passed a resolution also endorsing the continuation of Palisades. Thank you.

MR. CAMERON: Thank you, Mr. Lewis. Thank you, thank you very much.

We're going to go to Ryan McCoy at this point because he's here with his family and his young son and maybe they want to go bed. But --

MR. McCOY: I didn't mean to interrupt.

MR. CAMERON: Go ahead.

MR. McCOY: I'll be real brief.

MR. CAMERON: Go ahead.

MR. McCOY: My name is Ryan McCoy. I'm a citizen of South Haven. I'm not affiliated with anyone. I'm here mainly to be educated about it. I, I'm blessed to live close to the beach and I'm on the beach every day and I see that plant every day and I'm, frankly I'm worried so I want to know what's going on. Y-1

What I've heard from our former mayor and, and some of the commissioners has all been economic based. It's all about economy and jobs.

And this touches me deeply because I'm a recently unemployed worker who was selling topical plants and I lost my job from environmental impact from hurricanes.

So I'm unemployed and I still stand opposed to it. I want to know what I'm seeing here more is public relations and not a lot of truth. There was a gentleman asked a really profound question why the dry cast things weren't affiliated or weren't in with the seismic analogy. And to me that seems more important than the deteriorating radioactive, see and I don't even know the terminology, so forgive me. Y-2

But what I want to see happen is that economy take a backseat to ecology. If this is not ultimately safe for our citizens, if our citizens are breathing radioactive fumes, if there's a potential for a major accident that wipes us all out there's no need for an economy. Y-3

I'd like to see economy take a backseat to ecology. I'd like better answers on, on the questions that are asked, a lot less lip service.

I have a young child I want to see grow up in South Haven. I want him to grow up healthy. It's a beautiful community. We'll find ways to replace the economy.

These alternatives that you say have vast potential for economic sustain ability. The waste generated, dry casting it there and not having a home for it worries me. 20 years from now

what's that going to be like or where are we going to be with, how much more waste will they produce in those 20 years.

Y-4 And right now from what I've read and again I'm naive so I'm here to be educated but we don't have a home or a place to put this waste that's one of the most toxic substances on the plant from what I understand. It's sitting 150 yards from our precious resource the lake. Why that doesn't trouble more people I don't know.

Y-5 I understand the need for economy and jobs. Let's get that behind us and let's look at the ecology. I think that's most important.

You know, I'm happy to remain unemployed for another couple of months if that's what it takes. But I'd like to see some true answers, some truth, a lot less PR, a lot less bureaucracy and let's, you know, let's really talk about what's, what matters here.

I could go on and on but thank you for listening and for the opportunity and clearly I'm opposed to the re licensing. I've got a lot more to learn. But I think the economy is no, is no reason, it shouldn't be the top consideration.

MR. CAMERON: Okay. Thank you, Mr. McCoy. And I'm going to ask John Ellegood at some point not, not now, John.

MR. ELLEGOOD: Whatever you want.

MR. CAMERON: But since you're here in the community and since there's lots of questions that I think Mr. McCoy has is the draft, at some point not necessarily tonight but at some point, you guys could hook up and maybe you could, you could talk about some of these issues. That may be, may be helpful to him.

And, Mr. McCoy, did your, did your wife want to say anything? I know she's out there but --

MR. McCOY: I'm sure she doesn't. She's a little tied up.

MR. CAMERON: Yeah.

MR. McCOY: Our opinions are very similar.

MR. CAMERON: Okay. All right.

MR. McCOY: I'll just stand behind what I said.

MR. CAMERON: Good. Thank you very much. Let's go to Mr. Kauffman, Michigan Land Trust and then we'll go to Mr. Adams.

MR. KAUFFMAN: I appreciate the opportunity to speak. Maynard Kauffman speaking on behalf on Michigan Land Trustees. P-2

I live on a farm about ten miles straight east of here. And my comments are about alternatives. And what I want to do first is say I am opposed to the 20 year extension of the Palisades operating license. I think it's a needless risk. And I'll try to explain why.

My hope is that by the time the current license expires in 2011 that nuclear power should be replaced by wind power and by a lot more conservation and more efficient use of electrical energy. That is possible. I'll come back to that. P-3

Also it's cheaper. Currently as according to my latest figures and I've been doing a lot of reading on this, wind energy is sold for four cents a kilowatt power or less sometimes when it's under long term contract to where as I understand the cost of nuclear energy is about three times higher than that. P-4

So we the taxpayers, the ratepayers are paying so somebody else can make money. And it's not necessary. Let me explain.

Palisades sits on 432 acre site of which 80 acres is developed or I presumed used. That leaves 200 to 300 acres of land which could be available for wind turbines. If you figure four acres per turbine and they're really large, this would be a four megawatt turbine and they exist, you would need or you would have room for about 50 large wind turbines. They could be erected on the site, more land could be rented for farmers down the line along the transmission line too. P-5

But even these 200 megawatts that would be produced here by wind is not negligible. That's one fourth as much roughly as the current nuclear plant provides.

Now on page of the GEIS on page 845 I understand that wind power had been considered and rejected for a number of reasons. One of which is that it said could be intermittent and there's sense in which you could say that but I, I have a wind generator next to my house, nearby, and I say that wind power isn't seasonal. P-6

Because in this season it hasn't quit running for weeks and weeks. So it's not just intermittent but it might be seasonal. So certain other seasons might require a different mix of energy to keep the customers going.

So that's one of the problems I have here. It isn't simply intermittent. It's seasonal.

In any case wind power is really growing worldwide. It's growing at the rate of 30 percent per year. Most of this is happening in Europe and in Europe Germany is in the lead with I believe at this point 14,600 megawatts of electricity from wind. They seem to know how to do it.

P-7 So I suggest to the people at the NRC or to the, to the management company that they should go to Germany and ask and say we don't know how to make wind power work here maybe you could tell us how to do it. You may to say this in German so you might want to say ve con mein dusche dunday so they really understand what you're trying to do, okay.

Okay. I'm not here to entertain.

P-8 I want to suggest that there are three paragraphs on page 8-45 of this GEIS dealing with wind power and together the three paragraphs includes so many distortions, falsehoods or simple stupidity that I think if this is a kind of an indication of what's in this book it's bad news because this is not going to gly.

P-9 The way this is put down here is to sort of make wind a non starter. And it's not true because as I just said it is growing worldwide and it could here too if people were to take a different kind of attitude.

P-10 And incidently wind generators and their, their towers can be reused and recycled over and over again so that they have that advantage as well. And they provide the jobs that you're so concerned about in this community.

So let me wind this up.

P-11 There, I already mentioned in my comment earlier that it does not require 500 acres for a single wind generator and if the large ones, you know, the, the way the GEIS puts it you really have a system here where they say you need 500 acres or well actually they say 150,000 acres in order to provide 1000 megawatts.

I've been on wind farms and many of you have seen them. They're not one per 500 acres. This is either a big mistake by somebody that should have known better or it's a blatant distortion. As I suspect the latter because they don't want to deal with wind power they'd rather deal with nuclear because that's the business that they're in both for the commercial and governmental agency.

So I, I worry about this.

P-12 Finally I have to say that according to the GEIS again Consumers Energy has decided they didn't want to deal with what they call DSM and for you who haven't read the book DSM mean demand supply management. In other words giving advise to the consumer to use less energy

to get complex for, you know, all of the things that could save energy. Oodles of it. They chose not to do that. Why?

Well, it might be very costly or this or that. Now come on. This would be a way of trying to sort of curtail the need for licensing this plant in a risky way for another 20 years.

Any relevance has said that we could do with 50 percent less electricity if we used it intelligently and if we conserved. And I think this certainly true because I see all over the place that people do waste a lot.

So my point is that I think the, the put down of wind energy in this book is so blatant that I suspect I have to say I'm afraid I lose, I think that the nuclear regulatory commission loses credibility by people who know something about this. P-13

And that's a serious thing because I don't want to live in a society where governmental agencies lose credibility because they're supposed to be responsible. Thank you.

MR. CAMERON: Thank you, Mr. Kauffman, serious, serious comments that we have to seriously consider. So thank you for pointing that out, pointing that out to us tonight.

And then we're going to go Mr. Adams.

MR. ADAMS: Thank you very much. I'm Wade Adams. I'm from Kalamazoo, Michigan. I decided to take the, I decided to come over with my wife and, and waste that energy. I hope it's not a waste. I didn't come here to have it, to be a waste.

My concern is a catastrophic event. And as this plant becomes older and older as we already heard the Big Rock plant up in Charlaboy has been closed and it hasn't been generating electricity for some time. And as Mr. Kauffman said generating power by nuclear plants is not the cheapest way to generate energy. R-3

Now I came from Kalamazoo because we're right downwind of what could happen if radiation was released from the Palisades Plant. It would devastating to Southern Michigan perhaps Northern Indiana. It could, if you look at the Chernobyl case and I would guess that all those government authorities there in the Ukraine were just 100 percent behind Chernobyl until they had their accident.

And of course I also lived through the 3 mile island incident when Jimmy Carter was president. So I, I believe that we would be far better to spend our money on safer distributing energy sources like wind power particularly in Michigan. R-4

My wife and I just came back from California. Even a state like Wyoming has tremendous numbers of wind generating plants now. Wyoming has tremendous amounts of coal. They have tremendous amounts of oil yet they are going to wind generation.

And you look out across this nation the idea that you, you cannot have distributed types of energy production is insane in my view point.

R-5 So in that respect we do not have to take the chance even though it might be in your estimation small on re licensing this plant. This plant if re licensed could be in operation for 60 years. I do not believe it was engineered to last 60 years and I don't believe you can change all the components in that plant to make it really be safe for 60 years or even 50 years.

So let's invest in alternative energy sources. I hope and, and as far as jobs I'm a PHD did research in Kalamazoo for 27 years. 2500 of us lost our jobs quite recently when Pfizer decided to close that research facility. We're managing.

Certainly South Haven, Covert Township and this county will survive if you happen to have to close this plant in the next five years. Trust me.

Finally I'd like to say that I hope when you do your consideration that you listen to what Abraham Lincoln said. We need government of the people, by the people and for the people.

And what I am seeing increasingly in this nation is government of the corporation, by the corporation and for the corporation.

I hope you will keep the people in mind. Thank you.

MR. CAMERON: Thank you, Mr. Adams. We're going to next go to, to Mr. Hannan, Robert Hannan and then to Gary Kartch and Barb Geisler.

Mr. Hannan, do you want to come up.

MR. HANNAN: Thank you for allowing me to speak.

Z-1 It's just hard for me to imagine that, that we're all here in this room even talking about this. I think the humanity of, of this nuclear thing is, is not good. And if, and everyone in here is a human being and therefore we should all be able to define the meaning of humanity.

And to take a risk like this in my mind I, I don't care how safe it is, you know, it's, it's still a risk and you people you're here defending yourselves from a risk, a potential risk.

So therefore you're admitting that there could be a meltdown. So I, I just find this whole thing just, us being here talking about this is totally insane. We shouldn't even, man should have never split the atom to begin with. It was a bad thing. It's very bad. Z-2

And that's all, that's all I have to say.

MR. CAMERON: Gary Kartch.

MR. KARTCH: Thank you also for letting me speak. I wasn't really planning on saying anything but I am compelled to do so.

The statement by the resident, Ryan McCoy, was very eloquent. He said he thinks the economy should take a backseat to ecology. I agree. But the secret that the people, the citizens of this country and state and county do not realize that the economics are indeed an issue.

And forgive me for not having the information with me, the facts and figures at the moment, but the information I have been reading indicates that nuclear industry has received more government subsidies during its lifetime than any other industry. It's well over 50 percent of all of the tax incentives, breaks, guaranteed loans, supplementing catastrophic insurance for the industry etcetera. AA-1

The amount of money that the taxpayers are paying out of their tax, taxes to the industry on top of these high electric rates that they're having to pay monthly rates is absolutely extraordinary. If people knew that and if that was, if that was analyzed down to a level and given to them so they could see it they would be absolutely appalled. AA-2

And the renewable, the percentage of, of money going to renewal is something like 11 percent of all the money and the nuclear industry gets well, well over 50 percent as I say. AA-3

Now in the, and the media has, you know, made some, had been reporting a large subsidy and tax incentives to the oil industry and everybody is appalled over that. The nuclear industry has them by a mile. AA-4

So if this money were diverted to the renewalables and the technology to wind and solar you would and perhaps let's pretend that the, the information in the environmental impact statement is correct for a minute but as submitted by the, in the EIS, that, that wind turbines need X amount of acreage and all this and they can only produce X amount of megawatts etcetera. AA-5

If you take even a minuet amount of the money that is given to the nuclear industry just as a given and divert that to renewables and, and improve the technology of the renewables this would absolutely not be an issue.

AA-6 And I also concur with Mr. is it Hannan, who said these, how can we even be in this year of, of, of 2006 still being, trying to justify the manufacture of a waste that is absolutely lethal for hundreds and thousands of years. What are we going to do with it.

Who, nobody wants it. This is the substance of which we are having international, you know, traumas over right now with North Korea and a few years ago it was, you know, India, Pakistan and every, every nation on earth wants nuclear and we're giving it to other nations. It's absolutely preposterous.

AA-7 The process by which we are generating electricity is the same process that was used to make the atomic bomb that was dropped on, on Hiroshima and Nagasaki. So this is a technology of death make no mistake about it.

We are made of better stuff than this. We are intelligent enough to create electricity in a manner that does not produce a waste. And to have the waste off of discussion for the environmental impact statement is absolutely scandalous.

That is my comments. Thank you very much.

MR. CAMERON: Is, is Barb Geisler still here.

MS. GEISLER: Yes.

MR. CAMERON: Oh, hi, Barb.

MS. GEISLER: Hi.

MR. CAMERON: Would you like to join us up here. This is Barb Geisler.

MS. GEISLER: Thank you. I live 10 miles from here on a farm. I'm going to address something a little differently.

In the early 80s I became, can you hear me or do I need to be over here more.

MR. CAMERON: Maybe we, maybe we can bend it over a little towards you.

MS. GEISLER: Yeah, okay.

MR. CAMERON: See this, this.

MS. GEISLER: I'm a little shorter than the guys.

MR. CAMERON: Okay. Go ahead and see how that works.

MS. GEISLER: Dose that work.

MR. CAMERON: Is that better. It sounds good.

MS. GEISLER: Okay. In the early 80s I, I became concerned about nuclear issues in, in a broad way. And I remember a film from that era which was called The Dark Circle documentary. And it, they interviewed lots of people in the nuclear industry both the weapons industry and the power industry. BB-1

And what I remember from that is how intertwined they all are. That it, that you can't really separate atoms for peace, atoms for industry from, from the weapons industry. And Gary Kartch said, you know, it's, it's about death. Do we choose death or do we choose life. It really is about that ultimately.

And in going to various meetings and conferences through the last 25 years I want to focus on just one thing which is I've heard a lot of whistle blowers speak. And their lives have been ruined. BB-2

Now some of you may have seen the film about Karen Silkwood and maybe you thought that was over dramatized or not true or whatever. But I sat down with a women in her 70s at at least three of these events who told me what happened to her.

She went, and this is I'm, I'm moving to the inside here. She was an innocent young girl. She went to work for the industry and she noticed that some figures weren't quite right. And so she thought she better tell her boss and she did and that was the beginning.

Basically she was told you can either do the figures the way we want them or you can leave. And she realized either way she was a marked woman. And yes she did have to go underground. She, the, the act that protected people that came out I believe after Silkwood she, she, she literally had to go underground. This is, this a gramma tell me this.

She, she was, she felt, she feels deliberately exposed. She was dying of bone cancer.

Now this is just one woman speaking. I don't think she was lying but I can't prove this. But she's only one of several that I've talked to who had their lives ruined in one way or another.

Ann Harris at Lockspar, part of TVA, Curtis Overall eight years ordeal, same place. Finally won on appeals. Wrongful termination. I, he was in tears, divorced, everything else. Ann Harris was run off the road.

Interestingly enough it was Curtis Overall whose, who pointed out the flaws Lockspar which led to Cook very near us, DC Cook being shut down for three years because they had the same kind of system.

And I remember hearing a guy in St. Joe talk about working at Cook and becoming a whistle blower and his life was ruined too. That's very near us. People are threatened. They are called on the phone. They are run off the road.

So knowing this I wonder if this isn't just a charade. How many of you within the industry would have the guts if you, if you decided it was, there were things that weren't quite right to say so in public. You'd, you'd pay a heavy price number one.

BB-3 Number two because of all this and because of the nature of this dangerous industry that has to be closed, it has to be secret, it has to be top down, it has to be authoritarian. This isn't a real democratic meeting here. It couldn't possibly be, you see. This is so we think we have some input.

And when I look at our country as some others here mentioned tonight and I see it moving more and more toward secrecy and authoritarianism and it's Orwellian, isn't it. We live in a democracy but you know what? If you're a little Quaker lady in Palm Beach our wonderful new spy people are down there, you know, we're all being spied on you know that don't you.

They wrote a report that these, and these are passivists, you know, Quakers are passivists, they wrote a report saying that this was a very dangerous group. We went through this in Viet Nam. Quakers are dangerous. They're not the real terrorists are they.

BB-4 So I guess I want to end by saying I don't think you can have nuclear weapons and nuclear power, the Dark Circle and also have democracy. And I think that's what we're up against in this country right now if you want to look at, excuse me, the big picture.

BB-5 So let's look for alternatives. We need a whole new way of living. We can get along with a lot less of this, look at this. Lights on all night. You go to the cities they're, and frankly we're going to, we're running out of oil, we're running out of natural gas, we're running out of a lot of stuff. We're going to have to think about doing things a different way guys.

BB-6 And just keeping this little plant open 20 more years and maybe it won't blow maybe it will but it's not looking at what we're going to need in the future. That will be very different so let's, let's think about a new way.

Thank you.

MR. CAMERON: Thank you, Barb. Thank you. Is Michael -- still here and did he, Michael, did you want to, okay.

Let's go to, let's go to Kevin. Kevin, did you want to speak again.

MR. KAMPS: Yeah.

MR. CAMERON: Okay. Let's go to Kevin and then we'll go to Kathryn and Ken and Corrine and Mr. Hart.

Kevin Kamps.

MR. KAMPS: My name is Kevin Kamps. I work for Nuclear Information and Resource Service in Washington, D.C. But I'm from Kalamazoo, Michigan, a board member of Don't Waste Michigan for the Kalamazoo chapter.

And what I thought I would really focus on because it really caused quite a stir earlier today and I think it deserves as much attention from the public as it can get because the public deserves to know about it was the incident last October involving the cask that was stuck on a crane above the pool at Palisades. CC-1

And I just wanted to read some passages from NRC documents from Palisades documents that reveal the serious nature of that incident.

So I'll start with something I read earlier.

The NRC inspectors concluded that working outside the bounds of a work package on a crane with a suspended load that if dropped would damage the spent fuel pool warranted a safety significance determination. Had the load dropped the spent fuel pool could have sustained severe damage.

The inspectors concluded working outside the bounds of the approved work package and manipulating the break release represented an increase in the risk of a load drop. This increase in risk is directly associated with the reactor safety cornerstone objective of the spent fuel, spent fuel cooling system as a radiological barrier.

And what that last sentence means is if the cask which weighed 107 tons had fallen into the pool it would have cracked the floor of the pool, drained away the water which cools the waste

in the pool. And in a matter of time, some hours, the waste would catch on fire and it would be a large scale radiation release perhaps worse than Chernobyl.

So what were the potentially catastrophic consequences had the cask dropped. And again this is from an NRC report entitled Technical Study of Spent Fuel Pool Accident Risk published in February of 2001.

The analysis exclusively considered drops serve enough to catastrophically damage the spent fuel pool so that pool cooling water inventory would be lost rapidly and it would be impossible to refill the pool using onsite or offsite resources.

There is no possibility of mitigating the damage only preventing it in the first place. The staff assumes the catastrophic heavy load drop creating a large cooling water leakage path in the pool would lead directly to a zirconium fire.

Zirconium is the metal cladding around the fuel rods. It's, it's a combustible material, highly combustible.

The time from a load drop until a fire varies depending on fuel age, burn up and configuration. The dose rates in the pool area before any zirconium fire are tens of thousands of rem per hour making any recovery actions very difficult. Tens of thousands of rems per hour would deliver a lethal dose of radiation to someone close to that in a matter of minutes.

And that's what happened to the firefighters at Chernobyl. They received deadly doses of radiation in a very short period of time. They died two weeks later because their red blood cells stopped reproducing.

MR. CAMERON: And that, that part is not in
the --

MR. KAMPS: I'm sorry I'm, I'm trying to translate from --

MR. CAMERON: Oh, if you, I think it just needs to be clear if you're purporting to read --

MR. KAMPS: Okay.

MR. CAMERON: -- from our document and then you're editorializing just tell us when you're editorializing.

MR. KAMPS: I sure will, Chip.

MR. CAMERON: All right.

MR. KAMPS: I'm sorry that I was --

MR. CAMERON: I know you didn't, I know you didn't intend it.

MR. KAMPS: Right. I did not intend to at all.

MR. CAMERON: Thank you, Kevin.

MR. KAMPS: I'm reading directly from the NRC again.

Based on discussions with NRC staff structural engineers it is assumed that only spent fuel casks are heavy enough to catastrophically damage the pool if dropped.

In fact NRC has reported, "the possibility of a zirconium fire leading to a large fission product release cannot be ruled out even many years after final shutdown of a reactor".

Palisades is an operating reactor so the waste in the pool is thermally hot, it's radioactively hot. All the more likely to lead to worst case end results.

So this is a quote from a study done by Robert Alvarez and others in 2003 and it was about pool fires. This is the quote: "Spent fuel recently discharged from a reactor could heat up relatively rapidly to temperatures at which the zurcolode fuel cladding could catch fire and the fuel's volatile fission products including 30 year half life, cesium 137 would be released. The fire could well spread to older spent fuel. The long term land contamination consequences of such an event could be significantly worse than those from Chernobyl".

Another quote from that same report, "The damage that can be done by a large release of fission products was demonstrated by the April 1996 Chernobyl accident. More than 100,000 residents from 187 settlements were permanently evacuated because of contamination by cesium 137. Strict radiation dose control measures were imposed. The total area of this radiation control zone is huge equal to half the area of the State of New Jersey. During the following decade the population of this area declined by almost half because of migration to areas of lower contamination". From the Alvarez study.

And so we found out about this cask incident by a fluke because a number of us attended an unrelated NRC technical meeting where a piece of it was mentioned. But we understood what it could mean and so we followed up. CC-2

And we did a Freedom of Information Act request which NRC informed us would take two to four weeks to get back to us. Well, it took two months to reach us.

And in the meantime we found out all that we could and we found the tables in that earlier report I read from about spent fuel waste fires and the casualty figures downwind were quite remarkable. The NRC's own numbers again 20,000 to 44,000 cancer deaths over time downwind out to a distance of 500 miles away from a pool fire. That was at 2001 NCR study.

So we finally got the FOIA, this was after the Detroit Free Press exposed the incident in that front page article. We only received a partial FOIA response at this point. And the, the document that I read from earlier was the quarterly inspection report from the NRC. That was the first public document of that incident.

But the details that came out in the FOIA were quite interesting. The precursors that led to the incident. Here's, here's a quote from an internal Palisades mia copa done by the inspection crew that inappropriately handled the crane.

MR. CAMERON: And, Kevin, could you just sort of, sort of wrap up --

MR. KAMPS: Uh-huh.

MR. CAMERON: -- on this and, you know, feel free I mean read the quote or whatever but we'll just need to go on to some, some other, other people.

MR. KAMPS: Well, I'd like to encourage everybody to go over to that table in the back corner and get their own copy of this thing and read it because it's worth it.

CC-3 So this is, this is the company's workers who made the mistake that could have overridden the emergency brake. That's the whole point. They shouldn't have handled the crane because they didn't understand the crane.

We failed to consider the severity of the consequences if our troubleshooting caused the load to slip or fall into the spent fuel pool. This is why we set up an event response organization to, to allow an open forum with full consideration of how these activities will affect the plant and the health and safety of the public.

This is the company saying this.

The NRC earlier said that the risk of a load drop was increased because of this inappropriate handling.

So I'll just, please do pick up a copy. The precursors of the event that led to this thing, the false setting of the emergency brake were due to the fact that Palisades lacks knowledge of the crane. They have to bring in the crane company to help them operate the crane.

The crane company representative who came last August to set the emergency brake had to get to vacation. He was in a hurry. So instead of setting the emergency brake correctly with three checks on the emergency brake he did one check. And he set it wrong that time. He thought he set it at 175 foot pounds. He actually set it at 140.

So that was one precursor. He had to go home on vacation. And the other one was that Palisades doesn't know how to handle the crane. The people that did know how to handle it have left the company.

And one of the amazing admissions by the company is that there may be other aspects of operations where we also lack full knowledge not just this crane.

MR. CAMERON: Thank you. Thank you, Kevin. Kevin's report is back there on the table. I would also urge you to read the NRC inspection report so you can see what the NRC said about this particular incident. If you need to find out how to get a copy of that we'll be glad to get you a copy of the inspection report.

There was also a dialogue this afternoon on this particular issue. It is in the transcript that will be available from this afternoon's meeting and we're going to go to, to Kathryn Barnes and then Ken Richards, Corrine, Paul Harden.

Kathryn Barnes.

MS. BARNES: I'm a member of Don't Waste Michigan. I'm one of the people that decide the, one of the intervenors. I live within a 50 mile radius of Palisades. I have a son that attends Western Michigan. He's in electrical engineering. He's almost graduated. He's nearby.

I have my other son and their father work in Kalamazoo in carpentry. And my family pretty much all lives in the danger zone and a lot of my friends do.

And I'm concerned about Palisades because through the years, you know, growing up here in Michigan the last time I was in Lake Michigan was as a baby, when I was a baby my mother has a photo of me in the water. DD-1

When I was growing up I went swimming quite a lot in Lake Michigan. I can remember drinking the water, swimming, enjoying it. I can remember how many people were on the beach. It was just glorious.

And I can remember drinking the water and it was clean, sometimes it tasted a little fishy but, you know, it wasn't a bad taste, you could drink it. You can't drink it now.

Since the, the building of the nuclear reactors the water quality has deteriorated. Last time I went swimming last year my daughter and my granddaughter, I have a little almost three year old granddaughter now, precious.

They went swimming and they both got stinging rashes. And I got a rash myself although I was only in the water for a couple of minutes. And we cannot drink the water, it's got a bad, foul taste and I don't know if this is because of the chlorine, bromine and amean released or if it's from other things.

DD-2 One time I sat on the beach and I had the sand in my fingers etcetera and there was a lot of gas coming out of Palisades that day and I was near the plant. I got real sick afterwards.

It reminded me of when I was out at the nuclear test site the feelings I had afterwards being very tired and nauseous and just really dead tired.

I'm a cancer survivor. I know what it's like to go through that dark cloud. I've seen children from Chernobyl. I've seen their sunken eyes and their handicaps and I feel so sad for what they've gone through, what their parents that carried them went through. That's an end to the, to the lineage of people.

Once you have a nuclear disaster you lose your DNA. When you lose your DNA quality you use up the seed for cancer and then you set the seed for death. And there's no getting it back.

DD-3 I live on land where there's pesticide use. I'm been a victim of that which is an essentially a cause of cancer not radiation but radiation does cause cancer too.

DD-4 I've seen frogs with ten arms. I've seen a lot of things from broken DNA. And here what you have is, I know a man who worked at Palisades and he's still in the nuclear industry he's got a real high job in the nuclear industry.

DD-5 And he told me that it's well known quote un quote, is what he said it's well know within the nuclear industry that Palisades is the most likely to blow of all the nuclear power plants in the United States at this time.

And I asked him well why is that. I said is it, are they covering something up like they did at DC Cook which for ten years they covered up the fact that they had a non functioning coolant system. Or if they had a meltdown they could not have, they could not have stopped the meltdown.

And only by the grace of God we have not had a meltdown yet.

Well, they covered that up and as people have mentioned the whistle blower got in trouble for that. And now he said no he says Palisades they don't cover things up he says they just don't report it.

And I think this, this incidents of the crane that was just mentioned that's another incident I believe that was not reported to the NRC. And I believe that Palisades asked for an exemption that they don't want to report things any more. DD-6

I think that the premiss is upside down where they consider the, another 20 years of, of Palisades operating as, environmentally a small issue and they consider alternatives as a great impact. I think it's opposite actually. DD-7

I think that Palisades was burgeoning nuclear waste which is a problem, unstable geological strata, the singing sands, the shifting sands, freezing and thawing conditions on the casks. Cask number four which is surrounded by other casks has bad welds, could crack. DD-8

There's a lot of problems there and, and these aren't being addressed. The, at one of the meetings earlier and I've been to all of these meetings now, this is before there was a lot of people here. Thank God there's more people getting involved but maybe this is the last meeting.

They were talking about the experimental use of sealants. And that wasn't addressed. There was other things that the NRC themselves wanted to address. DD-9

And when I came to the meeting supposedly for that, those issues they switched locations and so they kept this, the public in the dark on that one.

So where's, and I, I don't know the answers to those questions or if they were ever answered to the NRC's specifications. But I know there's real issues at Palisades.

The biggest issue I've heard about and this is not disputed, this is fact. Is that it is embrittled. In a layman's terms I'll try to explain to you what embrittlement is. DD-10

When a nuclear reactor has, of the, the design at Palisades is, had so many reactions through the years it gets like little finger holes in it, lots of little holes from all this stress and these reactions. Cooling, heating, cooling heating and the near misses they've had.

And after you get this, these holes in the, in the design structure it becomes embrittled which means that if there was a stuck value, broken coolant pipes, lots of things could happen to cause a meltdown, okay, and then it starts heating up. And they cool, they had to cool it real

fast. So they flood it with water. If the plant is embrittled as Palisades is it's like taking a really hot glass coffee pot and immersing it in cold water. Bang.

That's what accurate embrittlement is and that's what I've hear would, would be the most probable thing that would happen to cause a meltdown.

DD-11 Well, what does a meltdown mean here. Okay, well, if you live in Covert, you know, you don't have a chance to say goodby to anyone.

If you live anywhere close to Palisades you, you'll, you'll, you're gone. If you live downwind which could be in any direction but usually the wind comes from the Great Lakes. It comes from, from the west going east.

MR. CAMERON: Kathryn, could you just try --

MS. BARNES: I will try and wrap up, yes, I will to wrap up.

DD-12 What it means that there is a huge area of contamination. It could go into Canada. It could affect all of us in Michigan and Canadians. And as in the case of Chernobyl that year Meyer -- had the most insane bizarre food. I am sure in Michigan because of all our precipitation we had fallout.

I had turnips, they got this big with a little narrow and then they bulged out again and they were rotten inside. I had cabbage that was huge and rotten inside. That's not normal. It's never happened since.

But I, I think that it can affect everybody in the world.

DD-13 I would like to see with your rules, a rule be made if, if this nuclear power plant is relicensed that everybody that is in on the decision to relicense it be obligated with their families to live within five miles of Palisades until the plant is shut down.

MR. CAMERON: Okay. Kathryn, thank you.

MS. BARNES: That might make a difference.

MR. CAMERON: Thank you. Ken Richards. Then we're going to Corrine and to Mr. Paul Harden.

Ken Richards.

KEN RICHARDS; Good evening. I'm Ken Richards Palisades Conversion Group. I'm going to try to get this down a bit but --

MR. CAMERON: We will have to keep you to five at this point.

KEN RICHARDS: Yeah. Recently I got the generic impact statement license renewal and I've been reading through both the manual and its cover letters. I see despite potential radioactive hazards the NRC insists that environmental impact of the Palisades Nuclear Power Plant, all the radioactive materials about its reservation, such as the casks is always regarded as small throughout the report. O-1

But when I turn to alternative energy sources which should be pursued at Palisades plant site they're impacts are often referred to as large which all considering they would be taken into account the enormity of nuclear power the plant puts on the grid for alternatives to equal out in their current forms at the site. O-2

A rather particular assumption bracketing both the plant and the NRC's position as well yet ignoring the simple fact that of all the resources used to continue operation of this plant or renewables and other forms of electrical generation throughout the state it would turn the argument on its head.

But my real concern here is the fact that the GEIS report does not take into consideration of dry cask storage. Other highly radioactive contaminated things such as the former steam generators on the site.

Many would argue that Palisades reservation is already a defactile high level nuclear waste dump which to their, Palisades Conversion Group and my way of viewing the issue a large impact on this fragile lakeshore enviroment. O-3

More to the point potential in fact should things not go as designed or planned or promised which over the last 38 years time and time again have been broken. With an additional 20 years worth of above ground dry storage cask along with other contaminated equipment which is sure to be replaced should this plant be pushed so far past its original design capacity which it already has by years now. O-4

Counter to the GEIS' insistence that no changes to the plant need take place in the additional 20 years. Isn't the reactor head soon to be replace in July perhaps. O-5

I talked with the vice president and he said 2000 and something.

The pressure reactor vessel long in question operating in a patchwork method since embrittlement was discovered more than ten years ago. How long before this is replaced.

Annealiated as once promised in court or a neutron thermal shield installed. And yes, the dry cask storage casks piling up on site.

I'm sure we'll all hear about Yucca Mountain or the -- Indian reservation taking all of this off our hands for the umpteenth time in the last 20 years.

Now there are over 20 to 30, somebody told me 29 here but I keep getting different answers, dry cask storage onsite. Will anyone here give us an exact number. Somebody did give me 29.

O-6 This is a community concern for we will have to live with and care take all of this waste for generations to come. In '93 we were told these experimental cut waste storage casks would be gone in 1998 time and time again by Mark Savage the plant's spokesperson.

Now we're told by the NRC there license to store fuel assemblies for 20 years. It'll last for 150 years and above ground storage is our nation's nuclear future since the Feds haven't found a hole deep or dry enough to put all this radioactive waste and materials in.

After nearly 50 years of looking, instructing, spending and charging us ratepayers for a place to take all of it off our lakeshore nothing but this. Another promise broken, more public trust going by the wayside.

O-7 On April 4th the Squaw Valley Reservation will be approved for above ground storage but with Yucca Mountain's inability to take this slated cask off the Goshite's hands, there will not be move in either nuclear waste storage site for all the waste piling up at Palisades now much less that all the additional waste produced during the 20 year relicensing period. All for a little electricity now. Decades perhaps centuries of radioactive waste for the local citizenry to look at.

Yet the operators still insist this is a cheap form of power generation.

Another concern is the plant's original seven mile cooling loop rumored to be back in use again. It's affect of Lake Michigan's eco system. Is it or is it not back in use.

MS. ELLEGOOD: There's no seven mile cooling loop.

MR. RICHARD: Okay.

MR. RICHARD: I, I agree --

MR. CAMERON: -- I would have to ask you to, to wrap for us now.

MR. RICHARD: I know Mr. Bradley a welder who built it back in the 60s, oh yeah.

MR. CAMERON: Okay, Ken, so if you could just make your main point for us.

MR. RICHARD: Yeah, wrap it up. Questions
about --

AUDIENCE: It's the last chance people have, let him speak.

MR. RICHARD: -- the Palisades -- crane break down on October 11th. 55 hour shutdown with a 110 casks containing spent fuel assemblies partially suspended broke in the air fell partly submerged over the fuel pool. O-8

The fuel pool went well beyond its original design capacity with fuel assemblies going back to the 70s. I gather from the Tribune article all the brakes froze because plant personnel did not set the emergency brake properly just before leaving for his vacation.

How big a rem stream would this situation be giving off. How many rems the article certainly didn't say. Did the whole fuel pool area must have had, must have had to been decontaminated. How much did it receive.

All that spent fuel at risk should that cask have dropped down onto decades where for spent fuel assemblies it would have caused a fire making for an accident much worse than Chernobyl.

The article also pointed out this incident was considered of low significance by the NRC within its quarterly report. Quite a change from the NRC in the early 90s when dry storage cask storage was initiated at Palisades hearing the operators 30 violations for everything from cracked pipes to mishandled drop fuel assembly rods into its reactor vessel. Did they ever find the two pounds of missing fuel.

To Palisades Conversation Group this incident further demonstrates the aged long time ineffectiveness of both the equipment and the personnel at the Palisades Plant right along with the current NRC not handing out violations for such --

This must have been some long term radiation being released for over two days within the flow through area. Were procedures fumbled, could not get their crane to budge for days because one brake froze and all the brakes shut down for 55 hours. What were the plant personnel doing scratching their heads.

A further explanation of partly suspended a 110 pound metal inner cask leaves me with cause for concern as it did others, was not made clear in the article.

Just insistent that everything was okay. Just what is the shielding of a bare metal cask --

MR. CAMERON: Ken, I'm going to have to ask you --

MR. RICHARD: -- that neutron thermal shielding --

MR. CAMERON: -- to wrap up --

MR. RICHARD: -- that they're -- in the cask at the time.

MR. CAMERON: Ken --

AUDIENCE: Let him talk.

AUDIENCE: This needs to be answered in public record. This is the last chance he has.

MR. CAMERON: He can submit his whole thing to us.

AUDIENCE: We want to --

AUDIENCE: We want --

MR. CAMERON: Could you just please wrap up and then we're going to go to Corrine, okay.

MR. RICHARD: We're wrapped up.

MR. CAMERON: All right. Thank you. Corrine.

MR. RICHARDS: Thank you.

MS. CAREY: Will the volunteers for the Raging Grannies please come forward if you're available. You've seen this guy before. He was --

MR. CAMERON: We have, we have.

MS. CAREY: Yes. He's built as --

MR. CAMERON: -- come up here again.

MS. CAREY: -- a recycle but I added a couple touches here.

MR. CAMERON: All right.

MS. CAREY: All right. Okay. I do encourage you to, yes, yes, all of you who would like to come, any honorary grannies are more than welcome.

The, yes, I urge you to get the materials that are on these tables on the side. People look at these over here including some rare books. And do get this one which is the radioactive releases from nuclear power plants in the Great Lakes Basin including a picture down here of the Palisades Plant and it's, it's, yeah, it's discharge holes and a map etcetera of the Great Lakes area.

And your very own picture of the current situation at the cask or the one that we heard about on March 18th. It happened in October. It made the federal reserve or the federal report to, yeah, register, in January.

So yes we, we all question that.

All right. So we are going to skip the one that says about -- this, the great region grannies are all over the country but they originated out in the Washington State area. There is another one the earth is going to throw up over, all over us. We'll skip that one.

Give me a home where the rivers don't foam. But this one is, happens to be about the land of the beaver. Oh, I forget to use this. Now this is an example of how inadequate this kind of protection would be in a nuclear event, totally inadequate just like the fallout shelters of years back.

So land of the beaver. Here in the land of the beaver (singing) they say we are nuclear free. We want to be happy believers but ask ourselves how can it be.

There are nuclear ships in our harbors and the tridents are out in the straights. We have tested the crews, terriorized caribou's, do we look like the 51st state.

They told us that we'd never do it. That no nuc mess would ever be found. But it's starting to look like we blew it and the bad stuff is spinning around.

There are nuclear ships in our harbors and the tridents are out in the straights. We have tested the crews, terriorized caribou's maybe we'll be the dirtiest state.

When business and George Bush are talking they put on their friendship display, big smiles, friendship display.

We wish they would do something shocking and have Georgie -- every state. We'll take nuclear ships from our harbors. We'll take tridents away from the straights. We'll not test the crews, terriorized caribou's and we won't be the dirtiest state. No, we won't be the dirtiest state neah, neah, neah.

We won't be the dirtiest state, neah, neah, neah. And that includes Michigan so.

MR. CAMERON: All right. Okay, thank you and Chester.

Mr. Paul Harden, site vice president at Palisades.

EE-1 MR. HARDEN: My name is Paul Harden. I'm the site vice president of Palisades Plant. And I'll focus my comments on the purpose of the meeting and that's the draft supplemental environmental impact statement.

And I'd like to start off by commending the Nuclear Regulatory Commission on the scope and depth of that report. It's very comprehensive and Nuclear Management Company agrees with the conclusions although we may have some comments that are minor that we'll submit as well by the date none of which will affect the conclusions of the report.

EE-2 I'd like to spend a few minutes addressing the environmental impact of operating, continuing to operate the Palisades Nuclear Plant.

EE-3 But before I do that I'd like to recognize not all of us are ever going to agree whether nuclear power plants should exist. Not all of us are ever going to agree the public policy that this country has taken on how to deal with spent nuclear fuel. That's okay. That doesn't bother me.

The fact that we have diverse people, diverse views and we have the freedom to speak our opinions is part of what makes this country great.

What I would like to do is share a few facts.

AUDIENCE: -- opinions and knowing --

MR. CAMERON: Excuse me.

MR. HARDEN: Some of the facts --

MR. CAMERON: Could we have the courtesy to just listen to the speaker. Thank you.

MR. HARDEN: Some of the facts are the environmental responsibility is built into the design of nuclear power plants. There are multiple redundancies so that no single failures of whether it's

human failure or equipment failures can cause incidents that would be adverse to the environment.

There's environmental responsibility built into the way the plants are operated, the way they're managed and the regulatory oversight. The nuclear industry is one of the more heavily regulated and industries that has additional oversight that there are out there. And the inspectors do a very good job of challenging everything we do.

Another fact is that in addition to continuously monitoring radiation levels on the site and monitoring all the release pathways from the site we go beyond that to verify that we're not having an adverse effect to the environment or the people that surround the plant.

We regularly sample soil. We sample fish. We sample fruits. We sample cows milks to verify that there are no low or trace levels of radioactive material that could have come from the plant. And we do that on a regular basis.

Another fact is that the employees that work at the Palisades Nuclear Plant over 600 employees they're also residents of the local areas. They raise their children here too and they have a deep respect and desire to keep the environment safe as well. They're just as concerned about their children as everyone else.

Given that Consumers Energy and Nuclear Management Company are confident that we can operate Palisades Nuclear Plant and extend the license renewal period safely and with no adverse impact to the environment. EE-4

That is why we are spending hundreds of millions of dollar each year as we proceed forward through the license renewal process upgrading the plant, changing the equipment.

I heard some of the concerns in here with aging of equipment. In a nuclear power plant we are required to have what we call aging management programs. EE-5

We do regularly change out components. Components that aren't changed out get inspected or tested to verify that they are in good condition to continue to operate. And if they start to degrade or the testing shows that there is degradation we change out those components to keep them going.

I'm not up here to change the mind of anyone who is against nuclear power. But I do want to get those facts out. EE-6

We agree that, with the conclusions of the draft report that there are no significant or adverse impacts of operating the Palisades Nuclear Plant in the continued license renewal period.

And if anyone would like to be educated on the facts or learn more about the plant I would be happy to discuss that with you. If you don't trust talking to someone who works for the plant I'd encourage you to talk to the Nuclear Regulatory Commission because nuclear power can be a safe and viable entity.

Everything we do in life has risks. It's a matter of agreement whether those risks are worth endeavoring whether it's a chemical plant, a coal plant or a nuclear plant.

But for the purpose of this meeting the draft environmental impact statement we agree with its conclusions and we look forward to operating the plant in a continued operating period.

MR. CAMERON: Okay, thank you, thank you very much.

A.5 Letters and E-Mails Received on the Draft SEIS

May 1, 2006

4/23/06
71FR 9383 (7)

To whom it may concern:

For several weeks I have been reading with increasing concern about the recent issues with the aging Palisades nuclear reactor.

Admittedly, with my background obviously NOT being in Nuclear Energy, it has been difficult to effectively understand all the technical information being dispersed.

FF-1 But from what I have read, I want to emphasize that while I agree that the US and the world certainly will need to continue to utilize Nuclear Power to reduce emissions and the reliance on foreign oil, and I am all for SAFE, NEW NUCLEAR PLANTS/TECHNOLOGY, after careful consideration and some research, I feel it is in the best interests of the public for safety issues, to close Palisades down and certainly NOT RENEW THE LICENSE with

FF-2 that aging reactor and all the surrounding safety issues as a result.

FF-3 Please take this into consideration as you decide this issue. How horriffic if we in Michigan had a "Chernobyl" incident contaminating Lake Michigan and the surrounding area. What a disaster that would be.

Thank you for your consideration.

Sincerely, Diane E. Byrne

Diane Byrne
9376 Highland View Dr.
Kalamazoo, MI 49009

4/28 In light of the recent radioactive exposure to workers at the Palisades Plant, I am even more convinced that this aging dinosaur needs to be shut down.

RECEIVED
2006 MAY -9 AM 9:13
RULES AND DIRECTIVES BRANCH USNRC

SISP Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = Bo Pham (BMP)
A. Guerrero (AXG3)

Halting 20 Extended Years of Risky, Reactor Operations and Radioactive Waste Generation and Storage On Lake Michigan at Palisades Nuclear Power Plant

Comments on NUREG-1437, Supplement 27 to the Generic Environmental Impact Statement for License Renewal of the Palisades Nuclear Power Plant

2/23/06
71FR9383
(10)

Submitted to:

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

RECEIVED
2006 MAY 25 PM 2: 42
RULES AND DIRECTIVES BRANCH USNRC

From:

Citizens Action Coalition of Indiana; Canadian Coalition for Nuclear Responsibility/Regroupement pour la surveillance du nucléaire; Citizens for Alternatives to Chemical Contamination; Citizens Resistance at Fermi Two (CRAFT); Citizens for Renewable Energy; Huron Environmental Activist League; Clean Water Action; Home for Peace and Justice; Great Lakes United; IHM Justice, Peace and Sustainability Office; Indigenous Environmental Network (IEN; International Institute of Concern for Public Health; Lone Tree Council; Kalamazoo River Protection Association; Michigan Citizens for Water Conservation; Michigan Land Trustees; Michigan Environmental Council; Michigan Interfaith Climate and Energy Campaign/Voices for Earth Justice; National Environmental Trust; Nuclear Energy Information Service (NEIS); Nuclear-Free Great Lakes Campaign; Nuclear Policy Research Institute; Nukewatch; Radiological Evaluation & Action Project, Great Lakes; Sierra Club, Mackinac (Michigan) Chapter; Van Buren County Greens.

Individuals endorsing these comments are listed at the end of this submission.

Please direct questions to the following organizations responsible for research and content development:

Don't Waste Michigan
2213 Riverside Drive, NE
Grand Rapids, MI 48505
Email: alicehirt@charter.net

Coalition for a Nuclear Free Great Lakes
P.O. Box 331
Monroe, MI 48161
Email: mkeeganj@comcast.net

Nuclear Information and Resource Service
6930 Carroll Avenue, Suite 340,
Takoma Park, MD 20912
Tel: 301-270-NIRS (301-270-6477)
Fax: 301-270-4291
Email: nirsnet@nirs.org

Coordinated by:
Tanya Cabala, Great Lakes Consulting, Tel: 231-981-0016; Email: tcabala@charter.net
May 18, 2006

SESP Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = Bo Pham (bmp)
C. Guerrero (cxg3)

I. Introduction

A 20-year license extension is proposed for Palisades Nuclear Power Plant

Consumers Energy, owner, and Nuclear Management Company (NMC), LLC, operator, of the Palisades Nuclear Power Plant situated on Lake Michigan in Covert Township, Michigan, has applied to extend its operating license 20 years beyond its original 40-year operation tenure, which began in 1971. The Nuclear Regulatory Commission (NRC), a federal agency responsible for regulating nuclear power plants, is required by the National Environmental Protection Act (NEPA) to seek input from members of the public and interested groups, regarding the environmental impacts of this action, as well as alternatives to the proposed action.

Don't Waste Michigan, the Coalition for a Nuclear Free-Great Lakes, and the Nuclear Information and Resource Service have researched, coordinated and taken a lead in the development of these comments on the proposed action. In addition to providing important background information on the plant and its impact on the region, the groups also present their assessment of the NRC's draft environmental impact statement (EIS), comments on the re-licensing process and stakeholder participation, and recommendations for improving security at the plant, as well as comments aimed at prevention of the continued risky operation of the plant, and the establishment of a permanent site for storage of high-level radioactive waste on the Great Lakes shoreline.

Description of groups submitting comments

Don't Waste Michigan is a federation of environmental organizations with a 25-member board and membership of 1,000 founded in 1987 to oppose the designation of the state of Michigan as a repository for what was misleadingly termed "low-level" radioactive waste from eight states. Don't Waste Michigan's work was ultimately successful and the state of Michigan was eliminated from consideration as a repository for the wastes. Don't Waste Michigan, with the Lake Michigan Federation (now the Alliance for the Great Lakes) and support from numerous local grassroots organizations, along with Michigan Attorney General Frank Kelly, brought suit in federal court in 1993 to prevent the loading of high-level nuclear waste in casks on the shore of Lake Michigan at the Palisades plant. The suit was unsuccessful and the issue was further pursued by Don't Waste Michigan and Lake Michigan Federation in a letter [Docket #: 05000255,07200007] sent to NRC Commissioner Dr. Shirley Jackson. A hard copy of this letter will be provided to the NRC by Don't Waste Michigan to be included as comments for this draft EIS.

The Coalition for a Nuclear-Free Great Lakes, founded 1986 in the wake of Chernobyl, is an association of groups and individuals from eight states and three Canadian provinces advocating for a nuclear-free Great Lakes. The group's inaugural conference drew representation from 35 reactor communities throughout the Great Lakes basin. The Coalition exchanges expertise and information across the basin regarding nuclear power while advocating for safe alternative energy sources and has held a series of ten basin-wide educational and conferences. The Coalition and its member groups

succeeded in encouraging the International Joint Commission to acknowledge radio-nuclides as persistent toxic substances, as well as undertaking major studies on the effects of radio-nuclides in the Great Lakes Basin. The coalition is based in Monroe, Michigan.

The Nuclear Information and Resource Service (NIRS), founded in 1978 and based in Washington, DC, is an international information and networking center for citizens and environmental organizations concerned about nuclear power, radioactive waste, radiation, and sustainable energy issues. NIRS and the World Information Service on Energy (WISE) joined forces in 2000, to create a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, radiation, and sustainable energy.

History of involvement by submitting groups in the Palisades nuclear power plant
Don't Waste Michigan, the Coalition for a Nuclear-Free Great Lakes, and the Nuclear Information and Resource Service, have a history of monitoring the operations of Palisades, as well as consistently participating in public meetings, providing comments, and instituting legal interventions as needed. The groups have been active participants to date in the meetings, licensing proceedings, and comment processes provided by the NRC as part of the review of the application by Palisades to extend its license.

Both Don't Waste Michigan, and NIRS (representing 50 of its members within 50 miles of Palisades) filed as official interveners against the 20-year license extension, and petitioned the Atomic Safety and Licensing Board (ASLB), the NRC's administrative law licensing board, to hold hearings on the 20-year licensing extension, raising numerous safety and environmental concerns. The ASLB ruled against granting a hearing on March 7, 2006 upon which the groups appealed the decision to the NRC Commissioners. This EIS process is separate and distinct from the ASLB/Commission appeal.

NRC's comment framework unnecessarily restricts public involvement GG-1
The NRC has established a framework for this application process that unfairly and arbitrarily eliminates a huge array of issues from consideration, discussion and comment by individuals, organizations, and Native American tribes that provides an effective obstacle to meaningful public participation. Because of this, some of these comments will fall "outside" of the scope of this process. Regardless, these comments are provided on issues that we believe are germane, and we vigorously object to the arbitrary and overly strict limitations on the scope of public input.

II. Adverse Consequences of Approval of Palisades' License Extension Request

There is much at stake with the prospect of 20 additional years of nuclear power and radioactive waste generation and the associated risks and serious consequences associated with the Palisades plant, which is already unfortunately sited right in the GG-2

3

heart of an exceedingly environmentally valuable and sensitive dune and shoreland on Lake Michigan. Part of the Great Lakes basin, Lake Michigan is an essential facet of a system that is invaluable from a planetary perspective, not only for its contribution to the water supply on the globe - approximately 20% of the world's fresh surface water - but also for its rich and abundant fish and wildlife and the ecosystem services it provides to people, as well as supporting a primary economic engine for the nation. There is no price that can be placed on the value of Lake Michigan, but we do know this with absolute certainty:

Lake Michigan provides essential water resources for 10 million people, supports necessities crucial to the overall health of the region, such as fresh, healthy food from its abundant agricultural base, and provides a significant contribution to the recreation and tourism economies of the four states that border its lakeshore. It is the essential core of the region's natural resource base and provides a value to its human inhabitants that cannot be quantified.

Because pollutants tend to remain in the Great Lakes and cycle through the atmosphere, sediment, water, and biological food chain, contamination of Lake Michigan is a concern for the entire Great Lakes basin, home to one-tenth of the population of the United States and one-quarter of the population of Canada.

Lake Michigan is currently in a critical stage of initial recovery, after suffering decades of impacts from toxic substances, as well as habitat degradation. This initial recovery, unfortunately, has already slowed from the impacts of the more recent intrusion of invasive species. Much has been done and millions of dollars spent to restore and protect the values provided by Lake Michigan, as well as the entire Great Lakes. A recent proposal by a government led coalition has recommended that $20 billion in funds be appropriated to fully restore and protect the Great Lakes.

GG-3 Given what is at stake with consideration of extending an operating license for Palisades, a nuclear power plant and waste storage facility unwisely situated within the heart of Great Lakes, it is imperative to examine the pertinent issues exhaustively as well as encourage the full and meaningful participation of the large constituency of citizens and stakeholders who will be affected by the license decision.

The aforementioned coalition of organizations and individuals listed at the end of these comments oppose the 20-year extension of a license for the Palisades nuclear power plant for the following reasons, elaborated more extensively further in this document:

GG-4 <u>1. There is strong evidence that suggest security measures at Palisades are not adequate.</u> Recent reports, including one in March of 2006 by the Government Accountability Office, call into question the ability and motivation of the NRC and nuclear power industry to take the necessary steps to ensure that the nation's nuclear power plants have instituted the most stringent security measures to protect against terrorist attacks.

GG-5 <u>2. Palisades' license extension will increase the amount of high-level waste on the Lake Michigan shoreline and the number of dangerous barge shipments of high-level</u>

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radioactive waste on Lake Michigan. Palisades will generate approximately 290 more tons of high-level radioactive wastes in 20 additional years with no national repository likely to be established to receive the wastes. The U.S. Department of Energy's plan for transporting high-level radioactive wastes generated by the plant's operation, involves barging up to 125 or more giant rail-sized containers of the wastes from Palisades to the Port of Muskegon, up along the Lake Michigan shoreline. The slightest leakage of even a small amount of this waste could not only threaten Lake Michigan as a source of drinking water for ten million people, but also cause a host of other irrevocable impacts on the lake's fish, wildlife, people, and economy.

3. Palisades' high-level radioactive waste storage facility is defective and risky, situated on the Lake Michigan shoreline. There are numerous incidents dating from the installation of the waste storage facility to the present that demonstrate the risks associated with the dry cask storage containers, as well as their problematic placement on a high risk erosion stretch of the shoreline, on pads not adequately designed to be stable during events such as earthquakes. GG-6

4. The Palisades plant harms the environment and the health of its workers and surrounding residents from its discharges of radioactive and toxic substances to Lake Michigan, the air, and land. Routine radioactive discharges by nuclear power plants are incorrectly deemed legal and judged to be "safe" by the NRC and the nuclear power industry, contrary to a recent National Academy of Sciences report that confirms that there is no safe level of exposure to radiation. Further, other toxic chemical discharges to Lake Michigan, such as Betz Clam-Trol, discharged via a National Pollutant Discharge Elimination System (NPDES) permit, require stricter controls and enforcement of violations, as part of any license extension application. GG-7 GG-8

5. Aging and extended operation increase the risk of accidents at Palisades. The longer Palisades operates, the more embrittled its reactor pressure vessel becomes, increasing the risk for Pressurized Thermal Shock, a condition caused by any number of system malfunctions which can result in a severe, sudden overcooling of the reactor pressure vessel. This can lead to a loss-of-coolant accident, meltdown, and catastrophic release of radiation to the entire Great Lakes basin. GG-9

6. The analysis of alternatives to extending the license for Palisades was flawed and biased. Renewable energy sources such as wind power and solar power, as well as alternatives such as energy efficiency and conservation, are not given credible consideration in the EIS. NMC/Consumers and the NRC reveal a bias in favor of fossil fuel and nuclear power by presenting only those two sources favorably and by downplaying the potential for energy efficiency, energy conservation, and renewable sources of electricity. GG-10

7. The draft EIS prepared by the NRC unaccountably discounts the effects of global warming. There is considerable evidence that more extreme winds, as well more frequent and intense tornadoes — all of which global warming could cause — could GG-11

make operation of Palisades more and more risky over time.

GG-12 8. Financial benefits to Covert Township, host to Palisades nuclear power plant, are not evident and not expected with a license extension. The township consistently rates substantially below comparable county, state and national economic indicators in median household and per capita incomes and the draft EIS notes no improvements are expected by the license extension.

GG-13 9. A 20-year extension for Palisades will be costly. Ratepayers and (by default) taxpayers are to pay for maintenance of the waste generated by the utilities. The fifty year old Price-Anderson Act requires taxpayers to pay for any major accident or terrorist incident at nuclear power plants over a cap of merely $11 billion paid for by the nuclear utilities and their insurance companies for accidents or terrorist incidents at the plant, a liability that could run into many hundreds of billions of dollars. This liability protection is a unique subsidy provided to the nuclear power industry, at taxpayer expense.

GG-14 10. A license extension at Palisades increases the fragile status of numerous already threatened, endangered, or candidate species, from daily "routine" radiation releases and/or potential large-scale radiation releases. Species exposed to cumulative exposures from the radioactive discharges of a nuclear power plant may over time develop subtle genetic alterations that are not observable in the short term, but that could have large, subtle impacts within a population, not immediately apparent. This has significant implications for the threatened and endangered species of southwest Michigan.

III. Background

Palisades nuclear power plant, a one-unit pressurized water reactor with 798 mega-watt-electric capacity, began operation in 1971. It is owned by Consumers Energy and operated by Nuclear Management Company (NMC). NMC operates six nuclear power plants in Wisconsin, Minnesota, Iowa, and Michigan. Consumers Power is a member/investor in NMC and retains ownership of the Palisades plant.

The operating license for the Palisades nuclear power plant, located 5 miles south of South Haven on Lake Michigan, will expire in March 2011. NMC has applied for an extension to operate the plant for an additional 20 years, until March 2031. Nuclear power plants were originally licensed to operate for 40 years, as allowed by the Atomic Energy Act of 1954. There has been a nationwide movement by government regulators and the nuclear power industry to extend the licenses well beyond that time period, even though the reactors are beginning to show signs of aging, raising considerable concerns about safety. To date, 39 of the nation's 103 nuclear reactors have received 20-year extensions, while 12 others are in the process, including Palisades. The Nuclear Regulatory Commission has approved all applications to date.

The Nuclear Regulatory Commission (headed by a 5-member commission, appointed by the President and confirmed by the Senate) was established in 1974 to license and regulate nuclear power plants with a mission of protecting public health and safety and the environment, as well as protecting the common defense and security. Unfortunately, the NRC's implicit mission has been more one of protecting the nuclear power industry's interests rather than the interests of the public. This may be due in part to its budget: by law, the NRC is required to collect fees from nuclear power plant applicants and holders of licenses for the majority of its budget. $628 million of the NRC's $777 million budget for fiscal year 2007 is provided by the nuclear power industry. GG-15

The drive for re-licensing of the nation's nuclear power plants started as early as 1982, with research on aging of nuclear reactors, and began in earnest in 1991 when the NRC published safety requirements for renewal. Currently, re-licensing plans are moving more rapidly as proponents attempt to take advantage of the nation's current energy crisis. Extended and new nuclear power generation is now being promoted as a "clean" alternative to the use of fossil fuels, which are now universally acknowledged as contributing to global warming. Many utilities that own nuclear power plants, however, including Consumers Energy, also own coal-burning plants. Consumers Power, in particular, generates a sizable share of its electricity from the burning of fossil fuels. GG-16

The NRC and power companies thus advocate for a dangerous source of electricity, nuclear power, calling it "clean" and "green" by appearing to discourage another harmful electricity source, one, however, that they plan to continue utilizing to the fullest extent possible. Nuclear reactors, including Palisades, are not 'clean." They emit harmful radioactivity into the environment on a daily basis and generate long-lasting radioactive wastes. Further, nuclear power is <u>not</u> "carbon free," as it relies heavily on the use of fossil fuels in the mining, milling, processing, transportation, management, and storage of its fuel and waste products. GG-17 GG-18

IV. Inadequate Security at Palisades is an Unacceptable Risk

The NRC has placed this issue outside the scope of the EIS for extending the license for Palisades. We strongly disagree and assert that the decision to allow Palisades to operate an additional 20 years in a much higher risk condition mandates extensive involvement by the public. GG-19

Maintaining the security of the Palisades plant is a high priority concern since the events of September 11, 2001. That threat is real and imminent, as nuclear power plants were considered to be potential targets by the terrorists who carried out 9/11, according to the report of the 9/11 Commission. The Commission report notes that several of the terrorists had given indications that a nuclear power plant near New York City was a considered target for an airplane attack, due to the large population that would be affected by a release of radioactivity. That did not happen, reportedly, because the

terrorists appeared to have concluded that it would have been difficult to control the effects of a release of radioactivity. But, the fact that it was considered means that each and every nuclear power plant in the U.S., including Palisades, should be regarded as a potential target for terrorism and security measures must be the most stringent available to address this threat. In fact, reactors such as Palisades are likely more at risk of terrorist attack than certain other reactors, as it is situated on the shoreline of Lake Michigan, the source of drinking water for the region.

Both the NRC and nuclear power companies assert that the events of 9/11 stimulated additional security at plants. However, numerous reports following 9/11 suggest otherwise, including a 2002 report by the Project on Government Oversight (POGO) referencing the plight of overworked and fatigued security guards at the plants during the year following 9/11, and numerous high-profile media accounts of risky gaps in security.

An October 3, 2002 Kalamazoo Gazette article, "Palisades incident leads to reassessment," describes a security response lapse due to Palisades' failure to follow proper procedures, leading to a communications breakdown. When three cars approached Palisades on the eve of the first anniversary of the 9/11/01 attacks, Palisades mistakenly phoned the local police rather than the county 911 system, leading to a 45 minute delay before state police arrived on the scene. By that time, the suspicious cars were long gone.

An October 20, 2002 New York Times article, "Guards at Nuclear Plants Say They Feel Swamped by a Deluge of Overtime," described an emotional breakdown by an armed security guard at Palisades with "unescorted access" to vital areas of the plant after she had been forced to work 72 hour work weeks for months on end. If guards complained about their fatigue, they faced the loss of their job, or forced psychiatric evaluations. Apparently, as reported by POGO, some nuclear utilities chose to nearly double current guards' duty time in order to avoid the added costs of training and providing benefits for newly hired guards.

In March of 2006, an independent nonpartisan investigatory federal agency, the Government Accountability Office (GAO), issued a report that demonstrates that there is much yet to be done to protect the nation from terrorist threats to nuclear power plants. The report, Efforts Made to Upgrade Security, but the Nuclear Regulatory Commission's Design Basis Threat Process Should be Improved (GAO-O6-388), assessed the NRC's current efforts and found evidence that suggested the nuclear industry attempted to avoid strengthening security to avoid costs. It also noted slow progress in conducting mock attacks or force-on-force exercises to test safety at plants, as well as egregious examples of security lapses in the small number of mock attacks that NRC has carried out to date.

NRC'S process for determining risk to nuclear power plants was flawed and undercut by the nuclear power industry

The recent GAO report was done to review the process that the NRC used to revise the Design Basis Threat (DBT) that was in place for nuclear power plants prior to 9/11. The DBT is a description of the threats that might be anticipated from terrorist activities and is used to recommend appropriate security efforts at plants. The GAO also looked at what nuclear plants were doing to meet the threats, and the results of mock attacks, called "force-on-force" inspections, to test security efforts, carried out by NRC staff.

Trained "threat assessment" staff within the NRC used intelligence information that provided information on the capabilities of terrorists and recommended that the DBT be changed to accommodate a larger suite of threats. After sending out the revised DBT for review by nuclear power plant industry officials and groups, however, the NRC changed their recommendations for revising the DBT to reflect nuclear industry concerns about what was "reasonable and feasible" to defend against.

Judgment calls were made on most likely threats

Much of the threat assessment analysis involved a review of a limited amount of information (not much was available specific to nuclear power plants) as well as personal judgment by NRC staff to predict what might be used in a terrorist attack against nuclear power plants. For example, the staff considered whether to increase the number of potential attackers in the DBT, based on knowing the number of attackers in other incidents. Staff did not, however, recommend increasing the number of attackers in the DBT because they assumed that a large number of attackers would be more likely to be caught before they could carry out an attack – a judgment call. NRC staff concluded that an attack similar to 9/11 would not focus on a single nuclear power plant and that since an attack from the air was not an option used often by terrorists, did not recommend that scenario to be included in the DBT. Staff did assess the possibilities of an attack from water, but concluded that a bomb transported by water would necessarily be of smaller size, because it would need to be carried on a boat. (This assessment would not apply to a facility on Lake Michigan, as boats of quite large size could approach Palisades; in addition, it is plausible that speedboats could have the ability to launch an attack on Palisades before plant security defenses could react.

Undue influence by the nuclear industry changed NRC recommendations

The GAO report, in its review of the revisions to the DBT, noted that because the nuclear industry had the opportunity to review the draft DBT, the changes that were made to the draft appeared to reflect concerns by the nuclear industry over the high cost of some increased security measures, suggesting undue influence by the industry. For example, industry representatives protested the inclusion of certain weapons in the DBT, saying that one would render the ballistic shielding of the plants obsolete and that another would be too costly. The industry argued as well that protecting against the use of certain weapons by terrorists was the responsibility of the U.S. federal government, namely, the Department of Defense.

The industry also opposed the inclusion of a threat of an attack from inside the plant, from an "active violent insider," saying there were no cost effective ways of avoiding this scenario. NRC staff made changes to the draft DBT that appeared to be influenced by the industry comments. When the draft DBT was presented to NRC commissioners, even more changes were made based on industry objections, for example, allowing plants to use a "human reliability program" to reduce the potential for an insider situation. The commissioners also removed some weapons from the list recommended by staff that plants would have to defend against that would have added to the cost of increasing security, as well as voting to decrease the maximum amount of weight of equipment, weapons, and explosives an attacker might carry, downgrading the level of security required at plants. The GAO report concluded that some of the changes suggested by commissioners and included as part of the DBT, were made due to judgment, rather than specific criteria.

Few mock attacks carried out to date

The GAO report noted that as of November 2005, the NRC had only conducted mock attacks, or force-on-force demonstrations at 20 of the 65 nuclear plant locations (with 103 reactors) in the U.S. The GAO reviewed documents from inspections and force-on-force demonstrations as well as observing a number of force-on-force demonstrations. Its review of 18 baseline inspection reports and demonstrations noted problems, including an intrusion detection failure at one site:

- Notice of demonstration dates were given 8 to 12 weeks in advance, and daytime and nighttime exercises were generally convened at the same times at each event, leading to a lack of unpredictability in the exercises.
- There were instances where advance information about attack scenarios had inadvertently been provided to plant personnel.
- The quality of feedback from NRC personnel to plants after an inspection varied. For example, not all potential problems were discussed by NRC with plant officials after each demonstration.
- Alarms failed to activate; some did not function properly.
- Gaps in patrols were observed.
- Not all personnel entering protected areas within the plant were searched (for example, a security officer did not examine objects that set off the metal detector).
- Some security officers were inadequately trained for a terrorist attack (lack of physical stress preparedness, training inappropriate to threat).
- Security officers in one location were noted as inattentive at their posts.
- A vehicle barrier system was improperly and ineffectively placed at one plant location.

Accountability to the public on security is non-existent

The need to keep classified certain sensitive information about measures taken at potential targets of terrorism is understandable, but those who live in the vicinity of Palisades, as well as those throughout the region who might be affected by a terrorist

attack directed at Palisades, must be assured in no uncertain terms by the NRC, Palisades, and elected leaders that every measure has been instituted that will provide safety and peace of mind to the public. It is disturbing to note that keeping back information on the plants has even broader implications. In March 2004, for example, the NRC decided not to publicize results of problems related to security at plants, as well as enforcement information relating to actions taken by the NRC against the reactor licensees for violations of safety regulations. This appears to be taking advantage of the heightened attention and concern for security at nuclear power plants to limit information about unsafe operations that should be readily available to members of the public.

If a force on force demonstration has not been conducted at Palisades, it should be conducted as soon as possible. Classified results of the demonstration should then be directly communicated to the region's U.S. Congressional representatives and senators, as well as the Governor and Attorney General of the State of Michigan, for their thorough review and approval and reporting back to the public. To truly secure the Palisades nuclear power plant and dry cask storage, the following security safeguards, if not instituted already, would need to be in place.

- Sufficient cameras and patrols;
- Delay measures, such as fences outside buildings and entrances that would delay potential attackers;
- Bullet resistant structures in the protected areas of the plant site;
- Adequate and specific training for security officers;
- Several levels of intrusion detection systems (Needed especially by Palisades to protect against intrusion from potential attackers that may enter from Van Buren State Park, adjacent to the plant site);
- Vehicle barrier systems to prevent vehicles with bombs from entering the site;
- Anti-aircraft capability, and;
- Shore patrol equipped with stationary weaponry capable of preventing an offshore assault.

While some of these safeguards may appear excessive, they are necessary to secure the facility. Unfortunately, some of these measures have significant civil liberties ramifications for the communities surround Palisades, therefore we request that the NRC address how this will be handled in a 20-year license extension in the draft EIS.

Palisades must also ensure that its irradiated nuclear fuel storage pools are safeguarded from terrorist activities. A study released in April 2005 by the National Academy of Sciences shows that the cooling pools at nuclear reactors, which store 10 to 30 times more radioactive material than that contained in the reactor core, are at risk from attacks by terrorists. According to the study, the cooling ponds could be severely damaged by crashing aircraft, high-powered weapons or explosives, releasing large quantities of radioactive material into the environment.

V. Lake Michigan Dunes and Shoreline Unsafe Location for Stored Waste Containers and Concrete Pads

Changing conditions of Lake Michigan dunes pose risks to waste storage facilities

GG-20 Lake Michigan dunes constitute a series of dynamic environmental settings, from bare beach shorelines, to "growing dunes" or lightly vegetated foredunes, fragile interdunal wetlands and ponds, and finally to mature, forested "oldest" dune hills. Vegetation – grasses, bushes, and trees – is an essential key to the stability of the dunes. When dune vegetation is disturbed by footpaths or other activities, high winds and storms can widen a small stretch of bare sand into an increasingly wide swath or "blowout." Blowouts, areas of blowing and unstable sands, in dunes in the vicinity of Palisades' dry cask storage system could threaten the integrity of the dry cask storage waste system, by clogging vents in the casks, and causing the wastes to overheat, which could lead to an explosion. Left unattended, large blowouts in the dunes surrounding the casks could possibly decrease the stability of the pads on which the casks are situated. This issue must be addressed in the EIS. Palisades must, at minimum, be required to monitor the dunes for potential blowouts and ensure that the dunes are consistently vegetated and stable.

Threat to the waste storage facility from earthquake impacts ignored

GG-21 Michigan has had a lengthy history of earthquake activity, dating back to the first several historically recorded quakes, in 1811 and 1812, originating from the New Madrid fault, centered in New Madrid, Missouri. These quakes registered at 8.0 or higher on the Richter scale. Additional quakes were felt in a variety of locations throughout Michigan in the later 1800s. The largest earthquake experienced in Michigan was in 1947. With a magnitude of 4.6, it was felt throughout southern Michigan, affecting an area of 50,000 square miles. A quake originating in south central Illinois in 1968 extended approximately 580,000 square miles and was felt throughout southern Michigan. The last earthquake in Michigan registered 3.5 and was centered in Lansing in 1994.

The New Madrid zone has produced the country's largest earthquake and is considered the country's most seismically active region east of the Rocky Mountains. The United States Geological Survey (USGS) has given the New Madrid fault a 25 to 40% probability of having an earthquake of 6.0 or greater in the next 50 years (USGS Fact Sheet FS-131-02). Movement has already been noted and described in a June 2005 *Nature* article describing the results of a University of Memphis study that detected a half-inch shift in the fault from 2000 to 2005.

The potential for earthquake activity to damage Palisades' outdoor dry cask storage pads, upon which the casks have been placed, warrants rigorous consideration, which unfortunately, is not in evidence in the draft EIS. Concerns regarding the impacts of an earthquake that might cause disruptive movement to the waste storage facilities at Palisades surfaced as early as 1994, from within the NRC. Dr. Ross Landsman, Nuclear Safety Engineer and Palisades Dry Cask Storage Inspector, questioned the adequacy of

requirements associated with earthquake activity for Palisades' dry cask storage facility in a letter to the chairman of the NRC. In his letter, Dr. Landsman voiced his concerns, "Actually, it's the consequences that might occur from an earthquake that I'm concerned about. The casks can either fall into Lake Michigan or be buried in the loose sand because of liquefaction [soil taking on liquid characteristics]. This event might be in the public's mind in view of what just happened in Southern California. It is apparent to me that NMSS [NRC's Office of Nuclear Material Safety and Safeguards] doesn't realize the catastrophic consequences of their continued reliance on their current ideology."

In a September 15, 2005 affidavit, Dr. Landsman further describes his concerns regarding the ability of the storage pads to withstand movement due to earthquakes, asserting that both the older pad nearer Lake Michigan and the newer one further inland, are in violation of NRC earthquake regulations, 10 CFR § 72.212(b)(2)(i)(B), which require that: "Cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion. . . ." Dr. Landsman noted that Palisades' analysts and engineers apparently failed to acknowledge the differences in elevation between the plant and pad sites in their design of the storage facility. This led to mistakes in the calculations made to determine the potential movement of the pads due to an earthquake. Dr. Landsman noted the violation after inspecting the new storage pad in 2004 and warned that it was not safe, but his concerns were not addressed and casks have nonetheless been allowed by NRC to be placed on the pad right up to the present.

The implications of damage to the casks from an earthquake are significant. Wastes in casks covered in or buried by sand, could overheat, causing severe damage to the irradiated nuclear fuel assemblies and making future storage, handling, transport, and management more dangerous. Overheated radioactive wastes could damage the dry storage casks, leading to leakage of radioactivity into the environment. Emergency responders could be at risk from any damage to the radiation shielding measures on the casks.

The dangers of nuclear waste cask submersion underwater are two fold. First, radioactivity could leak from the cask into the water. Leakage of even a fraction of a cask's contents into Lake Michigan could endanger the source of drinking water for ten million people. Second, enough fissile uranium-235 and plutonium is present in the high-level radioactive waste inside the casks, that water, with its neutron moderating properties, could actually cause a nuclear chain reaction to take place within the cask. This would complicate emergency responses, as potentially fatal radiation doses could be emitted from within the cask.

There is undoubtedly an elevated probability of a strong earthquake originating from the New Madrid fault in the next 50 years, and the potential for it to extend to

southwest Michigan. Because of that, it is imperative that the question of the safety of the concrete pads and the 29 storage casks of high-level wastes be resolved to the satisfaction of citizens of the region.

VI. Native American Tribes Left Out of the EIS

GG-22

NRC staff, in the draft supplement to the Generic Environmental Impact Statement (GEIS), recommended that the Commission determine that the impacts of continued operation of Palisades were not significant enough to make its extended operation unreasonable. The document states further that: "This recommendation is based on (1) the analysis and findings in the GEIS; (2) the Environmental Report submitted by NMC; (3) consultation with Federal, State, and local agencies; (4) the NRC staff's own independent review; and (5) the NRC staff's consideration of public comments received during the scoping process." Astoundingly, it is obvious that Native American tribes were not included in the consultation process for the development of the draft EIS for Palisades.

The role of affected federally recognized, as well as non-federally recognized Native American tribes can best be described as unfairly and severely restricted throughout all aspects of the development of the EIS. Even though the re-licensing application from NMC was submitted to the NRC in March of 2005, it was not until four months later that eleven tribes in Michigan and Oklahoma were invited to participate (via one letter) in the license extension proceedings. A single letter to a federally recognized tribe is not legally sufficient government-to-government consultation. However, other tribes that might be expected to have a substantial interest in proceedings involving Palisades relating to treaty rights and other related issues were left completely out of any part of the process, such as the Bay Mills Indian Community, the Keweenaw Bay Indian Community, the Sault Saint Marie Tribe of Chippewa Indians, all in Michigan's Upper Peninsula, tribes in Wisconsin, the Sauk and Fox Tribes and others in Oklahoma, and the Kickapoo Tribe of Texas (which absorbed the Mascouten Tribe), all with ancestral ties to the Lake Michigan shoreline. In particular, there are concerns for the continued disregarding of sacred burial grounds and other artifacts of tribal groups that may be present on the site and possibly along electric transmission lines extending from the plant, as well as concerns from the tribes in safeguarding such species as the sturgeon that may be negatively impacted by continued operations at Palisades.

Native American tribes are known to have traveled regularly throughout the dunes in West Michigan, hunting in them and using dune plants for food and medicinal purposes. Because of that, it is likely that villages or encampments, as well as burial sites, may well have been located on or in the vicinity of Palisades, especially given the presence of creeks just north and just south of the plant site and the heavily forested, large dunes of the property. This likelihood is confirmed in the draft EIS, on page 2-61 to page 2-62, where the NRC reports "Native American groups that inhabited the area during the historic period were predominantly the Potawatomi, Mascouten, Miami, and Ottawa. During the early historic period, their villages were situated on the edge of

forested land, adjacent to prairies and convenient to streams or the lakeside; temporary winter camps were established in sheltered areas. By the beginning of the nineteenth century, the Potawatomi had established 11 known villages in southern Michigan. Most were near the shorelines of Lake Michigan and Lake Erie, generally along the streams that flow into their waters." Thus, Palisades has a significant potential for such Native American sites to be located on its property.

Nuclear Management Company (NMC), however, gives scant attention to the interests of Native American tribes in its over 500 page Environmental Report, prepared as part of the re-licensing application process. Section 2.10, "Historic and Archaeological Resources," of the report consists of four paragraphs, taking up less than two-thirds of one page (Page 2-46). In fact, the potential for Native American sites on the Palisades property is not explicitly mentioned at all. In its Environmental Report, NMC referenced a number of documents prepared as part of the original license application for Palisades that noted the absence of known archeological or historical resources on the site or in the vicinity to discount the potential for Native American artifacts to be impacted by the license extension application.

The only specific documentation NMC provides in the Environmental Report to support its claim that there are no Native American artifacts, is a letter dated April 7, 1972 from the U.S. Department of the Interior (DOI) to the U.S. Atomic Energy Commission (the predecessor to today's NRC), in terms of nuclear power plant regulation). In that letter, reproduced from Pages C-5 to C-9 of NMC's Environmental Report, DOI states "It does not appear that the existing plant should directly affect any existing or proposed unit of the National Park System, nor any site eligible for registration as a national historic, natural or environmental education landmark; however, the final statement should contain evidence of consultation with the State Historic Preservation Officer concerning the effects of the power station on places on or being considered for nomination to the National Register of Historic Places." However, the DOI statement does not seem to indicate that there was attention placed on locating Native American burial sites, former village sites, etc. located on the power plant site or along the transmission line corridors.

Even though the Michigan State Historic Preservation Office (MSHPO) noted the possibility of unreported artifacts (see Page C-2, Cultural Resources Correspondence of NMC's Environment Report), there has been no survey done by Consumers Power to confirm or dispute this claim and no actions taken by MSHPO officials to resolve the question, demonstrating a distinct lack of significance attached to protecting the interests of Native American tribes. In fact, NRC staff acknowledged in the draft EIS that no adequate surveys have ever been conducted at Palisades. Further, although the draft EIS document determined that the license extension for Palisades might pose a "moderate" impact on the interests of Native American tribes regarding archaeological or historical cultural resources, this initial determination was verbally deemed "a mistake" by NRC staff at the April 5, 2005 draft EIS public comment meeting in South Haven, Michigan. We ask for an explanation as to the reason for this "mistake" and

justification for a significant downgrading of the impact level ascribed to Native American interests in such cultural resources as burial sites from "moderate" in the draft EIS to "small" at the public meeting.

Forty years ago, Native American tribes were seemingly ignored in decisions regarding the original placement and construction of the Palisades nuclear power plant, even though it was an intense and disruptive use on lands at one time occupied by a number of tribes along Lake Michigan, which is revered by all Native Americans of the region. It can only be concluded from this most recent lack of attention in the re-licensing process, that these tribes have once again been accorded neither legally sufficient notification nor appropriate involvement, which is especially negligent in respect to the federally recognized tribes, which are sovereign entities and are legally entitled to have a government-to-government relationship with the United States.

All Native American tribes and bands that could be expected to have an interest in the application by Palisades to operate an additional 20 years deserve both notification of this process, as well as the opportunity to share government-to-government decision making regarding the application, as allowed for under NEPA and other federal laws. A comprehensive site wide survey should be performed on the entire Palisades property - as recommended by Palisades' own cultural resource assessment subcontractor as described in the draft EIS - carried out in close consultation with all affected tribes. If Native sites, such as burials, are found, then appropriate actions should be taken to protect them from damage, again, in close and meaningful consultation with affected tribes in order to ensure that NEPA, treaties, and the terms of other relevant federal laws, such as the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act, are met.

VII. Socio-economic Impact Conclusions in EIS Biased by Substandard Methodology

GG-23

Palisades has been considered a major contributor to Van Buren County's property and municipal tax revenues, but the economic benefit to Covert Township has been ambiguous. In fiscal year 2004, a total of $3.6 million in property taxes went to Covert Township and schools, with an additional $1.6 million to Van Buren County and schools. As host to the Palisades plant and benefactor of its tax revenue, it is reasonable to assume that Covert Township should at minimum be at economic parity with surrounding geographic household and per capita incomes. Despite the financial benefit such payments suggest, however, Covert Township consistently rates substantially below comparable county, state and national economic indicators in median household and per capita incomes. The EIS overlap of Geographic Distribution of Minority Populations (figure 4-1 on p. 4-29 of the NRC draft EIS) and Low-Income Populations (figure 4.2 on p. 4-30) shows a large area of Covert Township (and St. Joseph/Benton Harbor) to be both "high minority and low-income. Poverty persists in the Covert Township, a high minority and low-income community, despite the presence of the Palisades nuclear power plant for nearly four decades.

Consumers Energy is described as the largest employer in Van Buren County, with 484 employees (draft EIS, Table 2-8). The draft EIS states that unemployment in the county "was moderately high at 7.2% in December 2004," but determines no "incremental change" in employment and personal income resulting from a Palisades license renewal –new employment opportunities are not projected to occur.

Palisades' Permanent Employee Residence Information by County and City (Table 2-3) lists employee residence totals as: South Haven (156), Bangor (14), Grand Junction (13), Paw Paw (12), Hartford (8), and Others (30). Unfortunately, residents of Covert Township that might be employed at Palisades are not specified in this information, raising the question as to whether or not Covert Township residents benefit at all from employment at the plant.

A review of household income further shows a lack of positive benefit to Covert Township from Palisades. Per capita incomes in 2000 were $21,587 for the United States, $22,168 for Michigan, $17,878 for Van Buren County and $12,156 for Covert Township (U.S. Census Bureau, 2000 Census, in 1999 dollars). These figures reveal incomes for Covert Township that range from 45% and 33% consistently lower than the state of Michigan and Van Buren County respectively.

Covert Township reported 14.3% of families with incomes less than $10,000, three times the rate of Van Buren County. There are over three times as many families below poverty level in Covert Township as in Van Buren County. Covert bears the burden of 34% of related children under 18 years of age in poverty compared to Van Buren's 11%; related children under 5 years of age in poverty, 38% compared to Van Buren's 17%; Covert families with female householders, no husband present, 48% compared to Van Buren's 25%; related children under 18 years of age for Covert at 57% compared to Van Buren's 30%, and Covert related children under 5 years of age living below poverty level at 80% versus Van Buren's at 48%. Covert reports 32% of individuals in poverty while Van Buren reports 11% of individuals living in poverty. As unfortunate as Van Buren County poverty levels may be, Covert Township's poverty is consistently two and three times worse. None of this data was provided whatsoever in the scope of the EIS socio-economic factors.

Comments by local and county government and Chambers of Commerce officials at public hearings have extolled the benefits of new fire trucks and infrastructure improvements, and the EIS notes that Palisades' property tax revenues are "used to fund local and county emergency management programs, public safety, local public schools, local government operations, local road maintenance, and the local library system," (page 2-58, of the draft EIS). Still, Covert Township experiences chronic poverty.

NRC staff ultimately determined that the socio-economic impacts resulting from Palisades' license renewal would be "small", implying that the impacts "would not produce an incremental change in any of the impact measures used. Unfortunately, the draft EIS's methodology neglected a comprehensive analysis of socio-economic

conditions in Covert Township and Van Buren County, leaving out those conditions that did not support a positive benefit from the nuclear power plant.

NMC/Consumers discounts potential impacts to Latin American migrant workers in southwest Michigan from an extension of Palisades' license. NMC/Consumers' Environmental Report (page 2-32) notes (inaccurately) that "Berrien and Van Buren Counties host moderate numbers of migrant workers." According to the U.S. Department of Agriculture, however, in 2004, 3,677 and 6,733 temporary farm laborers (many of them Latino) were employed in Berrien and Van Buren Counties, respectively. These numbers, in addition to family members of the workers, represent populations as large as the county seats and even the biggest towns in these counties. Rather than characterizing the number of migrant workers, many of whom are Latino and of low income, as "moderate," a more accurate characterization relative to the populations of the host counties would be "large," and therefore worthy of significant consideration not only in NMC's Environmental Report, but also in NRC's draft EIS.

The Latin American agricultural workforce of the Palisades area is also at disproportionate risk from both routine radioactive discharges, as well as catastrophic radiation releases, given this workforce's complete reliance on agricultural sector employment. A large-scale radiation release from Palisades could seriously damage the region's agricultural base. Even a "minor" accident at Palisades involving radiation release could significantly harm area agriculture, due to the stigma attached to radioactive contamination. In either scenario, the Latino migrant labor workforce would suffer disproportionate harm. There also has been no evaluation of the potential for the synergistic effects of chronic or catastrophic radiation releases combined with the toxic pesticides to which field workers have been exposed. In addition, there are no Spanish language emergency evacuation instructions and notifications prepared to serve the Spanish speaking Latino population within 50 miles of the Palisades reactor.

VIII. NRC's Re-Licensing Process Arbitrarily Eliminates Major Impacts from Consideration

With no new nuclear plant orders (that were not later canceled) since 1973, a consequence of the partial meltdown in 1979 of the Three Mile Island plant in Pennsylvania, and with the last reactor built in the U.S. completed in 1996, the American public believed that nuclear power was on the way out, too risky and costly to contemplate. That was not the case. Plans for extending the licenses of operating nuclear power plants were already underway, begun in 1991, with draft rules written to establish a process that would ensure approvals for the extension applications. Although there were major concerns about the procedure raised by the U.S. Environmental Protection Agency, the President's Council on Environmental Quality (CEQ), state officials, environmental and safe energy organizations, concerned citizens, and others about the proposed rule, the procedure nonetheless went forward and ended with a final rulemaking published in the Federal Register in 1995 that provides

for a generic environmental impact review process for any and all nuclear power plants in the country intending to extend their licenses.

The rule requires nuclear power plant applicants to submit an environmental report (ER) and the NRC to write an environmental impact statement (EIS). Both documents are to analyze the environmental impacts associated with the proposed license extension, consider alternatives to a 20-year extension, and alternatives for reducing adverse environmental effects.

This process allows renewal applicants to take advantage of a generic analysis of environmental impacts for numerous environmental issues. Out of 92 issues identified that need to be addressed in an environmental impact analysis of re-licensing, the NRC has determined that 69 are already "adequately" addressed in the generic impact statement. Only 23 issues were found to require additional assessment for at least some plants at the time of the license renewal review. In other words, members of the public and those who live around Palisades are not allowed to address the 69 issues in comments to the NRC about re-licensing, only the short list of 23 identified by the NRC. At that time, over a decade ago, NRC made no meaningful or adequate public outreach in the vicinity of Palisades to alert the public and potentially interested stakeholders to the significance of the rulemaking and the opportunity to provide meaningful input into the decision. GG-24

The NRC also made a determination "that, although no standard exists that can be used to reach a conclusion as to the significance of the magnitude of the collective radiological effects attributable to any plant, 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." This determination made by the NRC is in direct conflict with a 2005 National Academy of Science report, which concluded that no dose of radiation, no matter how small, can be declared "safe." GG-25

The NRC also concludes that any impacts from high-level waste and irradiated fuel disposal from a license extension (even acknowledging the uncertainties about the proposed Yucca Mountain repository) 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. GG-26

Through these determinations, the NRC has effectively stifled debate on two of the most significant impacts of a 20-year license extension – the continued and cumulative effects of radioactive discharges to the environment and humans from the Palisades plant, and the buildup of close to 300 more tons of high-level radioactive waste. This means storage of more wastes on the lakeshore, added to the 29 storage casks already in place, and the remainder of wastes stored in the pool within the plant, which is also a risky method for storing these deadly wastes.

IX. Routine Radioactive Discharges Pose Serious Threat to Health

GG-27 The NRC has placed this issue outside the scope of the EIS for extending the license for Palisades. We strongly disagree.

There are routine everyday discharges from nuclear power plants, deemed to be both explicitly "permissible" or "allowable," and implicitly "safe" or "insignificant" by the NRC and the nuclear power industry. Prior to the advent of nuclear power, radioactive fission products, produced in nuclear reactors, were present in only exceedingly rare, trace amounts in isolated locations on earth. Over 300 different radioactive chemicals are currently created by nuclear chain reactions - and it takes hundreds of thousands to many millions of years for these new chemicals to return to a stable state.

Radioactivity is emitted to the air and the water, as part of routine discharges by nuclear power reactors. It settles upon or is washed back up on the soil and beach as well. For example, reactors use large amounts of water for cooling, and that water when it is returned to a lake or river will have radioactive substances in it. Radioactivity from air discharges also can fall out into water bodies and become embedded in bottom sediments, as well as upon soil on land. Contamination of soils and groundwater can occur through routine discharges, as well as through leaks, accidents, and spills, which are not always fully detected or reported. Wind, water, precipitation, and ecological processes (such as bio-accumulation) can move the radioactive contaminants off site where they are dispersed or diluted, but still present in the ecosystem where they can eventually make their way into living organisms.

GG-28 Although radiation monitoring occurs at reactor sites, it only provides information on levels of discharges emitted or released. It does not provide specific information about where the radioactive materials end up, or if they contribute to radiation levels in plants, fish, and wildlife as well as body burdens of local and downwind or downstream residents. The Nuclear Regulatory Commission relies upon self-reporting and computer modeling from reactor operators to track radioactive releases and their projected dispersion. A significant portion of the environmental monitoring data is extrapolated - or virtual, not real.

Radioactive materials are toxic, persistent pollutants, now widely acknowledged to have many adverse affects on people, as well as fish and wildlife. According to the Union of Concerned Scientists (UCS), the adverse affects are numerous, and can include cancer, reproductive difficulties, genetic and birth defects, and death. "Routine" radioactive releases from nuclear power plants, while reported by the utility to be below "permissible" levels, are still potent due to their ability to become concentrated in organisms. For example, a report by UCS found that mallard ducks carried concentrations of cesium-137 in their flesh that was 2,000 to 2,500 times that in their food, while strontium-90 was concentrated by a factor of 65,000 in clam shells. UCS's report also found increased levels of radioactivity in marine life up to 300 miles from the source.

Ionizing radioactivity differs from natural background radioactivity because it produces radioisotopes that mimic natural chemicals and concentrate in the body where these chemicals reside. Strontium-90, which is routinely released during fission, can get into cow's milk and mimic calcium, following the path of that element in the body and end up in teeth and bones. It can concentrate to high levels and cause leukemia, a deadly form of cancer. Iodine-131, another highly toxic by-product of nuclear power, can concentrate in the thyroid where naturally occurring iodine is deposited, and produce serious hormonal dysfunctions or even thyroid cancer in children.

Radioactive byproducts in reactor waste have different half-lives – the amount of time it takes for half of a given amount of radioactive material to decay. Some decay in a few hours. Others, like strontium-90 and cesium-137 last longer, with half-lives of about 30 years. It takes them around 300 years, or ten half-lives, to decay. But some by-products, like iodine-129, have half-lives of a million years or longer. Plutonium-239, one of the most toxic human-made materials, has a half-life of nearly 25,000 years.

While concerns about the consequences of human exposure to ionizing radiation are not new, the 2005 National Academy of Science's seventh Biological Effects of Ionizing Radiation (BEIR VII) report on "Health Risks from Exposure to Low Levels of Ionizing Radiation" has confirmed that there is no safe level of exposure to radiation—that even very low doses can cause cancer and other maladies – and that risks from low dose radiation are likely greater than previously thought. The implications of NAS's recent findings require a thorough analysis by NRC in its EIS of the human health impacts of the radioactive substances released by Palisades. GG-29

NMC/Consumers should be required to provide the communities in the vicinity of the Palisades plant, with a monitoring program to supply independent information regarding radioactive discharges and releases. These communities are currently dependent upon the operators of Palisades to provide notification of radiological releases. Establishment of an independent program would give evidence of NMC/Consumers' interest in and commitment to ensuring the health of its surrounding communities. GG-30

Historically, the NRC has relied on a 1990 National Cancer Institute (NCI) study to address cancer rates near nuclear power plants. However, this study is now outdated, not accounting for latency periods which could have developed into cancers since 1990. And it was essentially methodologically flawed from the start, as the only data considered by the NCI was from the county that each reactor is located in, and not other downwind and downstream populations potentially affected by radioactive releases of the plants. Further, there are a host of other diseases associated with radiation exposure that have not been assessed, such as thyroid disease, infertility, genetic damage and birth defects, heart disease, and immune system suppression, which require monitoring and attention. A baseline assessment, as well as regular monitoring, of cancer and other disease rates is warranted prior to consideration of Palisades' proposal for a 20-year license extension. GG-31

X. More Palisades Waste to Build Up On the Lake Michigan Shoreline

GG-32 Palisades' high-level radioactive waste storage facility is defective

The NRC has placed the issue of waste generation and storage outside the scope of the EIS for extending the license for Palisades. We strongly disagree.

The Palisades nuclear power plant has generated, on average, 14.5 tons [U.S. Dept. of Energy's Feb. 2002 Final EIS for Yucca Mountain. Appendix A. Tables A-7 and A-8] per year of high-level radioactive waste. The Nuclear Waste Policy Act was amended in 1982 to allow the NRC to approve interim storage of high-level radioactive waste in dry cask storage facilities in a "generic licensing" without studies specific to each plant site or Environmental Impact Statements. In 1993, several tons of wastes that were accumulating in the Palisade plant's overfull irradiated fuel pools were moved into massive concrete and steel storage casks on concrete pads on the plant site.

GG-33 Inexplicably, the extremely dangerous radioactive wastes from Palisades, that will remain dangerous for tens to hundreds of thousands of years, were deliberately placed within a high-risk erosion zone, which is highly unstable, dynamic and risky. Currently, around 20 of a total of 29 casks, weighing 132 tons each, are situated approximately 150 yards from Lake Michigan, sitting atop loose sand dozens of feet thick. Thus, the casks, and the concrete pad upon which they sit, are not anchored to bedrock. This stretch of Lake Michigan's southwest shoreline is known to have the ability to recede in an exceptionally short time frame. The high-risk erosion zone requires 30-year construction setbacks that range from 55 ft. to 140 ft. and 60-year setbacks that range from 115 ft. to 260 ft.

GG-34 One of the waste storage cask systems at Palisades, the "VSC-24," (Ventilated storage cask containing 24 pressurized water reactor irradiated nuclear fuel assemblies) utilizes passive ventilation to keep the waste at the appropriate temperature. The vents on this type of cask need regular cleaning so they will not clog from blowing dune sand, debris, or snow. This cask is also not considered transportable, like some casks, and as such, wastes contained within them will need to be unloaded and transferred into shipping containers, when or if transport occurs. But even though Consumers Energy and the NRC testified in federal court that the casks could be safely unloaded, there have been numerous problems. When weld defects were detected in the fourth VSC-24 cask to be loaded in 1994, for example, it was found that there were critical questions about how to handle the procedure. This defective cask has yet to be unloaded, twelve years later.

To further complicate the unloading problems of Palisades' casks, the configuration of the dry casks currently stored on the older pad nearer Lake Michigan is such that those casks furthest back cannot be moved or unloaded until all other casks in front of them have been moved out of the way first. Thus, casks that cannot be unloaded on the shore side of the pads will effectively halt unloading of the casks behind them.

There have been other accidents and incidents with the VSC-24 system. While a VSC-24 cask was being welded shut at the Wisconsin Point Beach nuclear power plant in 1996, a spark from the welding caused a hydrogen gas explosion that tilted the lid of the cask (3 tons of metal) several inches ajar; this incident occurred on the edge of the waste storage pool, threatening to damage the pool and unleash a potentially catastrophic radiological accident. Additional weld defects have been detected in other casks at Palisades and at other plant sites.

On February 6, 1997, Mary P. Sinclair Ph.D. co-chair of Don't Waste Michigan, wrote to Dr. Shirley Jackson, Chair U.S. Nuclear Regulatory Commission and reviewed this history in great detail with documentation and references for each point made. In her letter to Dr. Jackson, Dr. Sinclair wrote the following:

" . . . Attorney General Frank Kelley petitioned for an injunction in May 1993, against the loading of these casks in the Western Michigan Federal Court at Grand Rapids. (Case No. 4:93 CV 67). Consumers Power Co.'s response to the Court was that the company would unload the casks and place the nuclear waste back in the spent fuel pool if the Court should rule against them and, therefore, an injunction to prevent loading was unnecessary. A supporting position for the utility's action was filed by Charles Haughney of the NRC, in which he assured Judge Robert Holmes Bell that Consumers was able to do this by simply reversing the process of loading, if the Court so ordered. This demonstrates that, not only did Consumers Power Co. mislead the Judge, perhaps out of ignorance, about Consumers' ability to unload these casks, but more importantly, Charles Haughney of the NRC pledged the Agency's credibility in support of this position. His statement is signed, "Pursuant to 28 U.S.C. sec. 1746, I declare under penalty of perjury that the foregoing is true and correct." (Executed and signed on May 5, 1993). Judge Bell, of course, could hardly grant an injunction under those circumstances. This is one of many instances in which the judgment of the staff was flagrantly in error, and helped to compound the problems that have later developed. [pp. 3-4, Requests that Commission review 2.206 petition filed on 950919 & amended on 960930 by Lake Michigan Federation & Don't Waste Michigan, Sinclair MP. Accession Number: 9704090248, Docket Number: 05000255,07200007, Microform Address: 92410:204-92410:211] A hard copy of this letter is being provided by Don't Waste Michigan to be entered in its entirety into the record as part of comments being submitted on this draft EIS. There are additional comments in the letter, which also pertain to this EIS process.

The Wisconsin explosion led to a three year hiatus in the loading of VSC-24 casks nationwide, in order to improve safety procedures. Palisades was the first plant in the country to begin loading VSC-24s again, in June, 1999. However, mistakes were made yet again. A welding crew accidentally ignited flammable hydrogen gas being vented off a loaded VSC-24. But it failed to notify the next welding crew coming on shift to replace them. The new crew also ignited the leaking hydrogen gas, representing a breakdown of safety protocols, risking a repeat of the Wisconsin explosion.

During the June, 1999 dry cask loading campaign, Palisades also loaded irradiated fuel that had not yet thermally cooled and radioactively decayed in the underwater storage

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pool for the required minimum of five years. This represented a violation of the technical specifications for the casks, and thus NRC safety regulations. Also in June 1999, a fire at Palisades in an office trailer storing paper records on the dry cask storage installation destroyed records on the most recent, and earlier, accidents.

Palisades also uses Transnuclear NUHOMS-32PT dry storage casks. In October 2005, crane handling errors led to a 107 ton NUHOMS transfer cask fully loaded with high-level radioactive waste dangling for 55 hours above the storage pool. Reports confirmed that the risk of a heavy load drop had been increased due to improper emergency brake manipulation during the incident. NRC reported that, had the load dropped, severe damage to the pool could have resulted.

GG-35 A separate NRC report, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," (NUREG-1738, Feb. 2001) revealed that a heavy load drop can cause the cooling water to drain away. The densely-packed waste in the pool could then overheat, spontaneously combust, and ignite a waste fire causing catastrophic radiation release. NRC concluded that up to tens of thousands of people could die from cancer over time, downwind of such an accident.. Despite similar crane problems years earlier at its Big Rock Point nuclear power plant in northern Michigan, failure to communicate "lessons learned" within the nuclear utility contributed to repeating the same dangerous errors at Palisades.

GG-36 Establishment of a permanent national waste repository remains indefinitely delayed

In 1982, with the passage of the Nuclear Waste Policy Act, the U.S. Department of Energy (DOE) was given the responsibility for finding a permanent site to build and operate a repository for all of the wastes accumulating at the reactors across the country. Original plans were for the repository to begin accepting irradiated nuclear fuel in 1998, but it has been pushed back until 2020, according to the most-recent predictions made by Energy Secretary Samuel Bodman. In 2002, Congress voted to allow DOE to apply for a license from NRC to construct and operate a repository at Yucca Mountain in Nevada. The opening of the repository is uncertain: the State of Nevada has actively opposed the plan, and raised legitimate questions about the suitability of the site; DOE does not have full funding for construction and operations, and recently, a federal appeals court found that the impact of the project must be evaluated for longer than the 10,000 years currently considered. Even if the Yucca site were to open in 2020, DOE has projected in its 2002 Final EIS for Yucca that it would take 24 to 38 years to transport wastes to Yucca from reactors across the U.S., including Palisades. Thus, even if Yucca opened in 2020, it would take until 2044 or even until 2058 for the wastes generated before 2010 at Palisades to be moved to Yucca Mountain, Nevada. Because of this, existing wastes from Palisades are likely to remain on the Lake Michigan shoreline indefinitely.

GG-37 Waste from 20 additional years of operation at Palisades will not go to Yucca Mountain

Yucca Mountain is limited by law to store 70,000 metric tons of nuclear waste. Only 90%, or 63,000 metric tons, of that can come from commercial nuclear reactors. 63,000

metric tons is approximately the amount of nuclear waste that will be stored on-site at reactors around the country by 2010. A 2004 analysis by the Environmental Working Group found that the 26 reactors at nuclear power plants re-licensed between 2000 and 2004 will produce an additional 9,000 metric tons of high-level nuclear waste over the 20-year period of their license extensions. Eighteen more reactors at nine power plants with license extensions pending would add another 6,600 metric tons of waste, for a total of 15,600 additional metric tons. Wastes produced at Palisades for 20 additional years– 290 additional tons of irradiated nuclear fuel –will likely be stored indefinitely in the same manner as the other Palisades wastes that have been produced to date, resulting in a massive assemblage of concrete and steel silos extending along the high risk erosion zone on Lake Michigan, as well as a packed storage pool within the Palisades plant.

<u>If Yucca Mountain opens, waste will be transported by barge and rail</u>

The DOE has estimated that transporting the waste from the plants to Yucca Mountain would require more than 53,000 truck shipments to Yucca over 24 years or about 2,200 per year. If rail is the primary means of transporting the waste – and DOE has stated that it prefers rail – the proposed action would require more than 10,700 cross-country shipments over 24 years, or about 450 per year (Halstead 2002). Re-licensing to date has added about 5,700 more truck shipments, or 1,050 rail shipments to that total. GG-38

The Department of Energy declared in April 2004 that rail shipment to Nevada is the preferred mode of transportation for high-level nuclear waste. Barge shipments are being considered under this option because 17 nuclear power plants, including Palisades, have no rail access, yet could connect to rail lines via barges.

For Palisades, DOE has proposed barging up to 125 giant rail-sized containers of high-level radioactive waste from Palisades to the Port of Muskegon, up the Lake Michigan shoreline. DOE's estimate of 125 shipments may very well be an underestimate, in that DOE assumed Palisades would only get a 10-year license extension, while NRC's practice to date has been to approve every request for a 20-year license extension. Thus, an additional 10 years worth of waste generation would mean that many more barge shipments between Palisades and Muskegon.

The barging of 125 or more shipments of high-level radioactive waste is very risky. Any submersion of the casks in water, could stimulate the fissile uranium-235 and plutonium, both present in the high-level waste, to cause a nuclear chain reaction. The slightest leakage of even a small amount of this waste could not only threaten Lake Michigan as a source of drinking water for ten million people, but also cause a host of other irrevocable impacts on the lake's fish, wildlife, people, and economy.

<u>Storage of "low" level radioactive waste from Palisades not addressed in the draft EIS</u>

The Barnwell, South Carolina "low" level radioactive waste dump, which has accepted shipments from Palisades for decades, will close its doors to wastes from Michigan in 2008. Neither NMC in its Environmental Report, nor NRC in its draft EIS, have GG-39

explained how Palisades will deal with the "low" level radioactive wastes when Barnwell closes, such as establishing storage installations for "low" level radioactive wastes on the plant site. What NRC and the nuclear industry term "low" level radioactive wastes contain many of the same radio-nuclides as high-level radioactive waste, only less concentrated. Some "low" level radioactive waste can even deliver a lethal dose of radiation at close enough range in as little as 20 minutes. "Low" level radioactive waste management at Palisades is a significant health, safety, and environmental issue that requires is largely unaddressed by NMC and NRC in the license extension application and requires specific consideration.

XI. Plant Aging Increases Accident Risk

GG-40 A top concern directly related to the re-licensing of Palisades for 20 additional years, is the aging of the plant, in particular *embrittlement*, or the gradual weakening of the reactor pressure vessel (RPV) from decades of bombardment by neutrons emitted by the nuclear chain reaction in the core. It is generally acknowledged that the reactor pressure vessel at Palisades is one of the most embrittled in the nation. The longer Palisades operates, the more embrittled its RPV becomes, increasing the risk for Pressurized Thermal Shock (PTS), a condition caused by any number of system malfunctions which can result in a severe, sudden overcooling of the reactor pressure vessel. This, combined with the intense pressurization in a pressurized water reactor, can stress the RPV such that its walls could crack or rupture, leading to a loss-of-coolant accident, meltdown, and catastrophic release of radiation to the entire Great Lakes basin.

Age-related failure of Palisades' systems could initiate the sequence of events that leads to PTS. Examples of aging systems at Palisades are evident in this short list of recent incidents:

1. Alert Declared Due to Loss of Shutdown Cooling (Event # 39699 March 25, 2003)
2. Failure of the Control Rod Drive Mechanism (see PNO-III-04-010 August 11, 2004)
3. Reactor Manually Tripped Due to Fire in 2B Condensate Pump (Event# 41002 August 31, 2004)
4. Relief Requests for Reactor Vessel Head Penetration problems (NMC Request 10/4/04)
5. Reactor Vessel Head Nozzle Cracking - Through Wall Cracks (Degraded Condition 10/17/2004)
6. Manual Reactor Trip/Main Condenser Vacuum (Event # 41319)

7. Emergency Declared on Primary Coolant System Integrity (Event # 41681)

8. Control Rod Stuck in Reactor Core (Event #42569 May 11, 2006)

The embrittlement at Palisades, the unresolved risks of PTS, and the ever-increasing likelihood of the failure of the RPV as Palisades ages warrant special environmental considerations. This type of accident is considered one that goes beyond the design of the reactor. NRC has not, however, included the issue in the EIS nor incorporated it in "Beyond Maximum Credible Accident" scenarios for Palisades as a potential accident. Further, NMC in its Environmental Report, has declined to undertake major refurbishment for Palisades' license renewal, despite Consumers Energy's earlier pledge to "anneal" (super-heat) the reactor pressure vessel. This super-heating theoretically can bring back ductility or flexibility to the metal, thus reducing potential for PTS. Annealing has never been performed in the U.S., however, and thus raises concerns itself as an experimental procedure.

Please include for the record the Adobe PDF document entitled "Palisades Nuclear Plant Yearly Capacity Factors" & "Palisades Plant - Record of Transients or Operational Cycles" for Occurrence #1 dated 1/11/1972 through Occurrence # 126 dated 1/9/2005. This is a record which has major implications for embrittlement and the Reactor Pressure Vessel at Palisades. A hard copy will be sent. Please enter it into the record.

Age-related deterioration also increases the likelihood of unintentional leaks, as plant systems, structures and components wear out and fail. Palisades' age-related degradation means increasing amounts of radioactivity will be "routinely" released over time. Plans for addressing embrittlement and other aging issues at Palisades are not provided in NMC's Environmental Report or in the EIS. Any discussion of 20 additional years of operation at Palisades necessitates a specific plan for addressing embrittlement and aging issues.

The most recent NRC report on a potential accident at Palisades, done in 1982, (Calculation of Reactor Accident Consequences or CRAC- 2), predicted that a meltdown and large-scale radiation release from the Palisades reactor would cause 1,000 fatalities and 7,000 injuries in just the first year, 10,000 cancer deaths over time, $52.6 billion in property damage (based on 1980 census, expressed in 1980 dollars, thus significantly underestimating current and future impacts due to population growth and inflation; adjusting for inflation, property damage could exceed $100 billion expressed in year 2005 dollars). The above CRAC - 2 report did not take into account a "Beyond Maximum Credible Accident" scenario. We request the EIS provide assessment of the consequences of a "Beyond Maximum Credible Accident" as Palisades' embrittlement status increases the likelihood of such an accident.

XIII. Emergency Evacuation Plans Need Updating

GG-41 Emergency responders in the 50-mile zone around the Palisades nuclear reactor are likely to be inadequately trained and inadequately equipped to respond to a major radioactivity release during an accident or attack at the Palisades plant. Covert Township does not have the staffing, equipment, training or preparedness for a major radiological emergency, the risk of which increases with 20 additional years of operation at Palisades., as the plant ages.

Other communities within the 50-mile zone are mostly rural, and maintain only volunteer fire departments, which have even less equipment and training than Covert Township. Radiation monitors and radiation-protective gear are unheard of, or in limited supply. Isolation wards for radioactively contaminated victims – the patients themselves posing a hazard to emergency medical technicians, doctors, and nurses -- are limited as well at hospitals within 50 miles of Palisades

NMC/Consumers are obligated to demonstrate how the communities that surround its facility are equipped for such a risk referenced in NRC's 1982 report, of a catastrophic radiation release, as well as ensuring that the plant's current Radiological Emergency Response Plan projects 20 years forward and incorporates population trends and development, highway construction projects, transitory populations of migrant workers, and provisions for bi-lingual notifications and dissemination of information.

XIV. Dispute Regarding Violations of Palisades' NPDES Permitted Discharges Remains Unresolved

GG-42 There are questions regarding the status of the NPDES permit of Palisades to utilize and eventually discharge a compound, Betz Clam-Trol, to Lake Michigan to control mussel and clam mussel colonization in discharge and intake pipes. Reports posted by the Michigan Department of Environmental Quality (MDEQ) in 2000 and through 2004 indicated "continued non-compliance." Subsequent updating of the reports now appears to indicate that the plant is and was in compliance with its permit. To further confuse the matter, MDEQ has stated that the original reports were erroneous. We ask that a full explanation be provided for this situation and how it will be considered in the re-licensing decision. The impact of 20 additional years of pollution improperly controlled under requirements of the National Pollutant Discharge Elimination System will adversely affect the water quality of nearby sources, including Lake Michigan.

In its "Ninth Biennial Report on Great Lakes Water Quality," the International Joint Commission urged that "[g]overnments monitor toxic chemicals used in large quantities at nuclear power plants, identify radioactive forms of the toxic chemicals and analyze their impact on the Great Lakes ecosystem." The draft EIS must address how the NRC or the U.S. Environmental Protection Agency has met this obligation.

XV. Analysis of Alternatives to License Extension Flawed and Self-Serving

In the draft EIS, Section 7.0, "Alternatives to the Proposed Action," renewable energy sources such as wind power and solar power, as well as alternatives such as energy efficiency and conservation, are not given credible consideration. Polluting electricity sources such as fossil fuels are cited by NMC/Consumers as the only realistic alternatives to approval of a 20-year license extension at Palisades. This is not surprising, as nearly three-quarters of Consumers' electricity generation (in 2002) comes from fossil fuel facilities. But the choice is not just between nuclear power and coal as sources for electricity generation. NMC/Consumers reveal a bias in favor of fossil fuel and nuclear power use by presenting only those two sources favorably in their Environmental Report, and by downplaying the potential for energy efficiency, energy conservation, and renewable sources of electricity. NRC echoes this as well in its draft EIS. GG-43

Renewables, efficiency and conservation are not only available, reliable, safe, clean and affordable options for electricity generation and savings, but also a source for tremendous job growth and cost savings. Using simple energy efficient techniques, Michigan citizens and businesses could easily reduce the state's energy demand by 1%, the energy used by 40,000 homes. In the state of Michigan there is currently 19,250 megawatts of generating capacity. Palisades generates 798 megawatts, or 4% of the power generation in the state of Michigan. Wind power potential in Michigan, according to the DOE, is 16,000 megawatts, or twenty fold the mega-wattage of Palisades, and could be a viable replacement for the energy that Palisades provides. In fact, wind power is the fastest growing new source of electricity in the United States, relative to all other sources. GG-44

NRC staff's assertion in the draft EIS that such wind power expansion would have a large negative impact due to the large surface area of land it would require is incorrect, and ignores the fact that small-scale family farmers could benefit from the placement of wind turbines on their fields. These farmers could either benefit from the lease payments from wind power companies for use of their land's "windshed," or could work towards owning their own wind turbines on their own land, and thus receive the full income from wind powered electricity generation. Wind turbines would not preclude the farmers' continued use of fields for agricultural crop or livestock production. Wind power could serve as a valuable source of income for farming families, complementing their agricultural livelihood, while also providing safe, clean, reliable, and inexpensive electricity for the region. GG-45

There are also many examples of new efforts underway in Michigan to move forward with renewable energy, with the deployment by Mackinaw Power of modern, large capacity wind turbines on the northern tip of Michigan's lower peninsula, plans to deploy more wind turbines on the Lake Michigan shoreline of west Michigan, and advances in solar electricity by United Solar Ovonics in Troy, Michigan (which GG-46

manufactures solar electricity generating roofing shingles). President Bush visited the headquarters of United Solar Ovonics earlier this year to promote promising renewable energy technologies.

It is especially significant that on April 6, 2006, Michigan Governor Jennifer Granholm signed Executive Directive No. 2006 - 2, which charges the Michigan Public Service Commission to prepare an "Energy Plan for the State of Michigan" by December 31, 2006. The directive calls for the development of a renewable portfolio standard that "establishes targets for the share of this state's energy consumption derived from renewable energy sources" and initiates the "appropriate use and application of energy efficiency, alternative energy technology, and renewable energy technologies.... consistent with the goal of assuring reliable, safe, clean and affordable energy." This puts the state of Michigan in a favorable position to promptly substitute clean energy sources for those with adverse impacts, such as nuclear power, as it moves into the forefront of renewable energy technology.

The full cycle of nuclear power illustrates its complete adverse environmental impact

There are many different types of nuclear power reactors. In the U.S. there are two types of light water reactors, Boiling Water Reactors (BWR) and Pressurized Water Reactors (PWR). Palisades is a pressurized water reactor. All, however, rely on a nuclear fission chain reaction to generate heat to boil water, to create steam, which is then used to drive an electrical generator. The radioactive material used in the fission process is uranium.

Mining for uranium involves separating the ore from rock, which leaves "tailings" that contain residues of uranium, and other radioactive materials (such as radium, radon, and thorium) from the radioactive decay of uranium and, although being considered "low-level" radioactive waste, actually contain around 85% of the natural uranium's original radioactivity. Mining of uranium is likely to impact the quality of Michigan's environment with an extension of Palisades' license, as there have been recent proposals to mine uranium in the Upper Peninsula of Michigan. The Great Lakes have already been damaged by such mining activities. Uranium mining at Elliot Lake, Ontario from the 1940s to the 1990s released vast quantities of radiological and toxic chemicals into Lake Huron. Despite the mines shutting down in the late 1990s, harmful effluents still flow into the Great Lakes. Mine tailings were flooded over with water to prevent oxidation, thus creating "dead," artificial lakes which dot the landscape.

After mining, raw ore is milled, ground up, and chemically leached into a powder called "yellowcake." The yellowcake powder is chemically processed or enriched, into either uranium dioxide for use in power plants or uranium metal, used in making nuclear weapons. Wastes from the enrichment process, also miss termed a "low-level" radioactive waste by NRC, are called depleted uranium or DU. The U.S. and some other countries use DU to coat tank armor and armor piercing shells/weapons. There is considerable controversy regarding DU coated weapons and the potential for exposure to depleted uranium to cause kidney and lung damage, and cancer and birth defects.

According to Dr. Arjun Makhijani, Director of the Institute for Energy and Environmental Research, uranium mining and milling inflicts some of the worst human health impacts of the entire uranium fuel chain. This is due to the careless handling of the radioactive materials involved, and dumping of waste materials upon the surface of the land, where they can be dispersed in air and water. Because of this, the Navajo Indian Tribe in the Southwestern United States - the largest Indian tribe in the country - has officially banned the mining, milling, or processing of uranium upon its reservation territory. GG-47

Nuclear power is not carbon-free. Considerable amounts of fossil fuel energy are used to mine, mill, process, and transport, and manage uranium ores and byproducts. As more reactor licenses are extended, fossil fuel use is likely to increase as poorer-quality ores are used due to the depletion of higher quality ore reserves because poorer quality ores require much more conventional energy for extraction and processing. Mining of more distant deposits also contributes greater carbon dioxide inputs to the atmosphere. Uranium enrichment is also energy intensive, and has historically involved the release of very large amounts of ozone layer destroying chlorofluorocarbons. NRC's draft EIS does not address such negative environmental impacts of the nuclear fuel chain. A full cost accounting of the uranium fuel chain's negative impacts on health and the environment is required to properly evaluate Palisades' twenty-year license extension request.

Nuclear power generation is more costly than readily available alternatives

Many costs associated with nuclear power are often hidden or externalized; for example, the very existence of the nuclear industry is only possible due to the government's assumption of the accident liability risk. According to Public Citizen ("Renewable Energy Is Capable of Meeting Our Energy Needs" fact sheet, 2006) direct taxpayer subsidies to the nuclear energy industry totaled $115 billion between 1947 and 1999, with a further $145 billion in indirect subsidies. In contrast, subsidies to wind and solar during the same period amounted to only $5.5 billion.

Decommissioning, or the closing and dismantling of nuclear power plants, ranges from $280-$612 million for each plant, ultimately paid for by utility customers. DOE's latest cost prediction for the Yucca site for high-level radioactive waste generated up to the year 2010 is $58 billion. Energy Secretary Bodman has recently admitted, however, that DOE has no total price tag predictions for the project and the state of Nevada predicts the cost will top $100 billion. Ratepayers who receive electricity from nuclear reactors pay a Nuclear Waste Fee on their electricity bills. Several billion dollars of the Fund have already been spent at Yucca; about $20 billion remains in the Fund, far short of DOE's now underestimate of $58 billion for Yucca. The shortfall will have to be paid, yet again, by US taxpayers, many of whom have already paid as ratepayers. GG-48

Nuclear power is not, as currently promoted, cost effective compared with other energy sources. In a 2006 paper on the "economics and climate-protection potential" of nuclear power, Amory Lovins, energy researcher and director of the Rocky Mountain Institute,

describes the advantages of energy efficiency and explains that ".... nuclear power saves as little as half as much carbon per dollar as wind power and traditional cogeneration, half to a ninth as much as innovative cogeneration, and as little as a tenth as much carbon per dollar as end-use efficiency. ..... Empirically, on the criteria of both cost and speed, nuclear power seems about the least effective climate-stabilizing option on offer." [Amory B. Lovins, "Nuclear power: economics and climate-protection potential, Rocky Mountain Institute, 11 September 2005, updated 6 January 2006, p. 15.]

Lovins puts it succinctly in his recent analysis: "No other energy technology spreads do-it-yourself kits and innocent disguises for making weapons of mass destruction, nor creates terrorist targets or potential for mishaps that can devastate a region, nor creates wastes so hazardous, nor is unable to restart for days after an unexpected shutdown."

The full costs of operating the Palisades nuclear plant for 20 additional more years, including the costs of accidents, waste storage, and decommissioning, must be assessed as part of the EIS.

Impacts from extreme weather/global climate change discounted by NRC

GG-49 A majority of scientists throughout the world now believe that increased emissions of carbon dioxide since the Industrial Revolution are enhancing the greenhouse effect of the atmosphere that surrounds the earth, and causing a warming that will cause dangerous effects to the earth's climate and inhabitants - global warming. The NRC confirms it as well, in its analysis of impacts of alternatives that might be more appropriate options than extending the license for Palisades, as it concludes that the impacts of substituting coal plants for Palisades would be a "large" impact, due to their contribution to global warming.

A one-degree Celsius warming of the earth's surface may seem insignificant, but it is not. The temperature of the earth's surface greatly affects our climate in many ways. In particular, a warmer planetary climate means more rain, flooding, and snow in various regions, earlier spring arrivals, hurricanes, heat waves, drought and fires in some places, frigid cold in others.

The effects are already seen in Michigan, where water in the Great Lakes is warming. According to Dr. Natalia Andronova, research scientist at the Department of Atmospheric, Oceanic, and Space Sciences at the University of Michigan in a May 7, 2006 interview with the Ann Arbor News, "Measurements of the near-surface temperature over the northern part of Lake Michigan and southern part of Lake Huron showed that for both lakes the period from 2000 to 2005 was warmer by at least two degrees Celsius than the period from 1981 to 1985." An increase of Lake Michigan water temperatures may eventually affect Palisades' operation, since the condenser within the plant requires cooler water to operate efficiently. During a heat wave in the late 1990s, reactors on the U.S. side of Lake Ontario shut down because the water temperature was too high to efficiently cool the reactor and generate steam for electricity production. During the extreme heat wave in France in recent years, nuclear reactors released so

much superheated water to rivers that fish kills occurred; operators had to hose down the exterior of reactors as an emergency measure to provide additional cooling at the same time.

In the recent interview, Dr. Andronova also noted conditions particular relevant to re-licensing of Palisades. She commented that "it is becoming windier over the Great Lakes. The extreme winds increased from the one period to the next by more than 3 meters per second." More extreme winds, as well more frequent and intense tornadoes — all of which global warming could cause — could make operation of Palisades more and more risky over time. For example, documents received by the Nuclear Information and Information Resource from NRC during a Freedom of Information Act request regarding the October 2005 "near-drop" of a storage cask into the irradiated nuclear fuel pool at Palisades revealed that on extremely windy days, Palisades is prohibited from lifting loaded dry casks from the pool, as the high winds make crane operations too dangerous.

The potential danger presented by tornadoes to reactors was clearly shown in 1998, when a tornado struck the Davis-Besse nuclear plant in Ohio, knocking out the off-site electricity supply; the emergency back up diesel generators also malfunctioned. If not for extreme efforts by staff, the plant could have lost coolant, leading to a meltdown. An increase in severe weather due to global climate destabilization in the region could well increase risks at Palisades. Far from being a solution to global warming, nuclear power could become unacceptably dangerous and unreliable due to global warming.

The draft EIS prepared by the NRC unaccountably discounts the effects of global warming, noting that its effects cannot be predicted. We assert that there is sufficient information currently available that should be investigated and considered regarding the impacts of changes in weather that may occur in a 20-year extension to Palisades' license. This must also include an analysis of the increased potential for an electrical station loss of power that could lead to loss of cooling in the reactor core and waste storage pool, with the potential for core meltdown and waste pool fires, with consequent catastrophic large-scale radiation releases to the environment. The warming of the cooling water supply from Lake Michigan must also be considered in regards to the efficiency and safety of Palisades continued operation till 2031.

XVI. Endangered Species Harmed by Radioactive Discharges

Plant and wildlife species become endangered for a variety of reasons, including loss of habitat, overexploitation, disease and pollution, and the introduction of invasive species. Official designation of a species by federal or state government as endangered or threatened not only acknowledges the importance of that species, but also its fragile status that requires special protection efforts. These special protection efforts most certainly encompass protection against the routine and cumulative exposure to radioactive substances.

Frameworks for radiological protection have traditionally been focused on the protection of humans. The International Commission on Radiological Protection (ICRP), which provides recommendations on protection against ionizing radiation, has maintained that "if man is adequately protected then other living things are also likely to be sufficiently protected" (ICRP, 1977). There is no scientific evidence, however, to support this viewpoint.

In addition, it is well established that ionizing radiation is one of the causes of genetic mutation. Species exposed to cumulative exposures from the radioactive discharges of a nuclear power plant may over time develop subtle genetic alterations that are not observable in the short term, but that could have subtle, but large impacts within a population. This has significant implications for threatened and endangered species.

GG-50 NMC/Consumers' Environmental Report identifies numerous federal and State of Michigan endangered, threatened, candidate or species of special concern – such as the eastern box turtle, lake sturgeon, lake herring, creek chub sucker, Pitcher's thistle, prairie warbler, prairie vole, eastern massasauga rattlesnake, spotted turtle, Indiana bat, globe-fruited seedbox, scirpus-like rush, bald rush, Carey's smartweed, and sedges that either already live at or near the Palisades reactor or along its transmission lines, or very likely could in the future.

Approving a license extension of 20 more years of reactor operations at Palisades increases the fragile status of these already threatened, endangered, or candidate species, from daily "routine" radiation releases and/or potential large-scale radiation releases. At minimum, NMC/ Consumers must be required to establish a baseline for the status of the endangered species listed above and conduct appropriate monitoring to ensure that Palisades is not further endangering their health and viability.

XVII. Conclusions

GG-51 For the reasons laid out in this document, the coalition of aforementioned environmental, social justice, and public interest organizations oppose the application by Palisades nuclear power plant to operate for an additional 20 years beyond its original 40 year license. The decision to sanction approval of the 20-year license extension appears to have been predetermined and the invitation to members of the public and citizens of this region to participate in this decision making process has been merely perfunctory. This coalition of organizations protests the severe limitations of the process and advocates for a decision-making framework that allows for an unbiased, deliberative, participatory discussion as to whether or not to allow 20 more years of operation by the Palisades nuclear power plant.

With a **fair and just** Environmental Impact Statement – the conclusion reached in the EIS would not have been the continued operation of a potentially catastrophic accident risk and terrorist target on our beloved Lake Michigan shoreline. These risks are

exacerbated by the already regrettable high-level radioactive waste storage -- or de facto high-level nuclear dump -- in the heart of the Great Lakes.

There are too many explicit threats to the region's environment and people that have been ignored in order to promote the use of an energy that is far too costly, exceedingly hazardous, increasingly risky and highly irresponsible, as the question of a solution to the waste problem is passed down as a regrettable legacy to future generations.

For these reasons we urge that the proposed 20-year license extension be denied until all environmental impact concerns raised here and by other stakeholders are addressed in an objective process that is deemed acceptable by the public as prescribed by the 1969 National Environmental Policy Act (NEPA).

Recommendations

Security issues at Palisades must be addressed immediately. If a mock attack or force on force demonstration has not been conducted at Palisades, it should be conducted as soon as possible. Classified results of the demonstration should then be directly communicated to the region's U.S. Congressional representatives and senators, as well as the Governor and Attorney General of the State of Michigan, for their thorough review and approval and reporting back to the public. The following security safeguards, if not instituted already, must be put in place immediately: GG-52

- Sufficient cameras and patrols;
- Delay measures, such as fences outside buildings and entrances that would delay potential attackers;
- Bullet resistant structures in the protected areas of the plant site;
- Adequate and specific training for security officers;
- Several levels of intrusion detection systems (Needed especially by Palisades to protect against intrusion from potential attackers that may enter from Van Buren State Park, adjacent to the plant site.);
- Vehicle barrier systems to prevent vehicles with bombs from entering the site;
- Anti-aircraft capability, and;
- Shore patrol equipped with stationary weaponry capable of preventing an offshore assault.

NRC and Palisades must also ensure that the plants irradiated nuclear fuel storage pools are safeguarded from terrorist activities as well as address civil liberties ramifications of increased security to the host and surrounding communities of Palisades.

Native American interests must be addressed. All Native American tribes and bands that could be expected to have an interest in the application by Palisades to operate an additional 20 years deserve both notification of this process, as well as the opportunity to share government-to-government decision making regarding the application, as allowed for under NEPA and other federal laws. A comprehensive site wide survey GG-53

should be performed on the entire Palisades property - as recommended by Palisades' own cultural resource assessment subcontractor as described in the draft EIS - carried out in close consultation with all affected tribes.

GG-54 **Effects on the health of populations surrounding Palisades and subject to downstream or downwind discharges must be studied and quantified.** The implications of the National Academy of Science's recent findings require a thorough analysis by the NRC in its EIS of the human health impacts of the radioactive substances released by Palisades. NMC/Consumers are obligated to provide the communities in the vicinity of the Palisades plant, with a monitoring program to provide them with independent information regarding radioactive discharges and releases. There is also a need to establish a baseline assessment of cancer and other disease rates, as well as a program of regular monitoring, prior to consideration of the proposal for a 20-year license extension. This should also include an evaluation of the potential for the synergistic effects of chronic or catastrophic radiation releases combined with the toxic pesticides to which migrant field workers in the region have been exposed.

GG-55 **NRC must provide a detailed explanation to the public as to the ultimate disposition of the wastes stored currently on the Palisades plant site, as well as the 290 additional tons expected as part of 20 additional years of operation.**
The proposed national repository for high-level wastes from nuclear power plants, Yucca Mountain, Nevada, is not expected to open until at least 2020, and is likely to be delayed beyond that date. Further, by law, the repository can only store 70,000 metric tons, which will not include the additional wastes generated at Palisades during a license extension. NRC in its EIS, must also explain how Palisades will deal with its "low" level radioactive wastes when its current repository site in Barnwell, South Carolina closes in 2008.

GG-56 **Barging of high-level radioactive wastes in Lake Michigan must be removed as a transportation option.** The barging of 125 or more shipments of high-level radioactive waste on Lake Michigan is simply too risky. Any submersion of the casks containing the wastes in water, could stimulate the fissile uranium-235 and plutonium, both present in the high-level waste, to cause a nuclear chain reaction. The slightest leakage of even a small amount of this waste could not only threaten Lake Michigan as a source of drinking water for ten million people, but also cause a host of other irrevocable impacts on the lake's fish, wildlife, people, and economy.

GG-57 **NRC must require Palisades to develop and implement a specific plan for addressing embrittlement and aging issues.** Plans for addressing embrittlement at Palisades are not provided in by NMC or in the EIS. Any discussion of 20 additional years of operation at Palisades necessitates such a plan to address the aging of plant structures and components. We request the EIS provide assessment of the consequences of a "Beyond Maximum Credible Accident" as Palisades' embrittlement status increases the likelihood of such an accident.

NMC/Consumers must demonstrate how the communities that surround its facility are equipped for a catastrophic radiation release. The plant's current Radiological Emergency Response Plan is inadequate and must be revised to project 20 years forward and incorporate population trends and development, highway construction projects, transitory populations of migrant workers, and provisions for bi-lingual notifications and dissemination of information. This requires Spanish language emergency evacuation instructions and notifications prepared to serve the Spanish speaking Latino population. GG-58

A comprehensive analysis of socio-economic conditions in Covert Township and Van Buren County must be conducted to encompass income disparities. NRC must account for the lack of positive benefit by Covert Township residents as a result of the presence of Palisades' nuclear power plant and potential license extension. NRC must also direct NMC/Consumers to address the potential for disproportionate harm to the Latino migrant labor workforce from harm to the agricultural base from a radiation release. GG-59

The safety of the concrete pads and the storage casks of high-level wastes must be resolved to the satisfaction of citizens of the region. The potential for earthquake activity to damage Palisades' outdoor dry cask storage pads, upon which the casks have been placed, warrants rigorous consideration, which unfortunately, is not in evidence in the EIS. Further, blowouts, areas of blowing and unstable sands, in dunes in the vicinity of Palisades' dry cask storage system could threaten the integrity of the dry cask storage waste system, by clogging vents in the casks, and causing the wastes to overheat, which could lead to an explosion. Palisades must be required to monitor the dunes for potential blowouts and ensure that the dunes are consistently vegetated and stable. GG-60

NRC must revise its analysis of energy alternatives. Full and objective consideration must be afforded the options of renewable energy and efficiency. NRC must also provide a thorough cost accounting of the uranium fuel chain's negative impacts on health and the environment. GG-61

The EIS should be revised to include how the NRC meets its obligations as described in the International Joint Commission's (IJC) "Ninth Biennial Report on Great Lakes Water Quality." In it, the IJC urged that "[g]governments monitor toxic chemicals used in large quantities at nuclear power plants, identify radioactive forms of the toxic chemicals and analyze their impact on the Great Lakes ecosystem." GG-62

NRC must assess and consider as part of the EIS, the information currently available regarding the impacts of global warming to the region. This must also include an analysis of the increased potential for an electrical station loss of power that could lead to loss of cooling in the reactor core and waste storage pool, with the potential for core meltdown and waste pool fires, with consequent catastrophic large-scale radiation releases to the environment. The warming of the cooling water supply from Lake GG-63

Michigan must also be considered in regards to the efficiency and safety of Palisades continued operation till 2031.

GG-64 **NMC/Consumers must be required to establish a baseline for the status of the endangered species and conduct appropriate monitoring to ensure that Palisades is not further endangering their health and viability.** Approving a license extension of 20 more years of reactor operations at Palisades increases the fragile status of these already threatened, endangered, or candidate species, from daily "routine" radiation releases and/or potential large-scale radiation releases.

These Comments are Submitted by the Following Organizations:

Gordon Edwards, Ph.D., President,
Canadian Coalition for Nuclear Responsibility
Regroupement pour la surveillance du nucléaire, c.p. 236 Station Snowdon
Montreal H3X 3T4
Canada

Kay Cumbow, Director
Citizens for Alternatives to Chemical Contamination
8735 Maple Grove Road
Lake, MI 48632

Keith Gunter
Citizens Resistance at Fermi Two (CRAFT)
& Nuclear-Free Great Lakes Campaign
15784 Whitby Street
Livonia, Michigan 48154

S. (Ziggy) Kleinau, Co-coordinator
Citizens for Renewable Energy
462 East Road
R.R. #4, Lion's Head
Ontario N0H 1W0
Canada

Michael Keegan, Chairman
Coalition for a Nuclear-Free Great Lakes
P.O. Box 331
Monroe, MI 48161

Alice Hirt
Don't Waste Michigan
2213 Riverside Drive, NE
Grand Rapids, MI 48505

Bill Freese
Huron Environmental Activist League
P.O. Box 302
Alpena, MI 49707

Joanie McCoy
Home for Peace and Justice
P.O. Box 67777
Saginaw, MI 48608

Robert Shimek
IEN Mining Organizer
Indigenous Environmental Network (IEN)
IEN National Offices
P.O. Box 485
Bemidji, Minnesota 56619

Dr. Rosalie Bertell, Retired President
International Institute of Concern for Public Health
Toronto, Canada
(Currently, Member of the International Science Oversight Committee
National Association of Public Health Policy, Washington DC,
and Regent on the Board of Regents, International Physicians for Humanitarian
Medicine, Geneva)

Dayle Harrison
Kalamazoo River Protection Association
3108 - 62 St.
Saugatuck, Michigan 49453

Terry Miller
Lone Tree Council
4649 David Ct.
Bay City, MI 48706

Terry Swier, President
Michigan Citizens for Water Conservation
P.O. Box 1
Mecosta, Michigan 49332

Lana Pollack, President
Michigan Environmental Council
119 Pere Marquette Dr., Ste. 2A
Lansing, MI 48912

Patti Gillis, Coordinator

Michigan Interfaith Climate and Energy Campaign/Voices for Earth Justice
26672 Elm St.
Roseville, MI 48066

Maynard Kaufman and Barbara Geisler
Michigan Land Trustees
Bangor, Michigan

Vicki Levengood
Michigan Representative National Environmental Trust
1606 Melrose Ave.
East Lansing, MI 48823

Dave Kraft, Executive Director
Nuclear Energy Information Service (NEIS)
3411 W. Diversey, Ste. 16
Chicago, IL 60647

Kevin Kamps, Nuclear Waste Specialist
Nuclear Information and Resource Service
6930 Carroll Avenue, Suite 340
Takoma Park, Maryland 20912

Dr. Helen Caldicott, Founder and President
Nuclear Policy Research Institute
1925 K St N.W., Suite 210
Washington, D.C. 20006

Henry W. Peters, Director
Radiological Evaluation & Action Project, Great Lakes
(REAP-GL)
Rt. 1, Box 193
Ewen MI 49925

Anna Holden, Chair
Conservation Committee
Sierra Club, Mackinac (Michigan) Chapter
8430 E. Jefferson Ave., Apt. 217
Detroit, Michigan 48214

Chuck Jordan, Co-Chair
Van Buren County Greens
50521 34th Ave.
Bangor, Michigan 49013

The Following Individuals Add Their Support to the Submission of These Comments:

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Official Individual Intervenors Against the License Extension Who Live Within 50 Miles of Palisades:

Sandra J. Adams, 744 Garland Avenue, Kalamazoo, MI 49008

Wade J. Adams, 744 Garland Avenue, Kalamazoo, MI 49008

Ann Aliotta, 79955 Fernwood Walk, Covert, MI 49043

Amy Anderson, 3819 Devonshire, Kalamazoo, MI 49006

Elizabeth (Beth) Anderson, 145 66 Street, South Haven, MI 49090

Robert C. Anderson, 3819 Devonshire Avenue, Kalamazoo, MI 49006-2703

Anthony Badalamenti, 9251 West R Avenue, Kalamazoo, MI 49009

Joan Badalamenti, 9251 West R Avenue, Kalamazoo, MI 49009

Laura Barringer, 01655 67th Street, South Haven, MI 49090

Katherine (Katy) Beck, 30018 Lake Bluff Drive, Covert, MI 49043

Thomas Beck, 30018 Lake Bluff Drive, Covert, MI 49043

James F. Brisky, 24154 W. McGillen Avenue, Mattawan, MI 49071

Lee Burdick, 7130 Austrian Pineway #13A, Portage, MI 49024

Drucilla D. Carter, 96 S. Lake Doster Drive, Plainwell, MI 49080

Henry Cohen, 903 Pinehurst Blvd., Kalamazoo, MI 49006

Don Cooney, 1221 Vassar Drive, Kalamazoo, MI 49001

Bruce Cutean, A 3997 64th Street, Holland, MI 49423

W. Roland Elmore, 403 Water Street, Saugatuck, MI 49453

John Ephland, 714 Fairview Avenue, Kalamazoo, MI 49008

Jane Gardner, 28386 Sturtevant Walk, Covert, MI 49043

Barbara Geisler, 25485 County Road 681, Bangor, MI 49013

Joseph A. Gump, 45511 CR 380, Bloomingdale, MI 49026

Rachel Hayward, 827 W. Maple St., 2-B, Kalamazoo, MI 49008

Samuel Hayward, 1930 S. Westnedge Avenue, Apt. 4, Kalamazoo, MI 49008

Karen Heavrin, 80012 Ramblewood Drive, Covert, MI 49043

Janine Heisel, 29818 Lake Bluff Drive, Covert, MI 49043

Mary Lou Hession, 29818 Lake Bluff Drive, Covert, MI 49043

Alice H. Hirt, 6677 Summit View Drive, Holland, MI 49423

Shaun Hittle, 827 W. Maple St., 2-B, Kalamazoo, MI 49008

Lauretta Holmes, 2923 Memory Lane, Kalamazoo, MI 49006

Lee Ann Johnson, 1602 Jefferson, Kalamazoo, MI 49006

Chuck Jordan, 50521 34th Avenue, Bangor, MI 49013

Raelyn Joyce, 1920 Hillsdale, Kalamazoo, MI 49006

Judy Kamps, 441 Fairfax Avenue, Kalamazoo, MI 49001

Gary Karch, 251 Cass Street #714, Niles, MI 49120

Maynard Kaufman, 25485 County Road 681, Bangor, MI 49013

Joan Khaled, 3609 Devonshire, Kalamazoo, MI 49006

Nelly Kurzmann, 301 Edgemoor, Kalamazoo, MI 49001

Nan Lewis, 80078 Ramblewood Drive, Covert, MI 49043

Larry Mahannah, 3504 Tamsin, Kalamazoo, MI 49008

Michael Martin, 25741 31st Street, Gobles, MI 49055

Carol McGeehan, 568 W. 31st Street, Holland, MI 49423

Brenda F. Mehagan, 29886 Lake Bluff Walk, Palisades Park, Covert, MI 49043

Michael W. Mehagan, 29886 Lake Bluff Walk, Palisades Park, Covert, MI 49043

Jeanice Morgan, 01651 67th Street, South Haven, MI 49090

Maria Ochs, 4660 Sailview Drive, Holland, MI 49423

Maria Ogston, 2717 Ridgeview Drive, Kalamazoo, MI 49008

Elizabeth Paxson, 3258 Lorraine Lane, Saugatuck, MI 49453

Ken Richards, 72772 County Road 380, South Haven, MI 49090

Margaret Roche, 27842 Shorewood Walk, Covert, MI 49043

Pamela S. Rups, 2705 Pine Ridge Rd., Kalamazoo, MI 49008

James O. and Sally P. Schlobohm, 28324 Shorewood Drive, Windjammer, Palisades Park, Covert, MI 49043;

Stephen M. Senesi, 439 Park Place, Kalamazoo, MI 49001

Thomas E. and Nancy Cutbirth Small, 2502 Waite Avenue, Kalamazoo, MI 49008

Daniel B. Smith, 3022 Fleetwood Drive, Portage, MI 49024

Catherine Sugas, 410 S. Sherman St., Otsego, MI 49078

Elizabeth M. Sugas, 10888 Douglas Avenue, Plainwell, MI 49080

Kimeri Swanson-Beck, 30018 Lake Bluff Drive, Covert, MI 49043

Robin Tinholt, 6187 Bayou Trail, Saugatuck, MI 49453

Barbara Trumball, 80009 Ramblewood Drive, Covert, MI 49043

Ineke Way, 1938 Oakland Drive, Kalamazoo, MI 49008

Sally Zigmond, 79955 Fernwood Walk, Covert, MI 49043

Additional Individuals Adding Their Support to the Submission of these Comments:

Laurel and Mark Goetzinger
4453 Central Ave.
Indianapolis, IN 46205
Eldredge cottage in Palisades Park Community

Martha Eldredge Heck

Jean Keller
Owner of Grapevine Cottage, #182, at Palisades Park Country Club
Home address: 15691 Aulnay Lane
Huntington Beach, CA 92647
Phone 714 230 6528
Email: jkeller841@socal.rr.com

Ryan and Cheryl McCoy
208 S. Haven St.
South Haven, MI 49090

Tim O'Brien
Indiana resident
Frequent visitor to Palisades Park/South Haven area since 1978
Owner of a vacation home in the area.

Terry & Laura O'Brien
7390 Holliday Drive East
Indianapolis, IN 46260
Palisades Park cottage owners

Jean S. Prokopow
24390 Sandpiper Isle Way #104
Bonita Springs, FL 34134

Catherine Quigg
838 Harriet Land
Barrington, Illinois

Pamela Rups
2705 Pine Ridge Road
Kalamazoo, Michigan 49008

Mary E. Schmidt
6684 Sunset Concourse
Holland, Michigan 49423

Halting 20 Extended Years of Risky, Reactor Operations and Radioactive Waste Generation and Storage On Lake Michigan at Palisades Nuclear Power Plant

Comments on NUREG-1437, Supplement 27 to the Generic Environmental Impact Statement for License Renewal of the Palisades Nuclear Power Plant

Submitted to:

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

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From:

Citizens Action Coalition of Indiana; Canadian Coalition for Nuclear Responsibility/Regroupement pour la surveillance du nucléaire; Citizens for Alternatives to Chemical Contamination; Citizens Resistance at Fermi Two (CRAFT); Citizens for Renewable Energy; Huron Environmental Activist League; Clean Water Action; Home for Peace and Justice; Great Lakes United; IHM Justice, Peace and Sustainability Office; Indigenous Environmental Network (IEN; International Institute of Concern for Public Health; Lone Tree Council; Kalamazoo River Protection Association; Michigan Citizens for Water Conservation; Michigan Land Trustees; Michigan Environmental Council; Michigan Interfaith Climate and Energy Campaign/Voices for Earth Justice; National Environmental Trust; Nuclear Energy Information Service (NEIS); Nuclear-Free Great Lakes Campaign; Nuclear Policy Research Institute; Nukewatch; Radiological Evaluation & Action Project, Great Lakes; Sierra Club, Mackinac (Michigan) Chapter; Van Buren County Greens.

Individuals endorsing these comments are listed at the end of this submission.

Please direct questions to the following organizations responsible for research and content development:

Don't Waste Michigan
2213 Riverside Drive, NE
Grand Rapids, MI 48505
Email: alicehirt@charter.net

Coalition for a Nuclear Free Great Lakes
P.O. Box 331
Monroe, MI 48161
Email: mkeeganj@comcast.net

Nuclear Information and Resource Service
6930 Carroll Avenue, Suite 340,
Takoma Park, MD 20912
Tel: 301-270-NIRS (301-270-6477)
Fax: 301-270-4291
Email: nirsnet@nirs.org

Coordinated by:
Tanya Cabala, Great Lakes Consulting, Tel: 231-981-0016; Email: tcabala@charter.net

May 18, 2006

Please include
* Letter to Dr. Shirley Jackson
* Plant Capacity
* Record of Transients
as part of the Submittal coordinated by:

These documents are referenced in our electronic filing

Thank You

I. Introduction

A 20-year license extension is proposed for Palisades Nuclear Power Plant
Consumers Energy, owner, and Nuclear Management Company (NMC), LLC, operator,

5711 Summerset Dr.
Midland, MI 48640
Feb. 6, 1997

Dr. Shirley Jackson, Chair
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Dr. Jackson:

I respectfully submit a request that you and your fellow Commissioners personally review the 2.206 petition(10 CFR 2.206) that was filed on Sept. 19, 1995, and amended on Sept. 30, 1996, by Lake Michigan Federation and Don't Waste Michigan. Acting Director Frank Miraglia of the Office of NRR issued a decision on this petition on Jan. 23, 1997. The Federal Register notice of this decision indicates that there are 25 days in which the Commission can institute a review of this decision before it becomes final.

This petition was related to the fact that Consumers Power Co. (CPCo) did not have a workable unloading procedure in place before it loaded the first VSC-24 cask at the Palisades site in May, 1993, as required by the Certificate of Compliance (No. 1007) under 10 CFR 72, Section 1.1.2.

When cask #4 was found to be defective in Aug., '94, CPCo pledged to unload the cask. It claimed that this would be a means of affirming to the public its high standards of safety and of restoring public confidence in the cask loading operations at Palisades. When the task of unloading was actually to be undertaken, the technicians found that there were challenging procedures which had never been considered or anticipated in the initial unloading document. In a public meeting with the NRC in Maryland in late Aug., 1994, the concerns described included: 1) introducing 400 degree F. fuel from the metal basket to 100 degree F. spent fuel pool water which would result in a highly radioactive steam flash and raised concerns about thermal shock to the fuel; 2) cutting through the steel in a window of 50 hours or less, since the cooling process cannot be maintained during cutting; 3) developing a procedure for removing steel shims that were pressure-fit inside the fuel basket below the lid.

Without resolving these grave issues and demonstrating a successful unloading procedure of the defective cask, CPCo proceeded to load 9 more casks 150 yards from the shore of Lake Michigan at Palisades.

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A year later, when defective cask #4 was still not unloaded, Don't Waste Michigan and La e Michigan Federation filed the aforesaid petition 2.206 to demand enforcement proceedings by the NRC, since public confidence not only in CPCo but in the NRC,-- because it allowed continued loading of these casks,--was even further eroded by these actions.

I am enclosing a copy of this 2.206 petition so that you and your fellow Commissioners can readily review it and understand why we strenuously object to NRC's decision in the resolution of these matters and our reasons for doing so.

1) The decisions made by Mr. Miraglia are based on what appears to be a woefully inadequate understanding of all the facts involved. The lack of a factual basis for his decision is due either to ignorance on his part (understandable, perhaps, since he has been in his Acting Director position for only a few months), or is a deliberate evasion of some of the extraordinary issues and events that have transpired in the design, development, certification and implementation of this cask system that are now in the public record. It is possible to review these facts only briefly in this communication, but even this should be enough to convince you and your fellow NRC Commissioners that a hearing is in order to fulfill the requirement of your responsibility in implementing the 2.206 regulation in the Federal Code.

Mr. Miraglia appears to have relied solely on the judgment of the staff and the facts they provided him for his decision. For this reason, the role of the NRC staff must be reevaluated in light of the serious errors in judgment on the part of some staff members that have been made in the past, and the notable lack of comprehension and understanding of some important aspects of this cask system by some leading staff members who are in decision-making positions.

(It should be noted that there are some highly competent staff members who have tried to influence the decisions of the NRC in key areas. For example, Dr. Ross Landsman, an NRC soils expert, visited the Palisades area in Feb., '94, after repeated citizen concerns about placing casks on unstable sand dunes. He pointed out that using the site specific studies that were initially done for the nuclear plant's environmental impact statement as a basis for judging the stability of the cask storage area on site, as is now done under "generic"

licensing, was seriously flawed and could lead to "catastrophic consequences." As an example, he showed how a nuclear plant, itself, as at Palisades, usually has a foundation of 8 ft. of concrete that is grounded in bedrock. By contrast, the casks, as at Palisades, are placed on top of a 3 ft. concrete pad with no foundation to bedrock. His concerns and expert advice have been ignored by staff members in decision-making positions, and "generic" licensing continues to be the policy for siting dry cask storage facilities on our fresh water supplies throughout the country).

The few historical events we are limited to describing here will demonstrate how poor judgment and incompetence on the part of some of the staff who have directed policy have had unfortunate consequences for the public.

2) The NRC staff was establishing their "generic" licensing policy with the development of the VSC-24 cask at Palisades. This meant that there was no full environmental impact statement required for an area of the dunes at that site that was, and is, characterized as a "high risk erosion area" by the Michigan Dept. of Natural Resources, and no public adjudicatory hearing was permitted.

For these reasons and other safety concerns brought to him by the public, Attorney General Frank Kelley of Michigan requested such a hearing on the VSC-24 cask. This cask had never been built before and had never been fully tested before it was to be certified for use for dry cask storage of high level nuclear waste at Palisades. Having been refused such a hearing, Attorney General Kelley petitioned for an injunction in May, 1993, against the loading of these casks in the Western Michigan Federal Court at Grand Rapids. (Case No. 4:93 CV 67). Consumers Power Co.'s response to the Court was that the company would unload the casks and place the nuclear waste back in the spent fuel pool if the Court should rule against them and, therefore, an injunction to prevent loading was unnecessary. A supporting position for the utility's action was filed by Charles Haughney of the NRC, in which he assured Judge Robert Holmes Bell that Consumers was able to do this by simply reversing the process of loading, if the Court so ordered. <u>This demonstrates that, not only did Consumers Power Co. mislead the Judge, perhaps out of ignorance, about Consumers' ability to unload these casks, but more importantly, Charles Haughney of the NRC pledged the Agency's credibility in support of this position.</u> His statement is signed,

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"Pursuant to 28 U.S.C. sec.1746, I declare under penalty of perjury that the foregoing is true and correct." (Executed and signed on May 5, 1993). Judge Bell, of course, could hardly grant an injunction under those circumstances. This is one of many instances in which the judgment of the staff was flagrantly in error, and helped to compound the problems that have later developed.

3) On May 28, '96, a "hydrogen ignition" event occurred at the Point Beach n-plant in a loaded VSC-24 cask. This "ignition" was of sufficient explosive force to raise a 3 ton lid several inches and tilt it on its side. This event was a complete surprise to the utilities, the vendor, and most significantly, to the NRC. It was discovered that the chemical reaction between the zinc coating inside the metal basket and the boric acid of the spent fuel water released hydrogen causing the explosion when the lid was being welded shut. This is further evidence that the staff was not competent to evaluate all the parts of this cask before it was certified. Yet, Mr. Mirgalia repeatedly relies only on this staff's flawed judgment for his decision-making on our petition without providing any proof through documented data or the testimony of independent qualified experts to support his decisions.

(Such independent evaluations by qualified experts would have surely been a great assistance to the staff if a public hearing and an environmental impact statement had been required in the process of certifying this cask. It would have prevented much of the chaos, confusion and costs that we are now experiencing as remedies are being sought for controlling the generation of explosive hydrogen within these casks.)

4) The NRC staff responded to the explosion at Point Beach by sending inspection teams to Point Beach and to the facilities of the vendor of this cask, Sierra Nuclear, in California, by issuing Confirmatory Action Letters to the utilities using the VSC-24, and by issuing Bulletin 96-04 to all utilities in the country to stop loading procedures and to analyze the casks they were using for chemical, galvanic, or other reactions in the casks. Their findings had to be approved by the NRC before loading could again proceed.

5) The responses prepared for Bulletin 96-04 by the utilities which were using the VSC-24 cask we found to be disturbingly inadequate and unsupported by documentation. For this reason, we retained a

highly competent corrosion engineer consultant, Dr. Rudolf Hausler, who had been retained in the past by the Electric Power Research Institute to solve a corrosion problem afflicting all nuclear reactors. He was able to do so and developed a corrosion inhibitor which is now used in all reactors.

Dr. Hausler was able to define a number of serious deficiencies in this cask that had not been found before, and he recommended that they be resolved before any more VSC-24 casks were loaded.

Carl Paperiello, Director of NMSS, wrote an analysis of Dr. Hausler's study and claimed his comments were not sufficient to halt further loading of the casks. (Dec.10, '96) Dr. Hausler responded (Dec. 29, 1996) by stating that Mr. Paperiello's evaluation was pure speculation, and pointed out in detail the additional data that would have to be a part of this analysis to come to the conclusions that Paperiello did in his analysis. Hausler also pointed out that in certain areas of the chemistry of metals, the staff was "stunningly ignorant."

6) Further evidence of the inadequacy of staff's regulatory performance in whom the public is asked to place its trust came to light when an announced inspection at the Sierra Nuclear Corp. took place a week after the explosion at the Point Beach plant. (Inspection Rept. No. 72-0007/96-204, July 9, 1996). Following are only a few of the serious deficiencies that were found:

a) Retrieval of documents was difficult. Design records for the VSC-24 were mixed with those of the VSC-17. Most of the analyses were performed for the VSC-17, whose testing data the NRC had never accepted, but were used, nevertheless, by Sierra Nuclear for the VSC-24 design. The design calculation package, dated Feb. 14, 1989, did not contain a signature nor proof of verification by either the Project Manager or Project Engineer. Neither the design plan or the design package included reference to the design verification as required. The Project Plan should provide detailed guidance for the design staff but contained neither.

b)The SNC staff indicated that the design was not reviewed by a corrosion engineer, that SNC did not consult an environmental effects specialist, and that SNC did not consider the problem of environmental interactions of components in the SFP.

c) The SNC design team had no well-founded basis to specify Carbo-Zinc 11 for coating the MSB components.

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All of these deficiencies should have been identified by staff inspections in 1989 and 1990, long before the cask was certified. The licensees should have been required to provide oversight and corrective actions among their own vendors since NRC regulations state that licensees are responsible for assuring that fabricators and vendors establish and execute appropriate QA programs. But the staff did not do so. Yet we are now asked to accept the judgments of this staff, who did not find these very obvious deficiencies in the critical design phase of this cask, as being able to give us the assurance and the appropriate resolution for the far more complicated safety-related issues we have described in our petition.

7) After the Point Beach explosion, you, the Chairman of the NRC, requested the Office of the Inspector General to evaluate staff actions and the dry cask storage program. A major conclusion was, "NRC staff told us they do not formally approve or validate licensee loading and unloading procedures because the agency does not have sufficient staff or expertise to review each procedure." Yet, that is exactly what the NRC staff has been doing when they halted all loading and unloading procedures at all utilities after the Point Beach explosion. They required responses to Bulletin 96-04 which they had to approve before these procedures could continue at individual plants.

Given this acknowledgement to the Inspector General' Office of the lack of sufficient staff and expertise, it strains the public's credibility to be asked to have the confidence in the judgment of the staff in all the critical areas that we pointed out in our petition, as Mr. Miraglia would have us do.

8) Since the explosion at Point Beach, there is general recognition that unloading these casks may be even more difficult. The problems that were earlier identified when CPCo first pledged to unload the cask are now compounded by the fact that hydrogen may be generated in that process. Here again we are asked to accept the judgment of the staff,--now already proved to be incompetent in so many ways--that "the deficiencies in the original unloading procedure would not have challenged the integrity of the cask or the fuel...and that the licensee would have ultimately been able to safely unload a cask." This failure to have an adequate unloading procedure,--with all these glaring mistakes and oversights

that are now apparent--is characterized by Miraglia as having "limited safety significance" and therefore, the NRC has refrained from issuing a Notice of Violation or a civil penalty.

The examples of the incompetence of some staff members cited here have become better known to the public since our petition was filed in Sept.19. 1995. But it is that record of poor judgment on the part of the staff that should have given pause to Mr. Miraglia in relying on them for an adequate response to this petition. Instead, his main reliance for his decision is on judgments by staff that he should be able to realize have been inadequate in the past and, therefore, cannot be relied upon now if the public is to have any confidence in the NRC.

Miraglia should have gone beyond these staff judgments to make a decision on our petition. He should have considered the magnitude of what has been done without adequate deliberation and knowledge--1) that millions of curies of radioactivity have been placed in 13 poorly designed casks on the shores of the Great Lakes, 9 of which the utility continued to load even though grave problems with unloading were known to it and were unresolved; 2) that Consumers failed to monitor the casks vendor's design, fabrication and construction practices, giving the public a cask whose design and function it cannot trust; and 3) that some of this high level nuclear waste on the shores of the Great Lakes will remain highly toxic for thousands of years, and yet the casks are licensed for only twenty years. He should especially have considered the fact that no cask has been successfully unloaded, and that there is no assurance of a federal repository.

In view of these considerations, he should at least have required that a VSC-24 cask be successfully unloaded to begin to restore the confidence of the public in the dry cask storage system in general, and at the Palisades site in particular. This should have been required as a condition for continuing to load these casks, and for not issuing a high level violation and meaningful fine. Instead he is asking us to believe his staff's demonstrated flawed judgment that procedural deficiencies of the initial unloading document were of "limited safety significance" as his decision states.

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Mr. Miraglia's decision sends the wrong message to the whole nuclear industry on this most dangerous course for the country--i.e. placing high level nuclear wastes on the shores of our fresh water supplies--with no repository in sight. The message is that no matter how careless and sloppy its procedures are, the NRC is a "paper tiger"--it will cost them nothing--and the sham of regulation will go on as usual.

I hope that you and your fellow Commissioners are beginning to understand the sense of outrage on the part of the public over this cavalier dismissal of the grave issues we have placed before you in this 2.206 petition--and its implications for the safety of the fresh water supplies of this country for all future time.

We hope that you and your fellow Commissioners will institute a review of the decision on this 2.206 petition discussed here.

We deeply appreciate your attention to these grave issues.

Yours sincerely,

Mary P. Sinclair

Mary P. Sinclair, PhD.
Co-chair, Don't Waste Michigan

cc. NRC Commissioners Kenneth C. Rogers, Greta J. Dicus,
Nils J. Diaz, Edward McGaffigan, Jr.
Vice-President Al Gore
Senator Carl Levin
Senator Spencer Abraham
Attorney General Frank Kelley of Michigan
Carole Browner, Administrator, EPA
Congressman Dave Camp
Congressman Fred Upton
Senator Joseph Biden

PALISADES NUCLEAR PLANT — YEARLY CAPACITY FACTORS

Year	Net Mwe	DER	MDC
1972	1,764,842	25%	32%
1973	2,411,337	34%	43%
1974	78,298	1%	1%
1975	2,427,933	34%	44%
1976	2,847,033	40%	51%
1977	5,084,688	72%	91%
1978	2,624,144	37%	47%
1979	3,433,264	49%	62%
1980	2,379,529	34%	43%
1981	3,462,629	49%	62%
1982	3,345,123	47%	60%
1983	3,769,958	53%	68%
1984	811,549	12%	15%
1985	5,301,797	75%	95%
1986	841,244	12%	13%
1987	2,634,430	37%	41%
1988	3,435,215	49%	54%
1989	3,637,779	52%	57%
1990	3,008,095	43%	47%
1991	4,873,885	69%	76%
1992	4,865,072	69%	76%
1993	3,545,655	50%	55%
1994	4,513,826	64%	71%
1995	4,856,858	69%	76%
1996	5,314,341	75%	83%
1997	5,803,456	82%	91%
1998	5,390,584	76%	84%
1999	5,128,361	73%	80%
2000	5,748,023	82%	90%
2001	2,355,631	33%	37%
2002	6,369,371	90%	100%
2003	6,158,154	87%	96%
2004	5,346,140	76%	84%

DER=Design Electrical Rating
805

MDC= Maximum Dependable Capacity

730 635 before 10/85

Based on 365 x 24 x Rating, no Leap Year adjustment

8/24/2005

PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 1

DESCRIPTION:

DESIGN: Reactor Trips from 100% power

ADMINISTRATIVE: Record all reactor trips at or above 10^{-4}% power

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
1	01/11/72	1030	15%	Loss of S/G LVL due to loss of feed pump
				Hotwell LVL low
2	01/12/72	1249	20%	Operation of z phase unit differential 487
				relay technician initiated suspected
3	01/13/72	0038	20%	Loss of Feed Pump on low suction pressure -
				condition pump suction strainers removed
4	01/13/72	1232	20%	Operation of z phase unit differential 487
				relay - wiring problem
5	02/03/72	0245	20%	Low S/G LVL due to FRV malfunction
6	03/05/72		70MWe	Loss of offsite power test
7	03/11/72	1708	20%	Turbine coastdown test
8	03/12/72	1941	30%	Pilot wire actuation - turbine trip without
				Rx trip (initial) - Loss of Load - Breakers
				open
9	03/27/72	0542	60%	Loss of feed pump due to high vibration -
				air in oil system due to improper filter
				change
10	04/04/72	2229	60%	Turbine trip test - Power test program
11	04/14/72		10%	Loss of condenser vacuum while opening east
				water box for maint, failure of 15%
				trip bypass
12	04/14/72	1328	15%	Failure of feedwater bypass v/v to control
				properly. Low S/G lvl trip

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PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 2

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
13	04/15/72	0056	15%	Lightening on 345 relays
14	04/20/72	2300	60%	Power test program. Generator trip test
15	04/22/72	1010	15%	Power test program. Partial loop inadvertant
				trip while shifting PCPs
16	06/03/72		10%	TM/LP trip - overly sensitive
17	06/22/72	2222	30%	Low flow pump suction
18	07/06/72		10%	Loss of feedwater due to inadequate feed pump
				speed
19	07/31/72	1022	18%	Feedpump trip on high vibration - low S/G LVL
				trip
20	12/09/72	0200	20%	Inadvertant closing of feed reg valve
21	12/11/72			TM/LP trip due to turbine - Rx pwr mismatch
22	12/21/72	0333	82%	FW valve closure (inadvertant)
23	03/06/73	1605	80%	EH failure - faulty load limiter control
24	03/19/73	0635	80%	2/4 high pressure spurious trip (A&C channels)
25	04/16/73	0509	100%	Loss of load - turbine trip; 25F7 & 25H9 opened
				simultaneously
26	05/18/73	2309	100%	Generator trip test - 100% power test
27	07/08/73	0204	88%	Unknown turbine trip while testing turbine
				valves - while reopening #1 stop valve.
28	07/22/73		10^{-4}	Rx trip on high pwr - faulty log NI channel
29	10/07/74		15%	Pilot wire/reverse power turbine trip. Cause
				unknown
30	04/22/75	1545	85%	Loss of load, turbine EH hydraulic fitting,
				loss of EH pressure

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PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 3

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
31	06/30/75			Loss of feed pump - unstable S/G level control
32	07/29/75		15%	Loss of feed pump - low S/G level
33	05/10/76	1004	25%	Loss of feed pump P-1B - Low water level in S/G
34	07/20/76	2043	93%	Loss of load due to lightening
35	08/24/76	2227		Per ER0001
36	08/31/76	0152	100%	Inst air dryer failure - high press. pressure
37	11/24/76	2210	99%	Generator voltage reg failure
38	11/25/76	0824	15%	Low S/G level
39	11/25/76	2044	22%	Voltage regulator problems
40	12/01/76	1232	100%	Loss of load
41	01/11/77	2102	100%	Line A. Cooling Tower Pump frozen (P-39A
				due to frozen pump basin ref line)
42	01/17/77	1320	100%	Loss of B feedwater pump; loss of feed due to loss
				to loss of level in MSDT (T-5) CV-0609 failed to
				open
43	01/17/77	2329	36%	Loss of A feedwater pump. Improper pwr decrease.
44	03/25/77	0039	90%	Loss of A feedwater pump while valving out P10A for
				repair
45	03/27/77	1017	84%	Loss of B feedwater pump
46	09/24/77	0652	85%	Low vacuum pressure in condenser when lightening
				caused the loss of the startup transformer and the
				loss of cooling tower circuitry. "R" bus lost
47	09/25/77	2310	37%	Loss of offsite power
48	11/25/77	0823	86%	"R" bus lost, loss of cooling tower pumps

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PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 4

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
49	11/27/77	1927	50%	Loss of feedwater pump, Low S/G level (E-50A)
				while attempting to place P-1A in Auto
50	12/11/77	0045	100%	Loss of "R" bus
51	04/21/78	0917	49%	Loss of "B" main feed pump (P-1B) vibration
				detector suspected
52	05/11/78	2105	25%	Loss of feed pump due to plugged y-strainer on CDS
				effluent
53	05/20/78	0728	99%	MSIV closure then reopened
54	05/22/78	1836	97%	MSIV closure (not reopened)
55	05/23/78	0719	20%	Low PCS flow; loss of 1B bus during xfer to
				station power (4160V)
56	06/07/78	1836	23%	Low S/G level on "B" S/G due to loss of feedwater
57	06/08/78	0122	20%	Feedwater control malfunction - low S/G level,
				unstable FW control
58	06/11/78	2148	83%	Loss of air pressure to MSIVs, MSIVs closed
59	06/13/78	1323	83%	Feedwater pump trip; loss of feed pump P-1B - Trip
				on low S/G level
60	06/18/78		84%	Pilot wire activation - lightening struck causing
				the main generator protective relaying to trip
61	07/09/78	2253	90%	Loss of vacuum caused by the pressure control valve
				supplying steam to the main air ejectors failed
				closed - TM/LP trip due to rapid power decrease in
				response to loss of vacuum
62	07/31/78	2140	25%	Loss of electrical power to 2 coolant pumps
63	08/07/78	2121	86%	Loss of "B" feed pump - loss of feed pump P-1B -
				Unstable FW control

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PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 5

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
64	10/17/78	0205	94%	Loss of "B" feed pump P-1B - low S/G level
65	12/16/78	1010	88%	Loss of "A" main feed pump, P-1A low S/G level
66	01/28/79	0844	100%	Manual trip because "B" S/G level increased 98% -
				feed reg valve actuator mechanical failure causing
				S/G B high level
67	02/01/79	0243	100%	Operator turned off of P-50A instead of P-56A
68	03/03/79	0707	100%	Fdwtr pump tripped low S/G level prompted by loss of
				htr drain pump due to low level in T-5
69	04/07/79	0830	100%	Loss of fdwtr flow when P-1B fd pump tripped
				Corrective after was to remove vibration trips on
				FPS
70	04/25/79	0919	97%	Generator loss of load condition - voltage reg sys
				Failed resistor in voltage regulator.
71	04/30/79	0044	100%	Similar to 4/25/79 trip above. Generator loss of
				load - voltage regulator malfunction.
72	06/09/79	1248	12%	Reverse power trip while lowering power. Bus 1A
				failed to transfer - for condenser leak repairs
73	08/10/79	0252	88%	Manually tripped after loss of both feedwater pumps
				during turbine valve testing
74	08/24/79	1323	91%	Manually tripped after loss of feedwater flow while
				cutting in Cond. Demin System
75	05/27/80	0751	7.5%	High pressurizer pressure spike
76	07/02/80	1739	95%	Manually tripped turbine rupture of filter housing
				on generator seal oil sys - loss of gen seal oil

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PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 6

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
77	07/09/80	1518	10^{-4}%	NI-3 began to fluctuate and resulted in trip
				(High start up rate)
78	08/26/80	0342	88%	Breaker 252-105 "Bus 1A" tripped (condensate pump
				trip)
79	09/28/80	0239	82%	Manually tripped. Short circuit failure of a
				transformer within EHC sys. Intercept valves
				closed.
80	10/09/80	1435	97%	Trencher cut underground cables resulting in gen-
				erator trip - loss of load severing buried switch
				yard control cables.
81	12/23/80	0008	97%	EH control syst failed. Intercept valves closed
				resulting in high PZR pressure trip
82	01/15/81	0047	98%	Irratic feedwater control. Feedwater pump trip
				due to S/G level controller failure
83	08/10/81		40%	Loss of cooling tower pumps resulting in high PZR
				pressure trip
84	12/31/81	2225	18%	EH control problems resulting in turbine trip.
				MSR E-9A relief valves lifting and failure to seat
85	01/02/82	0740	10%	EH control problems resulting in turbine trip.
				MSR intercept valves cycling open and closed.
86	01/24/82	0449	19%	Manual transfer to station pwr low PCS flow
				trip. (During fast transfer 460V A Bus)

MI0686-0003A-OP03

PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 7

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
87	01/30/82	0910	14%	Low S/G level due to closed throttle valve.
				Failure to open feed pump trip/throttle valve.
88	02/04/82	0406	80%	Loss of cooling tower pump resulting in TH/LP trip
89	05/12/82	0021	98.5%	Failure of #9TG bearing resulting in loss of load
90	06/12/82	0445	$9X10^{-3}$%	Failure of NI-03 resulting in high rate trip
91	07/11/82	1720	42%	Failure of cooling tower pump motor guide bearings
				and cutless pump bearings.
92	09/04/82	0836	42%	Tripped on high pressure. Operating EHC
				pump removed from service resulting in turbine
				valves closing and high PZR pressure trip
93	10/16/82	0325	100%	Failed level indicator on E-50A resulting in low
				S/G level trip.
94	10/28/82	2252	100%	Manually tripped from 100% due to loss of main
				FW flow - Failure of MSR drain tank high level
				dump valve and condensate recirculate valve
				resulting in low suction pressure trip of both
				main feed pumps.
95	01/26/83	0443	100%	Failure of T-G valve position limiter circuitry
				resulting in high PZR pressure trip
96	05/19/83	1114	100%	Loss of B main feed pump resulting in low S/G
				level trip

MI0686-0003A-OP03

PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 8

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
97	08/04/84	1355		Loss of Turbine EHC due to failed fittings
98	08/10/84	1437		Due to a PCS leak from an instrument line
99	08/11/85	0834	98%	Voltage regulator problem
100	08/30/85	1138	47%	Generator relay cut out improperly
101	03/26/86	1258	60%	Voltage regulator problem
102	05/19/86	1416	97%	EHC system power supply failure
103	04/12/87	0534	75%	EH Line Break
104	05/16/87	0125	93%	Power reduction to 0% power due to CV-1059
				(pressurizer spray valve) stuck in intermediate
				position (Rx in hot shutdown at 1718 hrs).
105	05/22/87	0007	40%	Ruptured disc on feedwater pump
106	07/10/87	0121	14%	Oil leak in the upper oil reservoir for "D" primary
				coolant pump.
107	07/14/87	1322	94%	Manual Rx trip due loss of 1-2 S/U x-fer.
108	08/17/87	0404	68%	Manual Rx trip due to EHC leak on lube oil line to
				#4 Govenor valve
109	08/23/87	0630	93%	Trip due to a failed voltage regulator on the main
				generator
110	08/04/89	1949	80%	Automatic trip due to "B" S/C low level ("D" Bus
				did not fast transfer to SU power when transfer of
				Y20 to bypass reg. attempted)
111	01/09/90	0512	35%	Manual reactor trip upon loss of P1A

MI0686-0003A-OP03

PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 9

REACTOR TRIPS FROM 100% POWER

OCCURRENCES

OCCUR #	DATE	TIME	POWER	COMMENTS
112	2/28/90	1825	59%	~~Automatic Trip due to~~ loss of "B" Main Feed Pump, at 80%, decreased 50%, SIG level increased, variable ~~high power trip~~, automatic VHPT at 59% power.
113	03/03/91	1435	100%	RPS trip ~~due to~~ occurred during maintenance on NI-7
114	07/12/91	1838	100%	Loss of "A" Main Feed Pump, low S/G level, automatic Rx trip
115	12/09/91	1722	22%	Main Generator seal oil pressure decrease, rapid down power to take plant off-line. Tave dropped below 525°F, momentarily S/G level increased. Manual Turbine/Reactor trip. Turbine tripped first so automatic Low Reactor trip on loss of load ~~at 22% power~~
116	02/01/92	1232	100%	Turbine trip due to loss of load signal but no actual loss of load.
117	07/24/92	1007	100%	Turbine trip due to low line voltage during test of Safety Injection System
118	08/14/92	0017	100%	Rx trip on low A S/G level
119	08/25/92	0129	100%	Rx trip due to loss of power to RPS Channel B
120	10/30/92	0700	100%	Turbine trip due to loss of load signal but no actual loss of load. Problem with DEH uninterruptible power supply.

MI0686-0003A-OP03

PALISADES PLANT

RECORD OF TRANSIENTS OR OPERATIONAL CYCLES

COMPONENT: Primary Coolant System LIMIT: 500 PAGE #: 10

Design Reactor Trips from 100% Power

Administrative: Record all Reactor Trips at or above 10^{-4}% Power

OCCURRENCES

Power changes in excess of 5%/minute

OCCUR #	DATE	TIME	Power	COMMENTS
121	5/22/95	1110	55	Manual Reactor trip due to loss
				of both Main Feedwater Pumps
122	7/21/98	1500	99.6	(Ref: SS Logbook 223, p. 76)
				Manual Reactor Trip due to
				loss of one (B) MFP.
123	4/4/00	0627	99.9	Manual trip due to electrical transient
				and loss of both MFP's.
124	12/1/02	2154	100.	Static Wire broke on transmission tower, SPB
				with fault on outgoing line ⇒ Turbine trip ⇒
				Reactor trip. Static line also fell across
				Rear bus, with loss of RCPumps. See
				CAP 0032289. Plant Stayed hot, above 500°F
125	8/31/04	0918	95%	Per LER-2004-01 Trip was from 95% power
				Condensate Pump fire See CAP 043294 SPB
126	1/9/05	11:27	73%	Loss of Condenser Vacuum. Power
				reduced @ 30%/hr (5%/min) from 100%
				prior to the trip from 73%
				See CAP 046023 SPB

MI0885-00091A-OP03

Unit	SCRAM Code	RX CRIT	Initial PWR	Initial RX Mode	Current PWR	Current RX Mode
1	M/R	Y	75	Power Operation	0	Hot Standby

Event Text

MANUAL REACTOR TRIP DUE TO LOWERING MAIN CONDENSER VACUUM

"The Palisades reactor was manually tripped from approximately 75% power at 1127 hours EST due to lowering main condenser vacuum. Prior to the reactor trip, power was lowered from 100% to 75% in accordance with off-normal procedures in an effort to restore condenser vacuum. The reason for the loss of condenser vacuum is not understood and is being investigated. At 1135 hours an automatic actuation of the auxiliary feedwater system occurred, as designed, to maintain steam generator levels. The atmospheric steam dump valves opened per design on reactor trip, however one dump valve did not fully re-close until instrument air was manually isolated to it. Reactor decay heat is being removed via steaming through the turbine bypass valve to the main condenser. Reportable under 10CFR50.72(b)(2)(iv)(B) and (b)(3)(iv)(A)."

After the reactor trip, Main Condenser vacuum rose to 25 inches - sufficient for using the Turbine Bypass valves for removing decay heat. All rods inserted on the manual reactor trip. The electric grid is stable.

Licensee notified NRC Resident Inspector.

NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

Office of Public Affairs,
Region III
801 Warrenville Road,
Lisle IL 60532
www.nrc.gov

No. III-06-018 April 20, 2(

CONTACT: Jan Strasma (630) 829-9663
Viktoria Mitlyng (630) 829-9662

E-mail: opa

Michael J. Keegan

From: "Thomas Keegan" <mkeeganj@comcast.net>
To: "Alice Hirt" <alicehirt@charter.net>; <kevin@nirs.org>; "kcumbow" <kcumbow@greatlakes.net>; "Gary Karch" <gakarch@michiana.org>; <auntynuke@aol.com>; "Kathryn Barnes" <greenwoodsart@msn.com>; <pgunter@nirs.net>; "Paul Gunter" <pgunter@nirs.org>; "Terry Lodge" <tjlodge50@yahoo.com>; "Thomas Keegan" <mkeeganj@comcast.net>; "John LaForge" <nukewatch@lakeland.ws>; <neis@neis.org>; "Corey J. Conn" <coreyjc@flash.net>; "Dave Menzer" <dmenzer@citact.org>
Sent: Friday, May 12, 2006 10:02 AM
Subject: Palisades Control Rod Problem & Reactor Trip (5/11/06)

Power Reactor	Event Number: 42569
Facility: PALISADES Region: 3 State: MI Unit: [1] [ ] [ ] RX Type: [1] CE NRC Notified By: PATRICK PITCHER HQ OPS Officer: BILL HUFFMAN	Notification Date: 05/11/2006 Notification Time: 17:35 [ET] Event Date: 05/11/2006 Event Time: 15:14 [EDT] Last Update Date: 05/11/2006
Emergency Class: NON EMERGENCY 10 CFR Section: 50.72(b)(2)(iv)(B) - RPS ACTUATION - CRITICAL	Person (Organization): RICHARD SKOKOWSKI (R3)

Unit	SCRAM Code	RX CRIT	Initial PWR	Initial RX Mode	Current PWR	Current RX Mode
1	M/R	Y	8	Power Operation	0	Hot Standby

Event Text

MANUAL ACTUATION OF REACTOR PROTECTION SYSTEM DUE TO FAILURE OF CONTROL ROD TO WITHDRAW

"Following a startup from a refueling outage with the plant at approximately 24% power, it was determined that one control rod appeared to be fully inserted in the core as determined by both incore and excore flux tilts. The Off Normal Procedure for a dropped control rod was entered. The decision was made to take the plant offline to troubleshoot and correct the apparent condition. The Off Normal Procedure does not allow operation in Mode 2 with a dropped control rod. At 1514 hours EDT the reactor was manually tripped from 8% power. The reactor trip was uncomplicated.

"This is reportable under 10 CFR 50.72(b)(2)(iv)(B) as a manual Reactor Protection System actuation while critical."

Decay heat is being discharged to the condenser via the turbine bypass valves and cooling is being supplied from AFW. All systems besides the control rod in question functioned as required.

It appears that the control rod in question may have been inserted since startup. The rod

position indicators were showing a normal rod position. The licensee believes that the rod may not be coupled. This rod has had a previous history of being difficult to couple. The licensee stated that normal rod testing was conducted prior to startup along with low power physics testing which did not indicate anything significantly out of spec.

The licensee notified the NRC Resident Inspector.

5/15/2006

2/23/06
71 FR 9383
(6)

RECEIVED
2006 MAY -2 AM 9:57
RULES AND DIRECTIVES BRANCH USNRC

April 23, 2006

Marguerite Callaghan
Property Owner, City of South Haven MI 49090
2601 Creek Bluff PL NW
Grand Rapids MI 49504-2359

Chief, Rules and Directives Branch
Div. of Administrative Services
Office of Administration
Mailstop T-6D59
US Nuclear Regulatory Commission
Washington DC 20555-0001

RE: PALISADES NUCLEAR FACILITY, SOUTH HAVEN MI 49090

Hey, NRC, Keep 'er humming! I'm writing to comment on the renewal of the license sought for the plant in South Haven.

HH-1 I am in favor of continued use of the facility because:

1. It is a valuable, viable alternate energy source which, with proper use, conserves and protects the environment.
2. Manpower required for its continued use provide an economic boost in the winter months for the City of South Haven and environs. While tourist dollars grow the local economy in summer, many local businesses benefit during the long winter months when Palisades maintenance plant workers come to the area to perform the bulk of plant maintenance during this time.

HH-2 HH-3 Finally, I am in agreement with the Kalamazoo Gazette article, April 2, that "it would be smart of the NRC to provide prompt reporting of even allegedly minor incidents". Quoting the same article, I agree with Don Williams, retired Hope College chemistry professor that, "not only should Palisades' life be extended, but another reactor ...added", and to paraphrase, NRC needs to plan for decommissioning the current reactor, replacing it with a more advanced, safer, more economical Generation III plant.

Sincerely,

Marguerite Callaghan

Marguerite Callaghan

cc: Dorothy Applegard,
Mayor, South Haven

SISP Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = B. Phan (BMP)
C. Guerrero (CXG3)

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO:

TAKE PRIDE IN AMERICA

May 15, 2006

ER 06/144

2/23/06
TFR 9383
13

RECEIVED
2006 MAY 24 PM 12: 53
RULES AND DIRECTIVES BRANCH USNRC

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

Dear Sir:

The U.S. Department of the Interior (Department) has reviewed the Generic Environmental Impact Statement (EIS) for License Renewal of Nuclear Plants, NUREG-1437, Draft Supplement 27 (dated February 2006), regarding the Palisades Nuclear Plant, Van Buren County, Michigan.

The license renewal does not involve any major construction or physical alteration of the project area. The Generic EIS and Draft Supplement 27 adequately address the concerns of the Department regarding fish and wildlife resources, as well as species protected by the Endangered Species Act. We concur with the preliminary conclusions of the U. S. Nuclear Regulatory Commission staff with respect to the impacts of continued operations on these resources and species. We have no comment on the adequacy of other resource discussions presented in the documents. II-1

We appreciate the opportunity to provide these comments.

Sincerely,

Michael T. Chezik

Michael T. Chezik
Regional Environmental Office

cc:

L. MacLean, FWS, Fort Snelling, MN

Step Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = Bo Pham (bmp)
C. Yuenes (cxg3)

South Haven, March 20 2006

RULES AND DIRECTIVES BRANCH USNRC

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC20555-0001

3/23/06
71FR 9383

2006 MAR 28 PM 3:05

My Comments regarding document
NUREG 1437, Supplement 27, Draft are:

(1)

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"Generic Environmental Impact Statement for License Renewal of Nuclear Plants (Supplement 27) ; Regarding Palisades Nuclear Plant ; Draft Report for Comments U.S. Nuclear Regulatory Commission February 2006.

JJ-1 **1 – Security measures and supervision requirements for the on-site storage of the spent fuel.**

It is clear that the amount of on-site, dry stored, spent fuel will increase during the renewal term as long as there is no final off-site storage facility provided by the Federal Government.
Therefore there would be additional security measures and supervision requirements to take care of the status of the on-site dry storage of spent fuel for an indeterminate period of time. Security measures would be: locate the dry storage facility at a place, guarded, hidden and less vulnerable to terrorist activity. I.e. The fact that the South Haven Municipal Airport is within 6 mile distance from Palisades, could imply the need to move the location of that Airport. Supervision requirements are related to continuos monitoring and accounting of the spent fuel during offsite storage. This activity could be an important part of the Palisades renewal term. All these impacts should be considered for the OL extension alternative.

JJ-2 **2 – Compliance with Homeland Security regulations.**

The SEIS (Supplemental Environmental Impact Statement) report should acknowledge that there has been changes in our government strategy since the original issuance of Palisades OL, particularly regarding sabotage and/or terrorism. Therefore additional analysis are required for OL Renewal.
We believe that additional Severe Accident Mitigation Alternatives (SAMAs) regarding this issue should be considered for Palisades Operation License Renewal.

JJ-3 **3 – Environmental impact of the on site dry storage of the spent fuel**

The spent fuel during the renewal term, while in on-site dry storage, would have discharges of radioactive elements and neutrons that by collision with the surrounding natural molecules could generate additional radioactive elements These discharges should be added to the atmospheric emissions and ground discharges of the Plant to verify overall compliance with the EPA and NRC regulations.

SISP Review Complete
Template = ADM-013

Page 1

E-RIDS = ADM-03
Add = Bo Pham (BHP)

4 – Environmental Impact of severe emergencies in Nuclear Plants.

Environmental Impacts during severe emergencies at the Nuclear Plant (uncontrolled releases of radioactive elements) were not considered for comparison purposes with other non nuclear alternative sources of energy. Even though probabilistic, these impacts should be evaluated and mentioned in the report's final summary conclusions. JJ-4

5 – Loss of Power in the National Electric Grid

Recognizing that the loss of power at the Palisades Substation could result in severe Plant accidents (core damage), we wonder if all feasible mitigation measures were considered in this regard. I.e. adding a second circuit to the 345kV line connecting Covert Plant to the Substation. JJ-5

6 – Plant Refurbishing Work

The fact that in the Application for renewal the Licensee states that no refurbishing will be performed prior to extended term operation is of our outmost concern. We believe that after 40 years of operations, a thorough refurbishing should be mandatory to insure a safe Plant operation during the extended term. JJ-6

7 - General comments regarding alternative sources of electric energy.

a – The considered Environmental Impacts were not weighted as required to perform an overall impact evaluation. In other words, not all environmental impacts have the same effect. JJ-7

b – Renewable (sustainable) energy sources should be given extra points when compared with energy sources of lower availability
Wind and Solar sources are renewable energy sources.
The Standard Nuclear Plant, using Light Water Cooled Reactor, is a source of limited availability. New types of Nuclear Reactors, using advanced fuel cycle or a fast neutron reactor would be of longer availability.

c - Nuclear Power alternatives using advanced fuel cycles would decrease the amount of long term hazards of nuclear waste. Is this point being considered in the comparison of Nuclear Plants ?

d – Is the impact on Proliferation of radioactive materials in the World being considered to evaluate the Nuclear Plants ?
The standard Nuclear Plant using 5% enriched Uranium has technology and materials, that could be used for the manufacture of the plutonium bomb.

e - Between the alternatives to be considered to obtain an "equivalent" electric generation we believe that the following should be maintained as technically feasible:

-Hydro-Pump storage (not considered in GEIS)
-Demand side Load Management. (considered but disregarded)
I.e. the introduction of smart electric meters.
-Wind Power (considered in GEIS Page 8-45, but disregarded)
- Solar Power (considered in GEIS Page 8-45, but disregarded)
- Co-generation (not considered in GEIS)

f – Are the CO2 atmospheric emissions for the different energy sources being considered in the evaluation of alternatives ?

Ruben Dal Monte P.E.
630 62nd Street
South Haven MI, 49090
Phone (269) 236 6237
e-mail: rubendalmonte @ cs . com

Page 3

RULES AND DIRECTIVES BRANCH USNRC

2/23/06
71FR9383
(9)

2006 MAY 19 AM 8: 59

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April 19, 2006

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

To Whom It May Concern:

I am writing regarding the proposed twenty-year license extension at Palisades nuclear plant in southwest Michigan. I oppose the license renewal because Palisades is an aging facility with a history of noncompliance, reactor pressure vessel embrittlement, radiation release, and other problems that have and will continue to affect the surrounding population beyond Covert Township, Michigan. Many of those affected in the surrounding area are of low socioeconomic status, as well as minorities, raising the issue of environmental justice. KK-1

License renewal should not be granted to the Palisades Nuclear Power Plant, because (1) both of the dry cask storage pads at Palisades are in violation of Nuclear Regulatory Commission's earthquake regulations (2) the risk of radiation to minority populations is underestimated using census block grouping; (3) radiation effects are only considered within a 50-mile radius; and (4) there is continued noncompliance of non-radiological persistent toxic chemicals to area water sources. KK-2 KK-3 KK-4 KK-5

Potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion are of great concern, especially considering the geological nature of sand increasing the likelihood of sand avalanches (Landsman 2005). The violation of the Nuclear Regulatory Commission's own standards in storage of radioactive material must be followed.[i] KK-6

Covert Township is one with high levels of minority populations and has many people who are of a low socioeconomic status. In the impact statement, these populations were taken into consideration, but large urban centers such as Battle Creek, Muskegon and Grand Rapids - where significant African American and Latin American communities live – were not considered. Because less than fifty percent of these cities were within the 50-mile radius, they were eliminated, and therefore significant risks to the minority populations were not fully documented.[ii] KK-7

The 50-mile radius considered in the impact assessment also fails to account for the movement of radiation with the wind. The radiation may expand and become less concentrated as it moves away from the epicenter (NRC 2006), but recent studies have shown that there is no safe level of ionizing radiation (NAS 2005). The effects beyond the radius cannot be ignored or discounted as negligible without serious ethical repercussions with this knowledge of toxicity of any level of radiation.[iii] KK-8

The impact of 20 additional years of pollution by non-radiological toxic chemicals will directly affect water quality of nearby sources, including Lake Michigan. In 2000, for example, Palisades was found to be in "continuing noncompliance" for its apparent multiple misuses of Betz Clam-Trol in Lake Michigan for the dispersion of mussels and clams affecting the reactor's water intakes (EPA 2004). The public health risks imposed by Betz Clam-Trol (Alkyl Dimethylbenzyl Ammonium Chloride) - immunological, neurological, respiratory, dermal and gastrointestinal – are counter to the Nuclear Regulator Commission's "*primary* mission to protect public health and safety." (ATSDR 2004 and NRC 2004)[iv] KK-9

For these reasons, I oppose the renewal of the Palisades Nuclear Power Plant license for an additional twenty years. The plant is a danger to not only our precious natural resources in Michigan, but to countless people who are affected by its daily operation, and many more who would be affected should a disaster occur. KK-11

Thank you for your consideration,

Morgan Dill

Morgan Dill
3779 140th Avenue
Holland, MI 49424

E-RIDS = ADM-03
Add = Bo Pham (BMP)
C. Guerrero (CXG3)

SISP Review Complete
Template = ADM-013

Appendix with Additional Information

[i] 10 CFR Part 72.212(b)(2)(i)(B) is the law that regulates earthquake standards. The more casks loaded on the storage pads at Palisades, the more risk of erosion to the sand supporting the pads, given the large weight of the casks themselves (VSC-24 casks weigh 132 tons each), weather related erosion of the sand dunes, as well as the erosion that will occur due to more severe weather impacts from the global climate crisis and climate de-stabilization. Arresting erosion at both pads is important to safety and radiation containment over the long haul, given the proximity of the waters of Lake Michigan. The State of Michigan and the U.S. Army Corps of Engineers have designated the sand dunes upon which the older pad is located – so close to the waters of Lake Michigan – as a high-risk erosion zone. Though Michigan itself is a region of "low risk" for earthquake occurrence (Bricker 1977), this does not remove the chance that the event may occur, necessitating compliance with the law.

[ii] Census block groups are a combination of census blocks, which are statistical subdivisions of a census tract, which are intended to remove bias (USCB 2000). Though eliminating bias in collection of data, the full impact of the data is not demonstrated in regards to minority populations, in their elimination from the data set considered in the Environmental Impact Statement for Palisades (because <50% lay within the 50-mile radius).

[iii] Wind has played a factor at other nuclear plants, notably at Three Mile Island. The effects of radiation were present at the epicenter, and upwind, throughout Pennsylvania and beyond. Increased incidences of cancer and other health problems pervaded, and the influence of wind cannot be ignored in the transportation of radiation (Momeni 1998).

[iv] Maintaining unclogged water intakes using Betz Clam-Trol falls within the scoping parameter of 10 CFR Part 54 that says: (a) Plant systems, structures, and components . . . [including] (2) All non safety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1) (i), (ii), or (iii) of this section (10 CFR 54.4 Scope). The International Joint Commission - an independent binational organization that serves to help prevent and resolve disputes relating to the use and quality of boundary waters – stated in its "Ninth Biennial Report on Great Lakes Water Quality," that "[g]overnments monitor toxic chemicals used in large quantities at nuclear power plants, identify radioactive forms of the toxic chemicals and analyze their impact on the Great Lakes ecosystem." The impact of Betz-Clam Trol is such that water resource quality is affected in a way that compromises the agreements made through the Boundary Waters Treaty of 1909, and subsequent Great Lakes Charter and Annex, that call for maintaining the integrity of the freshwater ecosystems.

PalisadesEIS - Palisade Plant, Covert Michigan, Page 1

From: "Paul C. French, Jr." <pcfrenchjr@lodisnet.com>
To: "Nuclear Regulatory Commission" <palisadeseis@nrc.gov>
Date: Mon, Apr 10, 2006 6:59 AM
Subject: Palisade Plant, Covert Michigan,

Chief Rules and Director Branch
Division of Administration, Mail Stop T-6059,
U.S, Nuclear Regulatory Commission
Washington D.C. 20555-001

2/23/06
71FR 9383
(3)

RECEIVED
2006 APR 26 AM 8:06
RULES AND DIRECTIVES BRANCH

April 10, 2006

Dear Sir or Madame,

As a resident of Bangor (southwestern) Michigan, well writing the area of the Palisades Nuclear Generating Plant, I am writing in support of renewing the license for this plant for another 20 years. LL-1

The plant has been a good neighbor. They routinely test their public warning system and I have never heard of any negative complaints about the operation or safety of this plant. LL-2

I ask that you totally disregard the environmentalist, and other protesters, many of whom do not live in our community. LL-3

Huxley, is his "brave New world, talked about "General Candle". The environmentalist have done great harm to our country and most American citizens by trying to stem the tide of change for the better.

People have lost their jobs to protect to birds or fish. Millions pay exorbitant sums for gasoline, diesel, heating oil and natural Gas, because thanks to the activist, we are held hostage to foreign oil suppliers, because they have blocked drilling, refineries, pipe lines, etc. for years.

Most of these protesters are misguided, liberals, with substantial assets and care very little for the public, but only for their own agenda. "General Candle sounds real good to some of them!"

No source of energy is 100% safe. But Nuclear power generation has been good for our country, providing jobs and inexpensive power, which God knows we surely need more of.

With your oversight, nuclear plants are not perfect, but they have an enviable safety record and the scare mongers and whiners should be ignored.

This is our plant in our community and we do not want to pay higher prices just to please these environmentalists, especially when most of them do not even live here. LL-4

I urge you to grant the Palisade nuclear generating Plant the 20 year license that is requested.

Thank you for your consideration.

Paul French
28840 63rd Street

SISP Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = Bo Pham (BMP)
C. Gwinnett (CXE3)

Bangor, Michigan, 49013.

2/23/06
71FR 9383

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RULES AND DIRECTIVES BRANCH

From: <ahanson47@comcast.net>
To: <PalisadesEIS@nrc.gov>
Date: Sun, Apr 2, 2006 9:01 PM
Subject: I strongly oppose the proposed 20 Year License Extension at Palisades Nuclear Power Plant

(5)

Dear Chief, Rules Review and Directives Branch, NRC:

Radioactive Waste

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In addition, the State of Nevada, adamantly opposed to becoming the country's atomic sacrifice area, has filed federal lawsuits against the proposal at every turn. One of them challenges NRC's "Waste Confidence Decision" directly. NRC is supposed to be the objective judge of whether or not Yucca Mountain should be opened, but if NRC sticks to its arbitrary 2025 deadline, its bias in favor of approving the dump at Yucca Mountain, despite its defects and dangers, is obvious.
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How can the NRC approve 20 more years of waste generation and storage on the Lake Michigan shoreline when there is nowhere for those wastes to go? How can NRC declare such an essential issue to environmental and public health and safety to be "out of scope" during this environmental impact proceeding? The ongoing generation of nuclear waste at Palisades must be stopped as soon as possible.

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--How can NRC approve a license extension for Palisades when Consumers Energy and Nuclear Management Company nearly dropped a 107 ton nuclear waste container into the storage pool in October 2005? Such a drop could have punched a hole in the pool floor, draining away the cooling water, leading to a waste fire and radioactive inferno. Tens of thousands of people could have died from radiation-induced cancer downwind. The company cannot safely handle its radioactive wastes with its present workforce, a situation that can only get worse as experienced personnel leave the plant or are laid off as plant owner Consumers Energy tries to sell Palisades, and as plant operator Nuclear Management Company has already been told it will not be retained in the future. Instead of protecting the public health and safety and environment against such hazards as the near-drop of such a heavy load into the vulnerable waste pool, NRC helped the company keep the public in the dark about the incident for months! MM-3

SFSP Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = Bo Pham (BMP)
C. Guerrero (CXG3)

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MM-4 --Due to deterioration and degradation, old reactors are more likely to experience accidents than younger reactors. At 39 years, Palisades is one of the oldest operating reactors in the U.S., and has been considered a "nuclear lemon" since it began operations in the first place. The risk of a severe accident at this "geriatric" reactor is reason enough to close it down in 2011 at the end of its current license.

MM-5 --Given the potential dire consequences of a major accident and radiation release at Palisades, how can NRC screen out "Severe Accident Mitigation Alternatives" because "the required extensive changes...would involve implementation costs known to exceed any possible benefit"? (EIS, p. 5-5) In 1982, in its CRAC-2 (Calculation of Reactor Accident Consequences) report, NRC calculated that a severe accident and catastrophic radiation release from Palisades would kill 11,000 people, injure 7,000, and do over $50 billion in damages. The population in the surrounding region has only grown since then (EIS, Table 2-7, p. 2-56), so casualty figures would be higher today. And adjusted for inflation, that property damage figure would top $100 billion, only $10 billion of which would be paid back by the nuclear power industry and its insurance companies (under the Price-Anderson Act, renewed in 2005, U.S. taxpayers would have to pay the rest, or else damages wouldn't be compensated for at all). A major radiation release at Palisades would ruin Michigan's tourism and agriculture forever. How can NRC's EIS " cost/benefit" analysis ignore its earlier CRAC-2 report?

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MM-7 --NRC reports that 15 Native American archaeological sites have been identified by surveys within 1 mile of the Palisades site and its transmission lines, including a prehistoric village site. Another of the prehistoric sites is of "unknown type," just 0.3 miles south of the Palisades site, and a third is just outside Palisades' eastern boundary. (EIS, pgs. 2-62 to 63) This validates the environmental contention, arbitrarily dismissed by the NRC licensing board on March 7, that 20 more years of routine radiation emissions, potential accidental radiation emissions, and plant expansions such as additional waste storage pads could do irreversible harm to as-yet unidentified Native American burial sites, village sites, etc. at Palisades. Why did the licensing board dismiss this contention when NRC admits in this EIS that it is an issue? (see http://www.nirs.org/reactorwatch/licensing/palisades.htm at Aug. 8 and 30, 2005 for these Native American impact contentions).
NRC admits in its draft EIS that "[i]ntact archaeological sites could be present within the remaining undeveloped areas as well as in soils below the depth of ground disturbance in most areas of the [Palisades] site." It admits "no archaeological field surveys have been conducted either at the Palisades site or for original transmission line construction or maintenance...[and] without accurate knowledge of the cultural resources present at the Palisades site, it must be assumed that power plant construction has the potential to adversely impact significant resources that may exist on the plant site." Palisades' own cultural resource assessment 25 years ago recommended that "an intensive survey be undertaken of the undisturbed portions of the site." Despite all this, no extensive surveying was ever conducted. In its draft EIS, NRC simply brushes off the potentially disproportionate impacts upon Native American cultural resources and spiritual values that could occur with 20 additional years of operations at Palisades. The

intensive site survey must be performed, in close and meaningful consultation with affected Native American tribes, before NRC even considers granting Palisades a license extension. NRC granting an extension without requiring such a survey would itself represent an environmental justice violation, not to a mention a potential violation of the American Indian Religious Freedom Act.

--It is baffling NRC concludes that "offsite impacts from Palisades on minority and low-income populations would be SMALL (sic), and no special mitigation actions are warranted." (EIS, p. 4-31) Just three pages earlier, NRC admits that "[c]ensus block groups with a minority population...are located in Covert," Palisades' hometown. Figure 4-2 on p. 4-30 also identifies Covert's predominantly African American population as "low-income." Why Covert's African American community is still low-income after 38 years of substantial profit-making at Palisades is quite troubling. In addition, Covert's community suffers the worst radiation doses from routine operations at Palisades, and would suffer the worst health impacts from accidental radiation releases. NRC even ignores the fact that Palisades' tax contributions to its neighboring community in Covert are dwindling over time – shown in Nuclear Management Company's 2005 Environmental Report -- so residents suffer worsening risks as the reactor deteriorates with age, while also receiving decreasing benefits such as tax income. (see http://www.astrongerkinship.com/ for a recent book about the African American history of Covert). MM-8

--NRC's treatment – or lack thereof – of Palisades' impact on the surrounding Latin American agricultural workforce is remarkably inconsistent and disconcerting. Regarding environmental interveners' contention that this community would suffer disproportionately from routine and accidental radiation releases from the reactor, NRC staff agreed that the company's license extension application does not sufficiently address the "adverse socio-economic impacts of a catastrophic radiation release...as they would be found among the low-income Latin American agricultural workforce of the Palisades area..." and that such a contention would not necessarily be out of scope. Likewise, NRC's licensing board stated that interveners' allegation of disproportionate impacts upon Latin American agricultural workers from an embrittlement/PTS core rupture might be pertinent and admissible in the proceeding to decide whether or not to grant Palisades 20 more years. Yet, the licensing board dismissed the contention, stating "no facts that would tend to show impacts falling disproportionately on this community have even been alleged." (see pgs. 57-60 of the licensing board's March 7, 2006 ruling dismissing this and all other intervener environmental contentions; also see the contention itself, at Aug. 8, 2005 on the "Palisades Watch" website). MM-9

Isn't it obvious that a catastrophic radiation release at Palisades would ruin nearby agriculture for years, decades, centuries, perhaps even forevermore? Who would eat cherries, blueberries, grapes, peaches, apples, or other agricultural products from west Michigan after a large radiation release from Palisades? (see EIS, p. 2-54 and 55; Table 2-6 shows that nearly half of Van Buren County's land base is devoted to agriculture!) Wiping out of agriculture would very likely impact the low-income, minority community of Latin American agricultural laborers more than any other segment of the surrounding population. MM-10

Yet, despite the NRC staff's and licensing board's statements to the contrary, NRC now dismisses any notion of disproportionate impacts upon – or even the existence of – a Latin American agricultural workforce near Palisades, in the space of two sentences. NRC now treats these real people as invisible (EIS, p. 2-57), which represents an environmental justice violation by NRC itself.

--NRC writes (on page Roman numeral xvi of its draft EIS) 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 [operating license]." We would agree with that. A catastrophic accident would do that in a hurry. Last October, had the 107 ton fully loaded high-level radioactive waste container dropped onto the waste storage pool floor, Palisades' operations almost certainly would have ended for good – but how much of the Great Lakes and surrounding states would it have taken with it? MM-11

We want to make it clear to Consumers Energy, Nuclear Management Company, any potential purchaser of Palisades (such as Exelon Nuclear, Dominion Nuclear, or other nuclear utilities), and to NRC that a groundswell of popular opposition by the citizens of Michigan and neighboring states will, sooner rather than later, force the closure of this most dangerously deteriorated nuclear power plant.

As evidence that we mean what we say, I would like to list the two dozen organizations comprising a growing coalition, representing hundreds of thousands of Michiganders and residents of surrounding states and provinces, which oppose the 20 year license extension at Palisades...(see list at http://www.nirs.org/reactorwatch/licensing/palisadesbackgrounder.pdf)

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Sincerely,
Art Hanson
1815 Briarwood Dr.
Lansing, MI 48917-1773

PalisadesEIS - I strongly oppose the proposed 20 Year License Extension at Palisades Nuclear Power Plant Page 1

2/23/06

71FR 9383

From: <nhanson48@comcast.net>
To: <PalisadesEIS@nrc.gov>
Date: Sun, Apr 2, 2006 10:47 PM
Subject: I strongly oppose the proposed 20 Year License Extension at Palisades Nuclear Power Plant

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RULES AND DIRECTIVES BRANCH

(4)

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Sincerely,
Natalie Hanson
1815 Briarwood Dr.
Lansing, MI 48917-1773

NMC
Committed to Nuclear Excellence

Palisades Nuclear Plant
Operated by Nuclear Management Company, LLC

May 15, 2006

10 CFR 54

2/23/06
71 FR 9383
(8)

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Chief, Rules and Directives Branch
Division of Administrative Services
Office of Administration
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U.S. Nuclear Regulatory Commission,
Washington, DC 20555-0001

Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

Comments Regarding Draft Supplement 27 to the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG 1437, for Palisades Nuclear Plant License Renewal

In Federal Register Notice 71 FR 9383, the NRC announced the availability of Draft Supplement 27 to NUREG 1437, Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants, and established a public comment period. Draft Supplement 27 pertains to the renewal of the operating license of the Palisades Nuclear Plant.

Nuclear Management Company, LLC (NMC) has reviewed the Draft Supplemental Environmental Impact Statement (DSEIS), and has developed several comments for NRC consideration. NMC's comments are provided in Enclosure 1.

Please contact Mr. Robert Vincent, Palisades License Renewal Project Manager, at 269-764-2559, if you require additional information.

Paul A. Harden
Site Vice President, Palisades Nuclear Plant
Nuclear Management Company, LLC

Enclosure (1)

cc: License Renewal Environmental Project Manager, Palisades, USNRC

E-RIDS=ADM-03
Add = Bo Pham (bmp)
C. Guerrero (cxg3)

SISP Review Complete
Template-ADM-013

27780 Blue Star Memorial Highway • Covert, Michigan 49043-9530
Telephone: 269.764.2000

Enclosure 1

Nuclear Management Company Comments on Draft Supplement 27 to NUREG 1437

(4 Pages)

Enclosure 1
Nuclear Management Company Comments
on Draft Supplement 27 to NUREG 1437

Comment number	Page Number	Line Number	Proposed Change	
1	2-4	22	Suggest that text specifically state the Covert Generating Station is owned and operated independently of Palisades.	OO-1
2	2-5	1	Replace "40-ac" with "400-ac" (See ER[1] p 2-1)	OO-2
3	2-12	4-12	The new Radwaste system became operational in December 2005. Change "NMC is planning to modify ..." to "NMC has modified ...." Remove 2 sentences describing old radwaste system. Change "The system NMC plans to install relies ..." to "The system relies ...."	OO-3
4	2-12	14	Change "The equipment NMC plans to install ..." to "The equipment NMC has installed ...."	OO-4
5	2-14	39-40	Change to "Sanitary waste is sent to three onsite septic systems." (See DSEIS Figure 2-3)	OO-5
6	2-19	1-2	Change "plant area" to "protected area".	OO-6
7	2-19	18	Change "OLs" to "OL"	OO-7
8	2-22	25	The NPDES Permit (corrected copy of 11/8/04 submitted to NRC in letter dated 12/8/04) requires outfall observations five times per week. Suggest changing last word from "day" to "week".	OO-8
9	2-23	5	Suggest adding third sentence to the paragraph which states, "Clam-Trol treatments are no longer required to be recorded in Palisades' DMRs, but monitoring during Clam-Trol treatments is performed in accordance with the NPDES permit."	OO-9
10	2-23	8-9	Revise sentence to state, "Temperature data collection at monitoring point 001A is conducted in accordance with the NPDES permit." As written, sentence implies, incorrectly, that monitoring was not conducted prior to 2005.	OO-10
11	2-23	13	Suggest defining "several" by stating the number of spills cited within the last five years.	OO-11
12	2-24	7	Correct name of facility is the "Benton Harbor-St. Joseph Wastewater Plant."	OO-12
13	2-25	27	Wind class differs from wind class given on DSEIS p. 8-45 line 21	OO-13
14	2-26	16	Change "2350" to ""2500". The rated capacity of the diesel generators is 2500kw per FSAR Section 8.4.	OO-14

[1] ER refers to Applicant's Environmental Report submitted with the Application for Renewed Operating License. (ADAMS Accession No. ML050940449)

1

Enclosure 1
Nuclear Management Company Comments
on Draft Supplement 27 to NUREG 1437

OO-15	15	2-49	35	Change "NMC performed an assessment ..." to "NMC performs an annual assessment..."
OO-16	16	2-51	Table 2-3	Suggest adding footnote "Figures may not add due to rounding."
OO-17	17	2-52	34-35	Fire protection services are provided by the Covert Township Fire Department and the South Haven Fire Department
OO-18	18	2-54	19	Change "Table 2.6" to "Table 2-6"
OO-19	19	2-55	23-25	Stated building heights are not correct. Suggest either deleting heights or replacing with the following approximate values: turbine building - 94 ft; containment building 192 ft; auxiliary building - 108 ft; cooling tower pump house - 35 ft; two cooling towers - 65 ft; and feedwater purity building - 58 ft. These are approximate heights above grade as the buildings would be seen from the west
OO-20	20	2-57	23	Value "27,488" appears to be an error. "27,488" does not represent 39% of Van Buren County's 16,977 employed in 2002, as stated.
OO-21	21	2-57	36-38	Appears that "Van Buren County" should be one of the two counties referenced (instead of both sets of figures being attributed to Berrien county).
OO-22	22	2-58	25-27	Taxes are also paid to Lake Michigan College and the Michigan State Education Tax (See ER[1] p. 2-40)
OO-23	23	2-58	34	According to Table 2-9, taxes paid to Covert Township averaged 58 percent of tax revenues. The word "spent" should be deleted from this sentence. (See DSEIS Table 2-9, p 2-60).
OO-24	24	2-58	35	According to Table 2-9, taxes paid to Covert School District averaged 32 percent of total property taxes. (See DSEIS Table 2-9, p 2-60).
OO-25	25	2-61	2	Suggest clarifying that there are no "known" historic & archaeological resources at the Palisades site.
OO-26	26	2-63	10	Approximately 80 acres of the site are developed or maintained (See DSEIS p 2-4 line 29)
OO-27	27	2-63	12-13	Replace existing sentence with, "Most of these facilities are located along the main and north access roads."
OO-28	28	2-63	19	Suggest changing "former" to "pre-operational"
OO-29	29	2-68	13	Change "Straminea" to "Pitcheri"
OO-30	30	4-24	11	No "Table 2-10" exists; should be changed to "Table 2-9" (See DSEIS p. 2-60)
OO-31	31	4-24	13	Taxes paid to Covert Township averaged 58 percent of tax revenues spent in the county (See DSEIS Table 2-9, p 2-60).
OO-32	32	4-24	14	The Covert School District received an average of

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Enclosure 1
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			$2.7 million annually from Consumers over the 3-year period (See DSEIS Table 2-9, p 2-60).	
33	4-24	21	VBCO & VBCISD received 3-5 percent of revenues from Consumers (See DSEIS Table 2-9, p. 2-60).	OO-33
34	4-26	11 & 15	Suggest rewording "The applicant has stated that these procedures are in place ..." and replacing with "These procedures are in place..."	OO-34
35	4-27	8	Change to "(1) no major..."	OO-35
36	4-37	23	Line should read, "... Palisades' NPDES permit ..."	OO-36
37	4-40	14	Suggest clarifying that Section 106 of the NHPA directs Federal agencies, and not the applicant, to contact Tribal Governments to take into account the effects of their undertakings on historic properties.	OO-37
38	4-40	19	Suggest adding new sentence at end stating that NMC and Consumers have procedures in place to require evaluation for archaeological resources if land-disturbing activities are planned in previously undisturbed areas.	OO-38
39	4-41	1	According to cited study, groundwater flow velocity is from the east-southeast to west-northwest at approximately 23 ft/yr. This would indicate a westward flow.	OO-39
40	4-42	23-24	Suggest noting that NMC and Consumers have procedures in place to require evaluation for archaeological resources if land-disturbing activities are planned in previously undisturbed areas.	OO-40
41	5-5	34	Change "its" to "it"	OO-41
42	5-6	10	"CP 1996" is not in ER[1] reference list—remove reference here; "CP 1995" and "CP 1996" are not in DSEIS Chapter 5 reference list	OO-42
43	5-8	11	% Contribution column does not add to 100%. Suggest adding footnote, "Figures may not add due to rounding."	OO-43
44	5-9	32	"NRC 2004" is not in the Chapter 5 reference list. No reference is cited for NUREG/BR-0058. NMC 2005a is not in Chapter 5 reference list	OO-44
45	5-9	29	Reference should be NRC 1997b, and reference should be added to Chapter 5 reference list.	OO-45
46	5-10	1	"NRC 2004" is not in the Chapter 5 reference list. No reference is cited for NUREG/BR-0058.	OO-46
47	5-10	27	NMC 2005a is not in the Chapter 5 reference list	OO-47
48	5-10	36	NMC 2005b, NMC 2005c are not in the Chapter 5 reference list	OO-48
49	8-4	6	There are no threatened or endangered aquatic species known at Palisades; suggest removing "including threatened and endangered species."	OO-49

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				(See DSEIS page 2-32)
OO-50	50	8-4	29	Palisades has three onsite sanitary drain fields (see DSEIS Figure 2-3)
OO-51	51	8-5	28	"Covert County" should be either "Covert Township" or "Van Buren County"
OO-52	52	8-7	17-31	Annual Energy Outlook 2006 is now available. Suggest updating paragraph to reflect latest information from DOE.
OO-53	53	8-34	4-6	Suggest noting that the AP1000 design is now certified also. See NRC website for references
OO-54	54	8-45	21	Wind class differs from wind class given on DSEIS p. 2-25 line 27
OO-55	55	8-53 & 8-54	Heading	Table numbers should be Table 8-8
OO-56	56	9-1	7	"NMC" should be replaced with "the plant owner"
OO-57	57	E-3	8	The South Carolina Radioactive Waste License for Delivery was reissued for 2006. Authorization information is as follows: Number: 0006-21-06 Issue Date: 01/09/2006 Expiration Date: 12/31/2006
OO-58	58	E-3	10	The Tennessee Radioactive Waste License for Delivery was reissued for 2006. Authorization information is as follows: Number: T-MI003-L06 Issue Date: 01/01/2006 Expiration Date: 12/31/2006
OO-59	59	G-2	39	Change "is 1.0×10^{-7} to "is about 1.0×10^{-7}" . Also change "NMC 2005a" to "NMC 2005b"
OO-60	60	G-4	28	Column does not add to 100%. Suggest adding footnote, "Figures may not add due to rounding."

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Re: NUREG-1437, Supplement 27

To:

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

Sent via email to: PalisadesEIS@nrc.gov

Comments Re:

Potential for Native Burial or Other Sites on Palisades Nuclear Power Plant Property That Could Be Damaged or Destroyed During Twenty Year License Extension

Prepared by

Kevin Kamps
Nuclear Information & Resource Service (Washington, D.C.)
and **Don't Waste Michigan** (Kalamazoo Chapter),
6930 Carroll Avenue, Suite 340
Takoma Park, Maryland 20912-4423

Endorsed by

Robert Shimek
IEN Mining Organizer
Indigenous Environmental Network (IEN)
IEN national offices
P.O. Box 485
Bemidji, Minnesota 56619

May 18, 2006

When reviewing Nuclear Management Company, LLC's [NMC, the operator of Palisades, which is owned by Consumers Energy Corporation] "Environemental Report" (ER, published in March, 2005) in preparation for U.S. Nuclear Regulatory Commission [NRC] environmental scoping hearings on July 28, 2005, it became clear that the nuclear utility's conclusion that there are no known Native American cultural resources and archaeological sites on the Palisades property was little more than self-serving, circular logic with no documented basis. In fact, the location of the Palisades property would tend to suggest that Native American resources and sites could very likely be located there. PP-1

Section 2.10, "Historic and Archaeological Resources," of NMC's ER is a scant four paragraphs long, taking up less than two-thirds of one page (Page 2-46). In fact, Native American sites on the Palisades property are not explicitly mentioned at all. The closest NMC comes is a euphemistic mention of "archaeological…resources on or near the Palisades site," and then only to dismiss any such notion: "The AEC [Atomic Energy Commission], in the Final Environmental Statement (FES) for Palisades, noted no known archaeological or historical resources on or near the Palisades site."

NMC's choice of words, "no known," seemed suspicious. What if there are "unknown" Native American sites at or near Palisades? Had a comprehensive site-wide archaeological survey ever been conducted at or near Palisades, to prove that no Native American sites are present in this geographical location where their presence would be likely?

NMC went on to report "The FES indicates on the basis of review by the U.S. Department of the Interior and the Michigan State Liaison Officer for Historic Preservation that operation of Palisades would have no effect on significant historic or archaeological sites (AEC 1972, Appendix A)." Such wording by NMC begs the question – do the companies and federal agencies regard Native American burial sites and village sites, for example, as insignificant?

NMC' ER continued "In the Terrestrial Ecological Survey done for Consumers in 1979, it was noted that no significant historical or archaeological resources were known to occur in the study area." Again, what about unknown resources? Was a search ever conducted?

NMC concluded "Communication with the Director of Michigan History Division in October 1979 confirmed the absence of significant historic or archaeological sites in the immediate vicinity of Palisades." Again, did the Director of Michigan History Division simply consider Native sites insignificant?

Thus, a cursory reading of Section 2.10 of NMC's ER would seem to convincingly lay the issue of Native American sites at Palisades to rest. After all, three federal agencies (the National Park Service, National Register of Historic Places, Atomic Energy Commission, and U.S. Department of the Interior), two State of Michigan agencies (Michigan State Liaison Officer for Historic Preservation, and the Director of the Michigan History Division), and a Consumers Power contractor were all cited, seemingly confirming that no Native American sites were present on Palisades property.

However, upon reviewing Attachment C of NMC's Environmental Report, "Cultural Resources Correspondence," such confidence in the absence of Native American sites at Palisades is shown to be false.

Contradictions, omissions, and loopholes big enough to drive a bulldozer through -- in the documents offered as proof that "no significant historical or archaeological resources were known to occur in the study area" -- raised alarm bells.

"Attachment C. Cultural Resources Correspondence" from the ER includes just two letters, the first from Consumers/NMC to the Michigan State Historic Preservation Office, the second from the Department of the Interior to the Atomic Energy Commission.

The letter dated February 11, 2005 from Dan Malone at NMC and Stephen Wawro at Consumers to Ms. Martha MacFarlane-Faes at the Michigan State Historic Preservation Office (MSHPO) begs several questions. The first paragraph reveals that MSHPO has "concern pertaining to possible unreported archaeological properties on, or within the vicinity of, the Palisades site." Yet, NMC and Consumers fail to include any documentation spelling out these concerns from MSHPO in the companies'ER, other than that brief mention that concerns exist. Why such a significant development was not mentioned in the main body of the NMC ER, at Section 2.10, but was instead buried in the attachments at page C-2, is not explained. This obscuring of such a significant development is unacceptable.

In the second paragraph, Malone and Wawro state that 20 more years of nuclear activity and operations at the site will not disturb the land, and "[t]herefore, NMC and Consumers do not believe a survey of the project area is necessary, as Federal and state agencies have confirmed on multiple occasions that no historic properties, archeological or architectural, are known to exist on, or in the immediate vicinity of the Palisades site."

However, as the coalition of dozens of grassroots Michigan environmental groups has contended in its intervention against the license extension, 20 more years of operations at Palisades risks a large-scale radiological accident due to the reactor having the most embrittled pressure vessel in the United States. Even if no accident were to occur, the daily operations of Palisades nuclear power plant release "low" levels (and sometimes, not-so-low levels) of radioactivity into the air, water, and soil (see NIRS pamphlet "Radioactive Releases from Nuclear Power Plants in the Great Lakes Basin: What Are the Dangers?" for more information; note that the photo of liquid discharges shows Palisades itself discharging directly into Lake Michigan.).

It also generates high-level radioactive waste, large quantities of which have already been stored at Palisades for nearly 40 years, and ever-growing quantities of which will continue to be stored on-site for at least several decades to come, even if dumps targeted at Native American lands out West (sacred Western Shoshone Indian treaty land at Yucca Mountain, Nevada; the Skull Valley Goshute Indian Reservation in Utah) are opened. Since the opening of such dumps is ever more doubtful, this means that Palisades' high-level radioactive waste could remain on-site indefinitely into the future.

The "routine" or "accidental" radioactive contamination caused by 20 additional years of operations at Palisades would be a significant adverse impact upon Native American burial or other sites located there.

It was irresponsible for NMC and Consumers to state so flippantly in the ER that no "survey of the project area is necessary" when they, and federal and state agencies, appear to have done little if any such surveying in the past. In fact, NRC itself later admitted in its draft Environmental Impact Statement (NUREG-1437, Supplement 27, on page 4-26) that "[t]he NRC staff's independent review of records on file at the SHPO [Michigan State Historic Preservation Office] did not locate records related to project-specific archaeological surveys conducted at Palisades for ground-disturbing activities." NRC continued "However, Consumers Energy did locate in its records one such report that documented a cultural resource field visit to the Palisades site by archaeologists in 1982 for three proposed projects." So Palisades has only a single cultural resource "field visit" documented in nearly 40 years of construction and operations?

Such an admission undermines the relevance of the only documentation NMC and Consumers give in their Environmental Report to support their claims: a letter dated April 7, 1972 from the U.S. Department of the Interior (DOI) to the U.S. Atomic Energy Commission (the predecessor to today's NRC, in terms of nuclear power plant regulation). In that letter, reproduced from Pages C-5 to C-9 of NMC's ER, DOI states "It does not appear that the existing plant should directly affect any existing or proposed unit of the National Park System, nor any site eligible for registration as a national historic, natural or environmental education landmark; however, the final statement should contain evidence of consultation with the State Historic Preservation Officer concerning the effects of the power station on places on or being considered for nomination to the National Register of Historic Places."

Given that no documented cultural resource assessment whatsoever was conducted until a decade later, such "evidence" as the 1972 DOE to AEC letter seems to completely ignore the possibility that Native American burial sites, former village sites, etc. could potentially be present on the power plant site or along its transmission line corridors.

It is interesting that consultation with the Michigan State Historic Preservation Officer is mentioned, because when Kevin Kamps of NIRS spoke with Martha MacFarlane-Faes at MSHPO by phone on August 30, 2005, it was clear that very little consultation had taken place between her office and the companies involved, and in fact, she admitted, that the "ball may have been dropped" on these important matters, apparently referring to her own state agency. Needless to say, "dropping the ball" when it comes to the preservation of Native American burial sites, and other ancient Native sites, is not acceptable. Besides the moral and ethical responsibilities, there are also federal laws, such as the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act, that require legal enforcement. To not protect Native American burial sites and other sites at Palisades is, in fact, a violation of the law.

Ms. MacFarlane-Faes told Kevin Kamps at NIRS that she would review her files on this matter and get back to him. Other than a single voice mail, perhaps, that her files revealed no more information, there was no further follow up from Ms. MacFarlane-Faes to Mr. Kamps. This was quite disconcerting.

It seems clear that the companies, as well as the state and federal agencies, have allowed this license extension proceeding to progress to this very advanced stage without adequately addressing the potential impacts to Native American sites, rights, and values.

In its Feb. 2005 letter to the Michigan State Historic Preservation Office, NMC and Consumers also mention that: "A May 19, 1972 letter from the Michigan State Liaison Officer for Historic Protection to the AEC (Atomic Energy Commission) confirmed the DOI's determination and stated that Palisades would not 'adversely affect known historical or archaeological resources of the State of Michigan.' "

They go on to state that a "Terrestrial Ecological Survey" conducted 26 years ago by a private contractor paid by Consumers "found no significant historical or archaeological resources were known to occur on the Palisades site" and that these findings were confirmed by the Director of the Michigan Department of State's Michigan History Division, which verified that "no significant historical or archaeological sites had been found in the immediate area of Palisades."

How "significant" and "immediate" are defined by these profit-driven private companies, and by these state agencies, is not clear. Are Native American sites such as burials or villages being considered as insignificant? It is especially troubling that NMC's "evidence" that no Native American sites are present at Palisades is 25 to 40 years old – Native American burial sites, especially, were less respected, morally and legally, at that time by the dominant culture than they are today, after many decades of hard work by Native American tribes to protect their ancestors' graves, and to demand legally-binding respect from the dominant culture.

It seems imperative that an updated, comprehensive, independent site survey be conducted, in close consultation with affected tribes, before Palisades is granted a license to perform nuclear and other activities on this site for another 20 years.

But it appears from the lack of supporting documentation that neither the AEC nor the DOI ever did a careful survey of the Palisades site or adjoining transmission lines. In the ER, NMC and Consumers seem unconcerned about the potential presence of unknown Native American burial sites or other cultural resources.

Yet, given the presence of creeks just north and south of the Palisades nuclear power plant site, it seems all the more likely that Native American villages or encampments might have been located there. And given the forested, large dunes surrounding the Palisades nuclear power plant, it seems possible that even burial sites might be located there, especially considering the great beauty of the area, and the remarkable view to the west (the direction the deceased travel on their way to the spirit

world in many Great Lakes Native American cultures) over Lake Michigan. One definition for "palisade," after all, is "a line of bold cliffs." (Webster's New Collegiate Dictionary) Apparently the hundred-year-old Palisades Park summer resort community with 200 cottages immediately south of the Palisades nuclear power plant took its name from the "cliffs," or tall forested sand dunes, on the site. And Palisades nuclear plant took its name from the Palisades Park community, much to the chagrin of the residents, many of whom have opposed the nuclear reactor since before it was built in the late 1960s.

NMC and Consumers go on in their letter to state that adequate protections are in place to safeguard cultural resources on the site. They write "Examples of activities requiring an Environmental Review include disturbance of 1 or more acres of previously undisturbed land, any earth change within 600 feet of water, wetland and waterway activities, and structural interference with landforms, lakes and streams, among others." But, given the decades of apparent lack of concern, perhaps it should not be surprising that such "protections" actually contain huge loopholes. For example, a good deal of Palisades nuclear power plant property – including much of the forested dunes – is more than 600 feet from Lake Michigan, streams and wetlands. In addition, Native American burial sites could occupy an area of land much smaller than even one acre. Thus, even such "protections" could still allow for overlooking or ignoring burial sites during construction or renovation projects, threatening those sites with damage or complete destruction, whether intentional or unintentional.

Malone and Wawro go on to assure the State of Michigan official that no major refurbishment activities are planned for the 20 year license extension period, so no disturbance to even unknown Native sites could occur. However, they fail to mention that as early as the summer of 2007, a major refurbishment activity is planned – the replacement of the reactor pressure vessel head, involving the movement of very heavy loads, and its barge transport up the Lake Michigan shoreline to Muskegon. In addition, administrative and legal challenges launched by the anti-license extension coalition to the dry cask storage pads at Palisades could require their replacement by new pads elsewhere on the site. This would certainly represent a major refurbishment activity. And with the age-related degradation in coming years and decades at the already 40 year old Palisades plant, it is hard to believe that no refurbishment activities will be required, activities that could disturb, damage, or destroy unknown or unreported Native sites on the Palisades property.

The nuclear companies state repeatedly throughout the Environmental Report that "NMC does not plan to undertake any major refurbishment activities," an admission that itself has dire implications, given the deteriorated state of the reactor and its safety systems. But then again Consumers never envisioned in the early 1970s that it would need to install dozens of 20 foot tall, 132 ton concrete and steel silos to store high-level radioactive waste just 150 yards from the waters of Lake Michigan. And yet, 20 years later, that is exactly what they did. So who knows, really, what projects the companies will need or want to perform on the site over the course of the next 20 years? Besides, Consumers Energy has put Palisades up for sale, so how can it be guaranteed that a future owner would abide by the previous owner's decisions and pledges?

In addition to the ever growing stockpile of high-level radioactive waste stored on-site, in 2008 the so-called "low" level radioactive waste dump at Barnwell, South Carolina -- where Palisades has sent large quantities of atomic trash for decades -- will no longer accept such wastes from Palisades. It is very possible that Palisades would thus expand on-site "storage" for "low" level radioactive wastes as well, some of which is actually intensely radioactive, despite the euphemistic "low-level" label.

Lastly, NMC and Consumers state in the last paragraph that their letter, and a copy of the response to it from the Michigan Historic Preservation Office, would be included in the Environmental Report. No such response is included in the ER. This begs the question, who dropped the ball? NMC/Consumers, or MSHPO? Or both? It is encouraging that MSHPO has expressed concerns, apparently, in the past. But it is discouraging that milestones such as the August 8, 2005 deadline for intervening/ requesting licensing hearings and the August 22, 2005 deadline for environmental scoping comments have come and gone, with no action regarding the potential for Native American impacts from this proposal being adequately addressed by the companies nor by the federal or state agencies.

On July 13, 2005 NRC sent letters to the following tribes: Citizen Potawatomi Nation, Oklahoma; Hannahville Indian Community Council; Grand Traverse Band of Ottawa and Chippewa Indians; Nottawaseppi Huron Pottawatomi; Little River Band of Ottawa Indians; Little Traverse Bay Bands of Odawa Indians; Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians; Miami Tribe of Oklahoma; Ottawa Tribe of Oklahoma; Pokagon Band of Potawatomi Indians of Michigan; Saginaw Chippewa Indian Tribe of Michigan. The letters invited the tribes to submit comments regarding the environmental scoping for the proposed 20 year license extension at Palisades. However, a single letter from NRC does NOT constitute sufficient government-to-government consultation on the part of the U.S. federal government concerning such an important matter.

The very late date of NRC's letter gave tribes insufficient time to consider intervening by the August 8, 2005 deadline for filing a petition to intervene and contentions against the 20 year license extension to the NRC's Atomic Safety and Licensing Board (ASLB). It also gave the tribes insufficient time for taking part in NRC's July 28, 2005 environmental scoping public meeting in South Haven, Michigan, as well as for submitting environmental scoping comments to NRC by the August 22, 2005 deadline. Despite the coalition's formal requests to NRC, both orally on July 28 and in writing on August 19, to extend the public comment deadline so that – among others – tribes could be notified and involved in the proceedings, NRC refused to grant any such extension.

In addition, NRC failed to even send a letter to a number of tribes with ties to the Lake Michigan shoreline, and thus a potential interest and stake in the Palisades license extension. Some examples would include: the Forest County Potawatomi in Crandon, Wisconsin, as well as other tribes on the Wisconsin shoreline of Lake Michigan; the

Prairie Band Potawatomi Nation in Mayetta, Kansas, as well as other Potawatomi diaspora tribes and bands currently located outside the Great Lakes Basin; tribes and bands in Michigan's Upper Peninsula, including the Bay Mills Indian Community, the Keewenaw Bay Indian Community, and the Sault Sainte Marie Tribe of Chippewa Indians. Why were tribes and bands in the northern lower peninsula of Michigan written by NRC, but not these tribes in Michigan's Upper Peninsula? And what about other tribes, such as the Sak and Fox Tribe of Oklahoma, which also have ties to the Lake Michigan shoreline? Why was it not notified and consulted?

But, one of the many contentions filed by the coalition of environmental groups (including NIRS) and concerned citizens (including fifty NIRS members) on August 8, 2005 regarding the license extension at Palisades was the negative impacts on Native American sites potentially on the property. The coalition also raised this Native American sites contention/concern orally at the NRC's July 28, 2005 environmental scoping hearing, and again in its August 22, 2005 written comments on NRC's environmental scoping.

Under its August 8, 2005 contention that "Environmental justice [is being] denied by the continuing operations of Palisades," the environmental coalition stated "Palisades' license extension application also has inadequately addressed the adverse impacts that 20 additional years of operations and waste generation would have on the traditional land uses, spiritual, cultural, and religious practices, and treaty rights of various federally-recognized tribes in the vicinity of the plant and beyond, as well as effects upon non-federally recognized tribes governed by international law..."

The coalition's August 22, 2005 written submission to NRC regarding environmental scoping added:

"...Despite the Michigan State Historic Preservation Office's concern pertaining to possible unreported archaeological properties present on, or with the vicinity of, the Palisades site (see Page C-2, Cultural Resources Correspondence of the Environmental Report), NMC and Consumers persist in opposing a survey of the project area as unnecessary. But, if unreported Native American archaeological sites are present at or near the Palisades nuclear power plant (which is very possible, given the very close proximity of a large creek in Van Buren State Park just to the north of the power plant, as well as the very close proximity of Brandywine Creek just to the south of the power plant in Palisades Park – rivers and creeks being common sites for encampments and villages amongst the indigenous peoples of Michigan since time immemorial), then 20 additional years of nuclear operations, radioactive waste generation, and daily radiation emissions would have a significant and severe adverse impact on Native American cultural and religious values at those sites, values which strive to protect sacred areas from such degradation...Given the sovereignty of these tribes and bands, and the treaty rights that exist between them and the United States federal government, the NRC has a government-to-government responsibility to consult with these tribes and bands on such significant federal actions as granting the Palisades reactor an additional 20 years of operations. An archaeological survey must be conducted before NRC grants a 20 year

license extension to assure that Native American archaeological sites are not negatively impacted by future Palisades reactor operations. Such impacts as harm to lake sturgeon – sacred to some Great Lakes tribes – must also be evaluated. It is interesting and telling that NMC's Environmental Report assigns no "importance" to lake sturgeon (in Table 2.3-1, Page 2-47), despite its State of Michigan Threatened Status, and its sacred status in the cultures and traditions of various Great Lakes Native American Tribes, not to mention its importance to the natural history of Lake Michigan as an ancient indigenous species in the ecosystem. This is an indication that NMC/Consumers is not acknowledging or addressing environmental justice impacts of 20 more years of operations at Palisades on Native Americans."

The coalition's full contention on this issue, as well as its full written environmental scoping comments on this issue, can be viewed at http://www.nirs.org/reactorwatch/licensing/080805intervenorssubmissionsnrcnativeamericanimpacts.pdf.

(Note that NIRS and the coalition's claim that NRC wrote only three tribes was mistaken. NIRS could only locate three such letters on NRC's ADAMS document system at that time, in late July/early August, 2005, and thus assumed that only three tribes had been written. But in fact, an additional eight letters had been sent by NRC to other tribes. NIRS and the coalition did not learn of this until ASLB hearings in early November 2005 in South Haven, Michigan when NRC counsel raised this fact orally.)

On August 30 and 31, 2005, NIRS sent letters to the following tribes regarding this issue: Gun Lake Tribe, Grand River Band of Ottawa Indians of Michigan, Grand Traverse Band of Ottawa and Chippewa Indians, Little River Band of Ottawa Indians, Little Traverse Bay Bands of Odawa Indians, Nottawaseppi Huron Potawatomi, Pokagon Band of Potawatomi Indians, and the Saginaw Chippewa Indian Tribe.

The letter to the Gun Lake Tribe can be viewed at http://www.nirs.org/reactorwatch/licensing/083005ltrtogunlaktribemiketennenbaum.pdf. Letters to the other tribes were similar or even identical.

On March 7, 2006 the NRC Atomic Safety and Licensing Board (ASLB) ruled that this Native American contention, and all other contentions NIRS and the coalition had filed, were inadmissible and denied any further hearings on the matter. On March 17, NIRS and the coalition appealed this ruling to the five-member NRC Commission. Although the NRC Commission has yet to rule on the appeal, the NRC Commission has never overruled any of the dozens of licensing board approvals for reactor license extensions.

Ironically, the NRC staff had just published, in February 2006, its Draft Supplemental Environmental Impact Statement (DSEIS) on the Palisades 20 year license extension (NUREG-1437, Supplement 27) a couple weeks prior to the licensing board ruling. In it, the NRC staff largely confirmed what NIRS and the coalition had contended, which NRC's licensing board nonetheless summarily dismissed. Such a contradiction

between NRC's ASLB ruling and its staff's admissions in the DSEIS have never been explained by NRC to NIRS and the coalition. In fact, it is very troubling that NRC staff and NRC counsel argued against NIRS and the coalition contention having to do with Native American sites on the Palisades property, while at the very same time, NRC staff were admitting in the DSEIS that NIRS and coalition contentions and comments were correct on this subject. Even if NRC's argument is that only aging issues can be heard by an ASLB, it must be pointed out that as systems, structures and components at Palisades age, they'll need replacing. Such refurbishment activities could disturb the land on the property, potentially destroying unknown or unreported Native sites.

NRC's DSEIS (NUREG-1437, Supplement 27, published Feb., 2006) contains numerous very significant admissions concerning Native American sites on or near the Palisades property.

On page iii of the Abstract, NRC admits that it "concludes that the significance of the potential environmental impacts of renewal of the OL [operating license] would be SMALL, except for historic and archaeological resources for which the potential impact would likely be SMALL, but could be MODERATE." NRC defines moderate impact on page xvii in the Executive Summary as "Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource." Note that out of the scores of environmental impacts examined in NRC's DSEIS, only the potential impact on archaeological resources rises to this level of potentially "MODERATE" impact. It is, however, difficult to understand how any noticeable alteration of Native American burial sites, for example, would not destabilize important attributes of that "resource."

Kevin Kamps from NIRS pointed out, during his public comments at the April 5, 2005 NRC DSEIS meeting in South Haven, Michigan, that NRC staff had contradicted itself regarding historic and archaeological resources. On a large poster on the wall in the back of the meeting room above NRC's informational hand outs table, NRC staff stated that even for historic and archaeological resources, a license extension at Palisades would have a "SMALL" impact. Yet, on page iii of the Abstract at the very beginning of its hardcopy DSEIS, NRC staff reported that there could be "MODERATE" impact upon historic and archaeological resources. NRC official Rani Franovich, one of the main NRC spokespersons at that April 5 public meeting, approached Kevin Kamps later and said to him that the listing of potentially "MODERATE" impact upon historic and archaeological resources was a mistake, and that it would be corrected in the final SEIS. This is suspicious and unsettling. Why, if NRC staff determined that a 20 year license extension could potentially inflict a "MODERATE" impact upon historic and archaeological resources at or near the Palisades site or along its transmission lines, would NRC suddenly backpedal on that determination when the issue was raised publicly?

Significantly, at page 2-62 of the DSEIS, NRC reports that "15 archaeological sites with 1 mi [mile] of the Palisades site and transmission line rights-of-way" have been identified. One is a prehistoric village site, Pell Village. Two are prehistoric sites of

"undetermined function," one just 0.3 mi south of the Palisades site (thus likely in the vicinity of Brandywine Creek in Palisades Park Resort Community), and the other "just outside the Palisades site's eastern boundary." If the prehistoric sites are of "undetermined function," is it possible that they are burial sites, village sites, or encampment sites, or related to such sites? If so, do they not deserve legal protection under federal and state law against the disturbance or destruction that could occur during a 20 year license extension at Palisades?

On page 2-63, NRC admits that "Intact archaeological sites could be present within the remaining undeveloped areas as well as in soils below the depth of ground disturbance in most areas of the site." It goes on to admit that "***no archaeological field surveys have been conducted either at the Palisades site*** or for original transmission line construction or maintenance. The cultural resource assessment, which was undertaken in 1979, concluded that ***without accurate knowledge of the cultural resources present at the Palisades site, it must be assumed that power plant construction has the potential to adversely impact significant resources that may exist on the plant site. The report recommends that an intensive survey be undertaken of the undisturbed portions of the site.***" [emphases added]

NMC had stated in its Environmental Report at page 2-46 that "In the Terrestrial Ecological Survey done for Consumers in 1979, it was noted that no significant historical or archaeological resources were known to occur in the study area." NMC and Consumers Energy seem to have only selectively revealed what its own contractor reported in 1979, thus misleading the public, tribes, and even state and federal agencies on this very significant matter of Native sites on or near the Palisades property. Where NMC reported "no significant historical or archaeological resources known," it failed to report "power plant construction has the potential to adversely impact significant resources that may exist on the plant site."

Wawro and Malone, on behalf of Consumers and NMC, also deceptively wrote MacFarlane-Faes at the State of Michigan State Historic Preservation Office that "NMC and Consumers do not believe a survey of the project area is necessary, as Federal and state agencies have confirmed on multiple occasions that no historic properties, archeological or architectural, are known to exist on, or in the immediate vicinity of the Palisades site." (NMC ER, Page C-2) How could Wawro and Malone make such a misleading statement to the State of Michigan, knowing that Consumers' own cultural resource assessment concluded that land disturbance "has the potential to adversely impact significant resources that may exist on the plant site," and the recommendation that "an intensive survey be undertaken of the undisturbed portions of the site"? Were Wawro and Malone attempting to deceive the State of Michigan into officially approving the 20 year license extension at Palisades, despite the State's "concern pertaining to possible unreported archaeological properties present on, or within the vicinity of, the Palisades site"?

More troubling still, on page 4-26 NRC reports that "During the site audit, the NRC staff expressed concerns about the NMC procedures not requiring a qualified

archaeologist to survey the proposed ground disturbance area for archaeological resources prior to construction. In addition, the NRC staff noted that "the procedure did not specify the training, experience, or credential requirements for the site's Environmental Coordinator to recognize archaeological materials or assess the potential significance of historic or archaeological resources."

Although NRC goes on to assure that Palisades has now revised its procedures, and that no major refurbishment activities are planned between 2011 and 2031, how can the mere words and assurances of NRC or Palisades be trusted? NRC and the nuclear utility must be required, in compliance with the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act, among other federal laws, as well as in compliance with treaties entered into with affected tribes – treaties being the highest law of the land, as recognized by the U.S. Constitution – to protect Native American burial sites, village sites, encampment sites, and other significant sites to the fullest extent of the law.

NRC seems to be concluding, in essence, that Consumers Energy and NMC can be trusted to protect Native American sites that might be stumbled upon during construction or refurbishment activities. But companies that have concealed relevant information relating to such issues, as described above, cannot be trusted to protect currently unknown or unreported Native American sites on the Palisades property. The laws must be enforced by the federal and state agencies.

It should also be pointed out that NRC's statement on page iii of the SDEIS Abstract, that "The NRC staff determined that information provided during the scoping process did not identify any new issue that has a significant environmental impact," is difficult to believe, given what has been described above. In the SDEIS Appendix B, "Contributors to the Supplement," three contributors whose "Function or Expertise" is listed as "Cultural Resources" were listed; these three experts on cultural resources came from three different government agencies, the NRC, Argonne National Lab, and Lawrence Livermore National Lab. Reviewing the environmental impact statements for the five most recently approved license extensions – at Cook (just 30 miles south of Palisades, on the Lake Michigan shore), Point Beach (on the Lake Michigan shore of northern Wisconsin), Millstone (itself near Native reservations in Connecticut), Arkansas Nuclear One, and Farley, only one "Cultural Resources" contributor took part in each of those EISs. It seems that comments provided by NIRS and the coalition of environmental organizations intervening against and commenting upon the 20 year license extension at Palisades raised a new and important issue – potential Native American sites on the property – that had not been addressed in four decades at Palisades. In fact, the licensee, NMC and Consumers, had nearly completely downplayed this issue in its Environmental Report. NRC then turned to three cultural resource specialists to address this important issue.

It is legally and morally incumbent upon the companies and federal and state agencies involved that a comprehensive site survey of the Palisades property be required and performed, and that it be carried out in close consultation and cooperation with

affected tribes on a legally sufficient, government to government basis. If Native American burial sites or other significant sites are discovered during the comprehensive site survey, then appropriate actions must be taken to protect these sites against 20 more years of radiological and physical disruption and damage. All this, before a license extension can legally be granted for Palisades.

It cannot be overly reinforced and re-emphasized that there should be meaningful consultations not only between the impacted tribes and the Palisades nuclear plant owner and operator, but also government to government consultations between tribes and relevant and involved federal government regulators and agents, including NRC. A letter or a phone call does not constitute legally sufficient government to government consultation.

NRC FORM 659 (6-2003)

U.S. NUCLEAR REGULATORY COMMISSION

Category 3

NRC PUBLIC MEETING FEEDBACK

Meeting Date: 04/05/2006

Meeting Title: Public Meeting to discuss Draft Environmenatl Impact Statement for Palisades Nuclear Plant

In order to better serve the public, we need to hear from the meeting participants. Please take a few minutes to fill out this feedback form and return it to NRC.

1. How did you hear about this meeting?

☐ NRC Web Page ☐ NRC Mailing List ☒ Newspaper
☐ Radio/TV ☐ Other _____

		Yes	No (Please explain below)	Somewhat
2.	Were you able to find supporting information prior to the meeting?	☒	☐	☐
3.	Did the meeting achieve its stated purpose?	☐	☐	☒
4.	Has this meeting helped you with your understanding of the topic?	☐	☐	☐
5.	Were the meeting starting time, duration, and location reasonably convenient?	☒	☐	☐
6.	Were you given sufficient opportunity to ask questions or express your views?	☒	☐	☐
7.	Are you satisfied overall with the NRC staff who participated in the meeting?	☐	☒	☐

COMMENTS OR SUGGESTIONS: Thank you for answering these questions.

QQ-1

3.) The NRC presented their fact findings and it seemed evident that the decision to renew the Palisades licence has been approved, regardless of the concerns, facts and alternatives presented by individuals attending this meeting. I question the purpose of this meeting -? to sugarcoat the problems with Palisades? and not offer the public any part in the decision making process. -

(cont.) on back

Continue Comments on the reverse.

OPTIONAL

Name Connie and Jim McAllister Organization — concern citizens

Telephone No. — E-Mail consomac@yahoo.com ☒ Check here if you would like a member of NRC staff to contact you.

OMB NO. 3150-0197 Expires: 06/30/2004

Public Protection Notification: If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

Please fold on the dotted lines with Business Reply side out, tape the bottom, and mail back to the NRC.

COMMENTS OR SUGGESTIONS: (Continued)

The NRC officials avoided detailed answers to questions regarding the safety of the aging reactor. When questioned about renewing the license for an additional 20 years beyond 2011, (Exceeding the original life span of Palisades of 40 years) The NRC officials once again avoided the issue of safety. QQ-2

Given the poor tract record of safety at Palisades along with present conditions of the reactor – How can we expect Palisades to be a source of safe and efficient power for the next 25 years?

I also concerned about the safe disposal of the spent fuel rods. Over the next 25 years, more rods will be used and where will they be stored? Is there a safe place to store this nuclear waste or will they be stock piled here along our precious resource Lake Michigan? QQ-3

Seek alternative solutions for a Safe and Clean Future. QQ-4

UNITED STATES
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WASHINGTON DC 20555-0001

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PalisadesEIS - Public comments on NUREG-1437, Supplement 27 Page 1

2/23/06
71FR 9383
(11)

From: "Terry O'Brien" <tobrien@obrienauto.com>
To: <PalisadesEIS@nrc.gov>
Date: Mon, May 15, 2006 2:58 PM
Subject: Public comments on NUREG-1437, Supplement 27

Dear NRC,

RR-1 My wife and I grew up vacationing at Palisades Park. We recently purchased an old cottage and renovated it so our four children, 8 and under, will grow up with the same wonderful experiences at the lake. We understand nuclear power can be a viable option for clean and efficient power, but we strongly oppose the renewal of the Palisades Nuclear Power Plant license.

RR-2 There are far too many identified safety, security, environmental and health issues to overcome specific to the Palisades facility to warrant a license renewal. The age-related degradation, embrittlement of the reactor vessel, radioactive generation and storage issues, as well as the sensitive socio-economic impact of the community are just a few. There are a number of energy efficient alternatives that are more viable for the area. Overlooking the interests of the people and clearly identified health concerns in the interest of plant self-preservation are actions from a bygone era.

RR-3

RR-4 We implore you to deny the license renewal for Palisades Nuclear Power Plant, listen to the voices of the people, and take a stand for future generations. This is an opportunity to do what is right and set a course for safe, healthy, efficient and renewable energy, rather than holding on to strings of a proven aged, unsafe and volatile facility. Please do the right thing and deny this application, for our kids and the future generations."

Terry & Laura O'Brien

7390 Holliday Drive East

Indianapolis, IN 46260

317-979-5646

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2006 MAY 24 PM 12: 52
RULES AND DIRECTIVES BRANCH USNRC

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E-RIDS = ADM-03
Add = Bo Pham (bmp)
C. Guerrero (CXG3)

CHIEF RULES AND DIRECTIVES BRANCH
DIVISION OF ADMINISTRATIVE SERVICES
OFFICE OF ADMINISTRATION
MAILSTOP T-6D59
U.S. REGULATORY COMMISSION
WASHINGTON, D.C. 20555-001

Nuclear Regulatory Commission

I'm writing to express my opinion on the use nuclear power plants in the united states. I believe we are putting our head in the sand like an ostrich by not using our nuclear power for electricity for the benefit of our citizens of this country. We burn coal like our 18TH century ancestors, we burn natural gas that is running out that will be needed for home heating, when we have nuclear energy that is clean, cheap and an unending supply. SS-1

Why do our leaders listen to activist like Kevin Kamps (who most likely got his information from the movie China Syndrome). SS-2

What I'm saying is every new territory our country has ventured into we have learned by doing, not letting nay sayers run our experts.

I understand the country of Israel generates most if not all of their electricity with nuclear power. Our technology not used at home. Look at the advancement in our nuclear suberines since they were put into service. We cannot advance in this field if we dont inter into it. I believe all our elect--ricity one day will be by nuclear power, because we must, the problems of spent fuel rods will be figured out by scientest not by activist.

SS-3 What I'm saying is build all the new nuclear power plants the electric companys need to build as that will benefit everyone. As for the Palisades Plant, let the experts make the decisens not the nuts on the street.

George Sechrada
931 Stonewood dr
Spring lake, Mi. 49456

(6)

Palisades Conversion Group

Concerns and comments, for Environmental Scoping Meeting
April 5th 2006

1. Having worked in two Occupations, within the Nuclear field, *Laborer, J.A. Jones Construction Co. 1971-72* on the *Donald C Cook Nuclear Power Plant*, then at *Palisades Nuclear Power Plant, Decon-Tech* for *Essential Services Co.* during an Refueling Outage, in the early 90s, I have seen construction of, then finished Plants, during tours. The Plants then new and impressive. Then again, many years later, aging, much obsolete, often highly contaminated equipment; mal-functioning devices such as the Reactor Containment, Hatch-door, in-operable for some time, while I was de-coning when *Consumers Energy*, Operated this Plant. Things get old, dilapidated with time, especially when they are neglected. Worn-out. Under the influence of radiation. Out-dated. Or used-up, such as the Palisades Plants Fuel-pool, now double-racked. Steam Generators replaced, highly contaminated previous units, within they're own mortuary on the Plant Site. Along with, approximately 30, V.S.C. 24 and (34) Dry Storage Casks, in use for Above Ground Spent-fuel Assembly storage, also on site. An Cut-rate, move Consumers Energy Co. took when their Fuel-pool was filled to maximum capacity. Well-passed, it's origional design capacity; threatening a Shut-down of the Plant. Breaking another promise, made when the Plant was first built, "That no, Highly contaminated radioactive materials would be on the plant-site, out-side it's high-level Containment structure. For purposes other than re-fueling and eventual removal of spent-fuel assemblies. To a National Depository." TT-1 TT-2
2. After 38 years of Operation, *Palisades Nuclear Power Plant* and it's *Reservation*, is showing it's age. Effects of Embrittelment, it's Pressure Reactor Vessel being protected with old, many cycled fuel assemblies, a case in point. Years now. No vessel replacement, or further shielding in sight. Or 2007 says the NRC, 2011, say others; 2014, says Palisades Lawyers! Should have been replaced ten years ago. As P.R. Spokesperson, Mark Savage told the Local Press back 1993, when the problem surfaced, during an interview with the South Haven Daily Tribune. Once they finally got him to admit, there was a metal condition called "Embitterment," effecting the reactor! TT-3

One of the biggest complaints, from Plant Critics, is the Operators have been less, than forth-coming when problems surface. Make excuses, rosy predictions they know, well never come to pass. Or lie to anyone listening, when the information might, or well be, perceived as contentious. Placing Public trust, in jeopardy. TT-4

Much the same thing, can be said, of the NRC, during these current round of Scoping Meetings, concerning this Relicensing endeavor. Long time followers of this issue, has seen and heard from a very different NRC, under past Presidential Administrations; the difference between now, and say, the early 90s, can not be denied. This is a very, Business Friendly, NRC. Not Public or Environmentally friendly. TT-5

2. Yesterday I received my copy of ***Generic Environmental Impact Statement for License Renewal of Nuclear Plants Supplement 27: Regarding Palisades Nuclear Power Plant*** Feb. 2006 TT-6

Reading through, both the Manual and it's cover-letters, I see, despite the potentional, Radioactive hazards, the *NRC* insists the *Environmental Impacts*, of Palisades Nuclear Power Plant and all the radioactive materials about it's Reservation, is always regarded as "SMALL"! throughout this Report. But, when I turn to the Alternative Energy sources, which should be pursued at the Palisades Plant site, there impacts are often referred to as "LARGE"! Which all considering, they would be, taking into account the enormity, of the electrical power the plant puts on the grid, for Alternatives to equal out. In they're current forms, at the site. TT-7

A rather particular assumption. Bracketing both the Plant's and *NRC* positions well, yet ignoring the simple fact, that if all the resources used to continue operation of this plant, were put into Renewables and others forms or electrical generation throughout the State, it would turn the argument on its head.

What my real concern here, is the fact this *GEIS Report* does not, take into it's consideration of the Dry-cask Storage, other highly radioactive, contaminated things such as the former Steam Generators on site. Many would argue the Palisades Reservation is all ready, a defacto High-level, Nuclear-Waste Dump! Which to their, *PCG* (*Palisades Conversion Group*) and my way of viewing this issue, a "LARGE" impact, on this fragile, Lake Shore Environment. More to the point, Potentional Impact, should things, not, go as designed or planned. Or Promised! Which over the last 38 years, time and time again, have been broken. TT-8 TT-9

With an additional, twenty years, worth of Above-ground, Dry Storage Casks, along with other contaminated equipment, which is sure to be replaced should this plant be pushed so far past is origional, design capacity. Which it all ready has, by years, now. Counter to the *GEIS's* insistence that no changes to the plant, need take place, in the additional twenty years.

Isn't the reactor-head, soon to be replaced? In July, perhaps? TT-10

The Pressure reactor vessel, long in question, operated in a patch-work method since Embrittlement, was discovered, more than ten years ago. How long, before it is replaced?. Annulated as once promised in Court, or an Neutron-thermal shield installed? Replaced!? TT-11

And yes, the Dry-storage Casks piling up on Site. I'm sure we'll hear all about Yucca Mountain, or the Goshutes, Skull Valley Indian Reservation, taking all this off our hands, for the umpteenth time, in the last twenty years. Now there are over 20 to 30 Dry-storage Casks on site. Well anyone here, give us the exact number?! Or are you going to just dodge the question again? Insisting it's a Federal issue, none of this Relicensing business concern.

This is, a Local Community concern, for we, well have to live with, and care-take all of this waste for Generations to come! In 93, we were told these experimental, Cut-rate, Dry-storage casks, would be gone in 1998, time and time again by Mark Savage, the Plant Spokesman.

Now, we are told by the *NRC*, they're licensed to store fuel assemblies for twenty years; well last for 150 years; and *Above Ground Storage* is our Nations Nuclear future! Since the Feds haven't found a hole, deep or dry enough, to put all this radioactive waste and materials in! After nearly fifty years of looking, constructing, spending and charging us Rate-Payers, for a place to take it off our shorelines. Nothing, but this. Another promise broken. More public trust, going by the wayside.

(On April 4th, the Skull Valley Reservation well be approved for Above Ground Storage; but, what with Yucca Mountain inability to take the slated casks off the Goshutes hands, there WELL NOT, be room in ether Nuclear-waste Storage-site, for the all waste piling-up at Palisades now; much-less then all the additional waste, produced during the 20 Relicensing period! All, for a little, electricity now, decades, perhaps centuries of Radioactive waste, for the local citizenry to look after. Yet the Operators still insist, this is a cheap form of power-generation!? TT-12

4. Another concern, is the Plants original 7-mile Cooling –Loop, rumored to be back in use again; it's effect of Lake Michigan's Eco-system. Is it, or is it not, back in use? When I questioned the new Palisades P.R. Spokesperson, she wasn't even aware, of this Cooling-Loop!?
Or so she. informed me. She was fairly new to the job, but this loop has been out in the lake since the plants inception. I know Mr. Bradley, one of the Under-Waters Welders who built it, back in the late 60s. I remember the Environmentally driven, Court actions, making Consumers Power Co. construct Cooling Towers, to bypass this system because of the Loops adverse impact on the Lakes wildlife and Endangered-species; therefore the Court's shutting this underwater Cooling loop down. I thought, for good, since Cooling Towers had the be constructed to operate the plant. Again, is this Cooling-loop back in use? What are the new, Eco-system Impacts on the Lake, taken into consideration by the Plant Operators and NRC, if it is?
What is the current status of this Loop, now?
No mention of the Sail Darter, in this new GEIS Manual. Is the Snail Darter now extinct, recovered, or still within the Plants immediate shoreline area? If-so, how is it doing, should this Cooling Loop, be back in use. Or is the Plants huge, lake water, intake and discharge ,effecting it?
(I need to call Dept of Wildlife? The DNR?) (I called up the Dept of Fish and Wildlife, in Lansing, spoke to Todd, who was interested, yet explained that the Snail-darter is an Endangered species, who lives in three South Eastren States. Not, listed as ever having lived within Lake Michigan!? To his knowledge, but this Court-suit goes back to the late 60s. It seems the Snail Darter must have moved on, wiped out of the Great Lakes so long ago, this issue is no longer prevalent to the current Cooling-loop problems.

5. Questions about Palisades, Fuel-pool crane breakdown, the Oct.11th. 55 hour shutdown, with an 110 ton. Dry-storage cask, containing spent fuel-assemblies, hung "partially suspended" in the air, held partly submerged over the fuel-pool. The Fuel-pool racked well beyond, it's origional design capacity with fuel-assemblies going back to the 70-s.. I have gathered from the Tribune article, all the brakes froze, because Plant-personal did not set the emergence brake properly, just before leaving for his vacation! TT-13

How big, a rem-stream, would this situation would be giving off? How many rems, the article certainly didn't say. Did the whole fuel-pool area, must have had to been decontaminated; how much did it receive?

All that spent-fuel at risk, should that Cask had dropped down onto decades worth of spent-fuel assemblies, in would could have caused a fire, making for a accident much worse, than Chernobyl!
The article also pointed out, this incident was considered, of Low, Safety significance, by the NRC, within it's Quarterly Report. Quite a change, from the NRC in the Early 90s, when Dry-Cask Storage, was first initiated at Palisades; giving the Operators 30 violations, for everything from crack pipes to, mishandled, dropped fuel-assembly rods, into its reactor vessel..
Did they ever find that two pounds of missing fuel?

To *Palisades Conversion Group*, this incident further demonstrates the Aged, long-time ineffectiveness of both the equipment and Personal, at the Palisades plant; right along with the Current *NRC*, not handing out *Violations*, for such screw-ups. This must have been, some long term radiation, being released for over two days within the Fuel-pool area? We're procedures fumbled? Could not get their crane to budge, for days!? Because one brake froze, then all it's breaks shutdown. For 55, hours!? What were the Plant Personal doing, scratching their heads?!
A further explanation, of "partially suspended" 110 lb. Metal inner cask, leaves me with cause for concern, as it did others, was not made clear in the article. Just insistences that everything was "Okay". Just what is, the shielding, of the bare metal cask? Lead, Neutron-thermal shielding? Was there Helium within the cask, at the time? The *Public* would like to know?
Just keeping this incident under wraps, while say, the Three Judge Panel Hearing was taking place, demonstrates both the Plant, and the NRC's inability, to be less than forthcoming with the local Public when things go wrong at Palisades.
And please, stop saying, this is a Federal issue, no concern to any of us Locals here. Or this Re licensing process. Anther twenty-five years, of manufactured waste, and waste handling, storage, is what we are going to have to live with, so it's our concern. On questionable storage pads, cut-rate casks, piling up out of a plant long past it origional Decommissioning Date.
By the way. Tell us this. What was, this Plants origional Decommissioning date, when first built and began operations, in 71?

Ken Richards
(P.C.G.) 72777 CR 380
South Haven MI 49096
Ph. 1-269-637-2908

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 2-6 2006

REPLY TO THE ATTENTION OF
B-19J

2/23/06
71 FR 9383
(14)

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RULES AND DIRECTIVES

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, D.C. 20555-0001

Re: Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 27: Palisades Nuclear Plant, Van Buren County, Michigan, Draft Report, NUREG-1437, EIS No. 20060052

Dear Sir or Madam:

In accordance with Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) has reviewed the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 27 (SEIS): Palisades Nuclear Plant, which is a draft report. According to the SEIS, the operating license for Palisades Nuclear Plant will expire on March 24, 2011. The proposed Federal action would renew the current operating license for an additional 20 years.

The Nuclear Regulatory Commission (NRC) developed the Generic Environmental Impact Statement (GEIS) to streamline the license renewal process on the premise that environmental impacts of most nuclear power plant license renewals are similar, in most cases. NRC develops facility-specific SEISs for individual plants as the facilities apply for license renewal. EPA provided comments on the GEIS during its development process--for the draft version in 1992, and for the final version in 1996.

Palisades Nuclear Plant is located in Covert Township, Van Buren County, Michigan, on the southeastern shoreline of Lake Michigan. The plant has a single pressurized light-water reactor. The maximum authorized power level of its reactor is 2,565 megawatts thermal. The plant's current net summer capacity is 786 megawatts electric. The plant is refueled on an 18-month cycle. Palisades Nuclear Plant uses a closed-loop cooling system.

Based on our review of the Palisades Nuclear Plant draft SEIS, we have given the project an EC-2 rating. The "EC" means that we have environmental concerns with the proposed action, and the "2" means that additional information needs to be provided in the final SEIS. Our concerns relate to:

1. Adequacy and clarity of the information provided,

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Add = Br Phom (BMP)
C. Guerrero (CXG3)

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2. Risk estimates,
3. Entrainment of fish and shellfish in early life stages, and
4. Threatened and endangered species.

We have enclosed our comments and the U.S. EPA rating system summary.

If you have any questions or wish to discuss any aspect of the comments, please contact Newton Ellens (for NEPA-related issues) at (312) 353-5562, or Michael Murphy (for radiation-related issues) at (312) 353-6686.

Sincerely,

Kenneth A. Westlake, Chief
NEPA Implementation Section
Office of Science, Ecosystems, and Communities

Enclosures

U.S. Environmental Protection Agency Comments on
The U.S. Nuclear Regulatory Commission's Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 27: Palisades Nuclear Plant, Draft Report, NUREG-1437

General Comments:

The supplement to the Generic Environmental Impact Statement (GEIS) for Renewal of Nuclear Power Plant Licenses should be a Site Specific Environmental Impact Statement instead. This would follow after forty years of operation, with a forty year data collection history, and where site specific conditions could be utilized to provide a specific response to the Environmental Impact requirements instead of a generalized one.

Specific Comments:

1. Section 2.1.4.2, *Gaseous Waste Processing Systems and Effluent Controls*, Page 2-12, second paragraph. Citations of dose values should include the dose value, in addition to the citation, to make the values clearer. UU-1

2. Section 2.2.7, *Radiological Impacts*, pages 2-49, 2-50. The references to the environmental standards need to be more complete citations, including title of the rule or regulation along with the basic standard for comparison provided consistently. All of the environmental standards that could be used for comparison should be used, including 40 CFR 61 Radionuclide National Emission Standards for Hazardous Air Pollutants values. This will reduce the time needed to look up these citations and verify values that are cited in the text. UU-2

3. Section 2.2.7, *Radiological Impacts*, page 2-49. We are concerned about the level of information provided in the draft supplemental environmental impact statement (SEIS) on direct and cumulative radiological impacts. According to the draft SEIS, Nuclear Management Company, LLC (NMC), the applicant for the operating license, has conducted a radiological environmental monitoring program (REMP) around the Palisades site since 1971. Through this program, NMC has monitored and documented radiological impacts to workers, the public, and the environment. The draft SEIS states: UU-3

> The REMP includes monitoring of the waterborne environment (ground water, surface water, and sediments), ingestion pathways (milk, fish and vegetation), direct radiation (gamma dose at thermoluminescent dosimeter [TLD] locations), and atmospheric environment (airborne radioiodine, particulates, gross beta, and gamma). [Page 2-49]

The draft SEIS cites two annual reports which summarizes information from the REMP, but the draft SEIS does not contain this summary information itself. Summarized

quantitative information about radiation and exposure pathways in the environment is relevant in determining radiological impacts from the continued operation of Palisades. We are unable to make such a determination from the draft SEIS as it is written. In addition, the draft SEIS lacks a comprehensive assessment of cumulative radiological impacts, since it does not include quantitative information about the D.C. Cook Nuclear Plant, located about 28 miles south-southwest of Palisades on Lake Michigan's shores. Therefore, we suggest that the final SEIS include (1) current annual summary information from the REMP, and (2) a quantitative cumulative impact assessment of radiological impacts which accounts for impacts from the D.C. Cook Nuclear Plant.

UU-4 4. Section 2.2.7, *Radiological Impacts*, pages 2-49, 2-50. Providing the estimated total effective dose equivalents (TEDE's) for comparisons helps in providing the public with additional assurances that doses are monitored and do meet the As Low As Reasonably Achievable (ALARA) principals of the U.S. Nuclear Regulatory Commission (NRC).

UU-5 5. Section 4.2.2, *Electromagnetic Fields - Chronic Effects*, page 4-17. We commend NRC for providing the reference to the National Institute of Environmental Health Sciences results and recommendations on chronic exposures to electromagnetic fields. This will provide the public with valuable information on these types of exposures.

UU-6 6. Section 4.8.3, *Cumulative Radiological Impacts*, page 4-38, 4-39. Information or procedures used to generate values to support the assertions in this section need to be provided in a clearer manner to reduce the possibility of misunderstandings and the reasoning on procedures to reach these conclusions.

UU-7 7. Section 5.2.2, *Estimate of Risk*, page 5-6. It is stated that "The baseline core damage frequency (CDF) for the purpose of the SAMA [Severe Accident Mitigation Alternatives] evaluation is approximately 4.05 x 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 Palisades risk estimates; however it did account for the potential risk reduction benefits associated with external events by increasing the estimated benefits for internal events by a factor of two."

The estimates for risks from both types of events should be evaluated and presented, along with a rationale for not basing risk decisions on the external events or including them in the considerations as necessary to get an accurate portrayal of the risk of the licensing renewal.

UU-8 8. Section 6.1, *The Uranium Fuel Cycle*, page 6-3. Under the bullet point for Off-site radiological impacts (individual effects from other than disposal of spent fuel and high level waste disposal), no consideration appears to be given to the potential long-term storage of the spent fuel and high-level waste materials on site until such time as a

permanent facility is finally licensed and begins to accept these materials for disposal. A reference to other sections that this evaluation may have been included in should be provided here as well as in other sections, or if this evaluation has not been adequately conducted, the issue needs to be considered and an appropriate evaluation conducted.

9. Section 6.1, *The Uranium Fuel Cycle*, page 6-8, under the bullet point for On-Site Spent Fuel. A more thorough evaluation for the volume of spent fuel expected to be generated during the additional licensed time needs to be provided, along with more specific information as to site specific circumstances that may impair or improve the risk values for potential exposures to this spent fuel storage. UU-9

10. Section 7.1, *Decommissioning*, page 7-2, under bullet point Radiation Doses. As the GEIS is based on a forty-year licensing period, an extension of this period would have an impact that needs to be quantified and reported. This information should have been included specifically in the draft SEIS as part of the risk that would be associated with the license extension. The specific methodology needs to be provided and explained. UU-10

11. Section 8.1, *No-Action Alternative*, page 8-5, under the bullet point Human Health. The actual value representing the cited percent value should be specifically provided in addition to the citation. This will reduce unnecessary additional research by readers, except for value verifications, and potential misunderstandings or confusion as to the actual value(s) being specified. UU-11

12. Section 8.2.1, *Coal-Fired Generation*, page 8-17, under bullet point Human Health. Any dose estimate that would have the potential to fall in the risk range of 10^{-6} to 10^{-4} or greater needs to be specifically evaluated for potential regulatory requirements or risk impacts to the public health. This should be estimated conservatively using the data that is currently available or that can be logically extrapolated from currently available information. UU-12

13. Section 8.2.3, *Nuclear Power Generation*, page 8-34. The changes in power production would provide a difference in potential risk to the public and needs to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination in this section of the document. UU-13

14. Section 8.2.3.1, *Closed -Cycle Cooling System*, page 8-39, under bullet point Waste. Waste impacts need to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination made in this section of the document. UU-14

15. Section 8.2.3.1, *Closed -Cycle Cooling System*, page 8-40, under bullet point Human Health. Human-health impacts need to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination in this section of the document. UU-15

4

UU-16 16. Section 2.1.4.1, *Liquid Waste Processing Systems and Effluent Controls*, Page 2-12. The draft SEIS does not provide quantitative details about the planned modification of the liquid radioactive waste processing system. The draft SEIS states that NMC is planning to replace the current system, which is based on evaporation, to a system using resins for ion exchange. The draft SEIS does not provide quantitative details about the estimated change in collection efficiency between the two systems. This information should be provided in the final SEIS.

UU-17 17. Section 4.1, *Cooling System*, page 4-9. We are concerned about entrainment of fish and shellfish in early life stages. Under a U.S. EPA rule, codified in 40 C.F.R. § 125 (U.S. EPA Rule), Palisades Nuclear Plant is required to reduce its entrainment of fish and shellfish in early life stages. Under the U.S. EPA Rule, Palisades Nuclear Plant is required to choose one of five compliance alternatives to reduce entrainment, and the compliance alternative must meet a regulatory performance standard. We understand that Palisades will comply with the U.S. EPA rule through conditions in a NPDES permit issued by the Michigan Department of Environmental Quality. However, we believe that the project proponents should have a proposed compliance alternative and regulatory performance standard for Palisades, because the project proponents must assess the feasibility of complying with the rule. Listing this information would provide a comprehensive public disclosure of plans to reduce entrainment. Therefore, we request the project proponents to determine and disclose the proposed compliance alternative and performance standard that would most likely be proposed in the NPDES permit application for Palisades in the final SEIS.

UU-18 18. Section 4.6, *Threatened and Endangered Species*, pages 4-32 to 4-35. We are concerned because the draft SEIS does not evaluate impacts on state-listed threatened and endangered species. The draft SEIS includes an evaluation of federal and state-listed threatened and endangered species in the study area. However, the draft SEIS only evaluates impacts to federal-listed threatened and endangered species. We believe that the final SEIS should include a more comprehensive evaluation of threatened and endangered species, by including an evaluation of impacts to state-listed species.

SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION*

Environmental Impact of the Action

LO-Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impacts. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Correctiv ures may require substantial changes to the preferred alternative or consideration of some other project alter including the no action alternative or a new alternative). EPA intends to work with the lead agency to r hese impacts.

EU-Environmentally Unsatisfactory
The EPA review has identified adver pacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS sate, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1-Adequate
The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alterative and those of the alternatives reasonably available to the project or action. No further analysis or data collecting is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information
The draft EIS does not contain sufficient information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment

Appendix B

Contributors to the Supplement

Appendix B

Contributors to the Supplement

The overall responsibility for the preparation of this supplement was assigned to the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission (NRC). The statement was prepared by members of the Office of Nuclear Reactor Regulation with assistance from other NRC organizations, Argonne National Laboratory, and Lawrence Livermore National Laboratory.

Name	Affiliation	Function or Expertise
	NUCLEAR REGULATORY COMMISSION	
Bo Pham	Nuclear Reactor Regulation	Project Manager
Robert Schaaf	Nuclear Reactor Regulation	Project Manager
William Dam	Nuclear Reactor Regulation	Project Manager
Harriet Nash	Nuclear Reactor Regulation	Aquatic Ecology, Terrestrial Ecology
Leslie Fields	Nuclear Reactor Regulation	Cultural Resources
Jennifer A. Davis	Nuclear Reactor Regulation	Cultural Resources
Richard Emch	Nuclear Reactor Regulation	Health Physics
Alicia Williamson	Nuclear Reactor Regulation	Hydrology, Air Quality, Meteorology
Cristina Guerrero	Nuclear Reactor Regulation	Land Use, Socioeconomics
	ARGONNE NATIONAL LABORATORY[(a)]	
David Miller		Team Leader
Ellen Moret		Administrative Assistant
Michael Lazaro		Air Quality, Meteorology
Konstance Wescott		Alternatives, Cultural Resources
William Vinikour		Aquatic Ecology
Halil Avci		Health Physics
John Quinn		Hydrology
Timothy Allison		Land Use, Socioeconomics
Patricia Hollopeter		Technical Editor
Kirk LaGory		Terrestrial Ecology
	LAWRENCE LIVERMORE NATIONAL LABORATORY[(b)]	
Carol Kielusiak		Cultural Resources

(a) Argonne National Laboratory is operated for the U.S. Department of Energy by the University of Chicago.
(b) Lawrence Livermore National Laboratory is operated for the U.S. Department of Energy by the University of California.

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to the Nuclear Management Company, LLC Application for License Renewal of Palisades Nuclear Plant

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to the Nuclear Management Company, LLC Application for License Renewal of Palisades Nuclear Plant

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and Nuclear Management Company, LLC (NMC), and other correspondence related to the NRC staff's environmental review, under Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51), of NMC's application for renewal of the Palisades Nuclear Plant operating license. All documents, with the exception of those containing proprietary information, have been placed in the Commission's Public Document Room, at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, and are available electronically from the Public Electronic Reading Room found on the Internet at the following web address: http://www.nrc.gov/reading-rm.html. From this site, the public can gain access to the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents in the Publicly Available Records (PARS) component of ADAMS. The ADAMS accession numbers for each document are included below.

March 22, 2005	Palisades, Applicant's Environmental Report – Operating License Renewal Stage (Accession No. ML050940449)
March 22, 2005	Letter from NMC to NRC, forwarding the application for renewal of the operating license for Palisades Nuclear Plant, requesting extension of operating license for an additional 20 years (Accession No. ML050940434)
April 6, 2005	Letter from NRC to NMC, "Receipt and Availability of the License Renewal Application for the Palisades Nuclear Plant" (Accession No. ML050960344)
April 7, 2005	E-mail from Britta Johnson, NMC, regarding U.S. Fish and Wildlife Service (FWS) correspondence (Accession No. ML051430125)
April 7, 2005	E-mail from Britta Johnson, NMC, regarding State of Michigan Department of History, Arts, and Libraries (Accession No. ML051430130)

April 8, 2005	Letter from NRC to Ms. Lois Bemis, South Haven Memorial Library, regarding Maintenance of Reference Material at the South Haven Memorial Library at the Palisades Nuclear Plant, License Renewal Application (Accession No. ML051100210)
April 12, 2005	*Federal Register* Notice of Receipt and Availability Regarding the Renewal of Facility Operating License No. DPR-20 for an Additional 20-Year Period (70 FR 19104)
April 26, 2005	Letter from the Honorable Fred Upton, United States House of Representatives, to NRC offering support for Palisades Nuclear Plant license renewal (Accession No. ML051220248)
June 2, 2005	Letter from NRC to NMC transmitting, Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, and Opportunity for a Hearing Regarding the Application from Nuclear Management Company, LLC for Renewal of the Operating License for the Palisades Nuclear Plant (Accession No. ML051530122)
June 8, 2005	*Federal Register* Notice of Acceptance for Docketing of the Application and Notice of Opportunity for Hearing Regarding the Renewal of Facility Operating License No. DPR-20 for an Additional 20-Year Period (70 FR 33533)
June 20, 2005	Letter from NRC to NMC, forwarding *Federal Register* Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for License Renewal for the Palisades Nuclear Plant (Accession No. ML051710509)
June 27, 2005	Submittal from Kevin Kamps, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052420502)
June 30, 2005	Letter from NRC to Mr. Craig Czarnecki, FWS, Michigan Field Office, “Request for List of Protected Species Within the Area Under Evaluation for the Palisades Nuclear Plant License Renewal” (Accession No. ML051820473)
June 30, 2005	Letter from NRC to Mr. Brian Conway, Michigan State Historic Preservation Office (SHPO), “Palisades Nuclear Plant License Renewal Review” (Accession No. ML051860359)

June 30, 2005	Letter from NRC to Mr. Don Klima, Director, Office of Federal Agency Programs, Advisory Council on Historic Preservation, "Palisades Nuclear Plant License Renewal Review" (Accession No. ML051870009)
June 30, 2005	Letter from NRC to Mr. Gary L. Randall, Clerk of House, Michigan House of Representatives, "Acknowledgment of Receipt of Your Letter on the Applications for Renewal of the Operating Licenses for Palisades Nuclear Plant and Donald C. Cook, Units 1 and 2, Nuclear Plant" (Accession No. ML051820578)
July 7, 2005	Letter to Mr. Daniel J. Malone, Site Vice President, Palisades Nuclear Plant, from the NRC, "Project Manager Change for the License Renewal Environmental Review for Palisades Nuclear Plant" (Accession No. ML051890081)
July 8, 2005	NRC meeting notice announcing public meeting in South Haven, Michigan, on October 18, 2005, to discuss the environmental scoping process for the application for the license renewal of Palisades (Accession No. ML051920383)
July 13, 2005	Letter from NRC to the Honorable John A. Barrett, Chairperson, Citizen Potawatomi Nation, Oklahoma, "Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal" (Accession No. ML051960002)
July 13, 2005	Letter from NRC to the Honorable Kenneth Meshigaud, Chairperson, Hannahville Indian Community Council, "Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal" (Accession No. ML051950435)
July 13, 2005	Letter from NRC to the Honorable Robert Kewaygoshkum, Chairperson, Grand Traverse Band of Ottawa and Chippewa Indians, "Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal" (Accession No. ML051950495)
July 13, 2005	Letter from NRC to the Honorable Laura Spurr, Chairperson, Nottawaseppi Huron Pottawatomi, "Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal" (Accession No. ML051950614)

July 13, 2005	Letter from NRC to the Honorable Lee Sprague, Ogema, Little River Band of Ottawa Indians, “Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal” (Accession No. ML051960069)
July 13, 2005	Letter from NRC to the Honorable Frank Ettawageshik, President, Little Traverse Bay Bands of Odawa Indians, “Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal” (Accession No. ML051950574)
July 13, 2005	Letter from NRC to the Honorable David K. Sprague, Chairperson, Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians, “Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal” (Accession No. ML051950602)
July 13, 2005	Letter from NRC to the Honorable Floyd E. Leonard, Chief, Miami Tribe of Oklahoma, “Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal” (Accession No. ML051960027)
July 13, 2005	Letter from NRC to the Honorable Charles Todd, Chief, Ottawa Tribe of Oklahoma, “Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal” (Accession No. ML051960011)
July 13, 2005	Letter from NRC to the Honorable John Miller, Chairperson, Pokagon Band of Potawatomi Indians of Michigan, “Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal” (Accession No. ML051960173)
July 13, 2005	Letter from NRC to the Honorable Audrey Falcon, Chief, Saginaw Chippewa Indian Tribe of Michigan, “Request for Comments Concerning Palisades Nuclear Plant Application for Operating License Renewal” (Accession No. ML051960103)
July 15, 2005	Letter from Ms. Tonya Schuitmaker, Michigan House of Representatives, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052420495)
July 28, 2005	Submittal from Kenneth Richards, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052420501)

July 28, 2005	Letter from Nancy Ann Whaley, Supervisor, Geneva Township, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052420497)
July 29, 2005	Letter to NRC from Mr. Craig Czarnecki, FWS, Michigan Field Office, "Endangered Species List Request, Proposed Palisades Nuclear Plant (Palisades) License Renewal Project, Allegan, Berrien, Kalamazoo, and Van Buren Counties, Michigan" (Accession No. ML052650168)
August 18, 2005	Letter from Wayne Rendell, Supervisor, Covert Township, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052420503)
August 19, 2005	Letter to NRC from Grant Smith, Cyndi Roper, Michael Keegan, Alice Hirt, James Clift, Chuck Gordon, Maynard Kaufman, David Kraft, Keith Gunter, Kevin Kamps, Mike Shriberg, and Thomas Leonard, "Request for Extension for Comment Period on NRC's Environmental Reviews of the Palisades Nuclear Power Plant" (Accession No. ML052380421)
August 20, 2005	Letter from Swami Tapasanarda, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052420506)
August 20, 2005	Letter from Kathy Barnes, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052510393)
August 22, 2005	Letter from Murielle and John Clark, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052510389)
August 22, 2005	Letter from Kevin Kamps, Nuclear Information and Resource Service, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052510468)
August 22, 2005	Letter from Gary Karch, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML052510391)

August 24, 2005	Letter to NMC from NRC, "Request for Additional Information (RAI) Regarding Severe Accident Mitigation Alternatives (SAMAs) for the Palisades Nuclear Plant" (Accession No. ML052370327)
September 7, 2005	Letter from NRC to Mr. Kevin Kamps, Nuclear Information and Resource Service, "Response to Request for Extension of Environmental Scoping Comment Period Regarding the Palisades Nuclear Plant License Renewal" (Accession No. ML052410029)
September 21, 2005	Summary of Public Scoping Meetings to Support Review of Palisades Nuclear Plant License Renewal Application (Accession No. ML052630426)
October 12, 2005	Letter from NRC to Dr. David R. Wade, Director, Michigan Department of Community Health, Division of Environmental & Occupational Epidemiology, "Request for Information on Cancer Incidence Within the Area under Evaluation for the Palisades Nuclear Plant License Renewal" (Accession No. ML052900205)
October 18, 2005	Letter from NMC to NRC, "Palisades Nuclear Plant, Response to Supplemental Questions Concerning Radioactive Solid Waste Management" (Accession No. ML053470428)
November 18, 2005	Letter from NMC to NRC, Supplement to "Response to NRC Request for Additional Information dated August 24, 2005, dated October 21, 2005, and telecon on November 10, 2005A.1" (Accession No. ML053470426)
December 14, 2005	Letter from NRC to Mr. Daniel J. Malone, Site Vice President, Palisades Nuclear Plant, "Issuance of Environmental Scoping Summary Report Associated with the Staff's Review of the Application by Nuclear Management Company, LLC, for Renewal of the Operating License for Palisades Nuclear Plant" (Accession No. ML053490390)
January 24, 2006	E-mail from J. Holthaus, Environmental Project Manager, NMC, Covert, Michigan, to B. Pham, Project Manager, NRC, Rockville, Maryland, with attachments. Subject: "Palisades Cultural Resources Procedures." Attachment 1: "Archaeological, Cultural and Historic Resources," FP-RP-ENV-01; Attachment 2: "Palisades Cultural Resources," LM-330. (Accession No. ML060240597)

February 14, 2006	Letter from NRC to U.S. Environmental Protection Agency, National Environmental Policy Act Compliance Division, "Draft Supplement 27 to the Generic Environmental Impact Statement Regarding License Renewal for Palisades Nuclear Plant" (Accession No. ML060450726)
February 14, 2006	Letter from NRC to Mr. Daniel J. Malone, Site Vice President, Palisades Nuclear Plant, "Notice of Availability of the Draft Plant-Specific Supplement 27 to the Generic Environmental Impact Statement (GEIS) Regarding License Renewal for Palisades Nuclear Plant" (Accession No. ML060450681)
May 15, 2006	Letter to NRC from Mr. Michael T. Chezik, U.S. Department of the Interior, providing comments regarding Palisades Nuclear Power Plant license renewal application (Accession No. ML061570025).
May 22, 2006	Letter to NRC from Mr. Kevin Kamps, Nuclear Information and Resources Service, response to request for comment period extension regarding Palisades Nuclear Plant license renewal review (Accession No. ML061380030).
May 26, 2006	Letter to NRC from Mr. Kenneth A. Westlake, Chief, U.S. Environmental Protection Agency, NEPA Implementation Section, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML061640114).
June 19, 2006	Letter to NRC from Ms. Martha MacFarlane Faes, Environmental Review Coordinator, Department of History, Arts, and Libraries, providing comments regarding Palisades Nuclear Plant license renewal application (Accession No. ML061920480).
September 5, 2006	E-mail from J. Holthaus, Environmental Project Manager, NMC, Covert, Michigan, to B. Pham, Project Manager, NRC, Rockville, Maryland. Subject: "Status of the Federally listed Pitcher's Thistle (Cirsium pitcheri) on the Palisades Nuclear Plant Site" (Accession No. ML062480156).

Appendix D

Organizations Contacted

Appendix D

Organizations Contacted

During the course of the U.S. Nuclear Regulatory Commission staff's independent review of environmental impacts from operations during the renewal term, the following Federal, State, regional, local, and Native American Tribal agencies were contacted:

Advisory Council on Historic Preservation, Washington, D.C.

Citizen Potawatomi Nation, Shawnee, Oklahoma.

City of South Haven Water Filtration Plant.

Covert Township, Covert, Michigan.

Grand Traverse Band of Ottawa and Chippewa Indians, Suttons Bay, Michigan.

Hannahville Indian Community Council, Wilson, Michigan.

Little River Band of Ottawa Indians, Manistee, Michigan.

Little Traverse Bay Bands of Odawa Indians, Harbor Springs, Michigan.

Match-E-Be-Nash-She-Wish Band of Potawatomi Indians, Dorr, Michigan.

Miami Tribe of Oklahoma, Miami, Oklahoma.

Michigan Department of Community Health, Lansing, Michigan.

Michigan Department of Environmental Quality, Kalamazoo, Michigan.

Michigan Department of Environmental Quality, Lansing, Michigan.

Michigan Economic Development Corporation, Lansing, Michigan.

Michigan State Historic Preservation Office, Lansing, Michigan.

Nottawaseppi Huron Potawatomi, Fulton, Michigan.

Ottawa Tribe of Oklahoma, Miami, Oklahoma.

Pokagon Band of Potawatomi Indians of Michigan, Dowagiac, Michigan.

Saginaw Chippewa Indian Tribe of Michigan, Mt. Pleasant, Michigan.

U.S. Fish and Wildlife Service, East Lansing, Michigan.

Van Buren-Cass Counties Health Department.

Appendix E

Nuclear Management Company, LLC's
Compliance Status and Consultation Correspondence

Appendix E

Nuclear Management Company, LLC's Compliance Status and Consultation Correspondence

Correspondence received during the process of evaluation of the application for renewal of the license for Palisades Nuclear Plant (Palisades) is identified in Table E-1. Copies of the correspondence are included at the end of this appendix.

The licenses, permits, consultations, and other approvals obtained from Federal, State, regional, and local authorities for Palisades are listed in Table E-2.

Table E-1. Consultation Correspondence

Source	Recipient	Date of Letter
U.S. Nuclear Regulatory Commission (P.T. Kuo)	Michigan State Historic Preservation Office (B. Conway)	June 30, 2005
U.S. Nuclear Regulatory Commission (P.T. Kuo)	U.S. Fish and Wildlife Service (C. Czarnecki)	June 30, 2005
U.S. Nuclear Regulatory Commission (P.T. Kuo)	Advisory Council on Historic Preservation (D. Klima)	June 30, 2005
U.S. Nuclear Regulatory Commission (P.T. Kuo)	Citizen Potawatomi Nation (J. Barrett)	July 13, 2005[(a)]
U.S. Fish and Wildlife Service (C. Czarnecki)	U.S. Nuclear Regulatory Commission (P. T. Kuo)	July 29, 2005
U.S. Department of the Interior (M. Chezik)	U.S. Nuclear Regulatory Commission	May 15, 2006
U.S. Environmental Protection Agency (K.A. Westlake)	U.S. Nuclear Regulatory Commission	May 26, 2006
Michigan State Historic Preservation Office (M.M. Faes)	U.S. Nuclear Regulatory Commission (B. Pham)	June 19, 2006

(a) Similar letters were sent to 10 additional Native American Tribes listed in Appendix C.

Table E-2. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for the Palisades Nuclear Plant

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NRC	10 CFR Part 50	Operating license, Palisades Nuclear Plant	DPR-20	03/24/71	03/24/11	Authorizes operation of Palisades Nuclear Plant
FWS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	–	–	–	Requires a Federal agency to consult with the FWS regarding whether a proposed action will affect endangered or threatened species
MDEQ	Clean Water Act, Section 402 (33 USC Section 1251 et seq.), Michigan Act 451. Public Acts of 1994, as amended, Parts 31 and 41, et. al.; Michigan Executive Orders 1991-31, 1995-4, and 1995-18.	NPDES permit	M10001457	09/23/04	10/01/08	Discharge of wastewater and stormwater to Lake Michigan
MDEQ	Clean Air Act (42 USC 7401, et seq.); Michigan Act 451, Public Acts of 1994 (as amended), Part 55	Renewable Operating Permit (Air Quality)	200200005	02/04/03	02/04/08	Operation of Palisades air emission sources (evaporator heating boiler, plant heating boiler, feedwater purity boiler, emergency generators, cold cleaners).

Table E-2. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
MDEQ	Michigan Act 207. Public Acts of 1941, as amended, Section 5; Michigan Executive Order 1998-2	Aboveground Storage Tank Registration	Facility No. 91084220 (Diesel Tanks No. 1)	Annual	Annual	Storage of flammable or combustible liquid (diesel fuel) in aboveground storage tanks
SCDHEC	South Carolina Radioactive Waste Transportation and Disposal Act (Act No. 429 of 1980.)	Radioactive Waste License for Delivery	0006-21-06	01/09/06	12/31/06 Renewed Annually	Shipment of radioactive material to a licensed disposal/processing facility within the State of South Carolina
TDEC	Tennessee Code Annotated 68-202-206	Radioactive Waste License for Delivery	T-M 1003-L06	01/01/06	12/31/06	Shipment of radioactive material to a licensed disposal/processing facility within the State of Tennessee

– = A consultation is not given an identifying number and does not have an issue or expiration date.
CFR = Code of Federal Regulations
FWS = U.S. Fish and Wildlife Service
MDEQ = Michigan Department of Environmental Quality
NPDES = National Pollutant Discharge Elimination System
NRC = U.S. Nuclear Regulatory Commission
SCDHEC = South Carolina Department of Health and Environmental Control
TDEC = Tennessee Department of Environment and Conservation
USC = United States Code

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 30, 2005

Mr. Brian Conway
Michigan State Historic Preservation Office
Michigan Historical Center
PO Box 30740
717 West Allegan Street
Lansing, MI 48909

SUBJECT: PALISADES NUCLEAR PLANT LICENSE RENEWAL REVIEW

Dear Mr. Conway:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating license for Palisades Nuclear Plant (Palisades), which is located in Covert Township on the western side of Van Buren County, Michigan. Palisades is operated by Nuclear Management Company, LLC (NMC). The application for renewal was submitted by NMC on March 31, 2005, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54). The NRC has established that, as part of the staff review of any nuclear power plant license renewal action, a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437, will be prepared under the provisions of 10 CFR Part 51, the NRC rules that implement the National Environmental Policy Act of 1969 (NEPA). In accordance with 36 CFR 800.8, the SEIS will include analyses of potential impacts to historic and cultural resources.

In the context of the National Historic Preservation Act of 1966, as amended, the NRC staff has determined that the area of potential effect (APE) for a license renewal action is the area at the power plant site and its immediate environs that may be impacted by post-license renewal land disturbing operations or projected refurbishment activities associated with the proposed action. The APE may extend beyond the immediate environs in those instances where post-license renewal land disturbing operations or projected refurbishment activities, specifically related to license renewal, may potentially have an effect on known or proposed historic sites. This determination is made irrespective of ownership or control of the lands of interest.

On July 28, 2005, the NRC will conduct two public NEPA scoping meetings at the Lake Michigan College, 125 Veterans Boulevard, South Haven, Michigan 49090. You and your staff are invited to attend. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is February 2006. If you have any questions or require additional information, please contact Mr. Robert Schaaf, Senior Environmental Project Manager, by phone at 301-415-1312 or by email at rgs@nrc.gov, or Ms. Cristina Guerrero, Project Support, by phone at 301-415-2981 or by e-mail at cxg3@nrc.gov.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-255

cc: See next page

Palisades Nuclear Plant

cc:

Robert A. Fenech, Senior Vice President
Nuclear, Fossil, and Hydro Operations
Consumers Energy Company
1945 Parnall Rd.
Jackson, MI 49201

Arunas T. Udrys, Esquire
Consumers Energy Company
1 Energy Plaza
Jackson, MI 49201

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Supervisor
Covert Township
P.O. Box 35
Covert, MI 49043

Office of the Governor
P.O. Box 30013
Lansing, MI 48909

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Palisades Plant
27782 Blue Star Memorial Highway
Covert, MI 49043

Michigan Department of Environmental Quality
Waste and Hazardous Materials Division
Hazardous Waste and Radiological Protection Section
Nuclear Facilities Unit
Constitution Hall, Lower-Level North
525 West Allegan Street
P.O. Box 30241
Lansing, MI 48909-7741

Special Litigation Division
525 West Ottawa St.
Sixth Floor, G. Mennen Williams Building
Lansing, MI 48913

Manager, Regulatory Affairs
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Director of Nuclear Assets
Consumers Energy Company
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Mr. Daniel J. Malone
Site Vice President
Palisades Nuclear Plant
27780 Blue Star Highway
Covert, MI 49043

Mr. Douglas F. Johnson
Director, Plant Life Cycle Issues
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

John Paul Cowan
Executive Vice President & Chief Nuclear Officer
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Jonathan Rogoff, Esquire
Vice President, Counsel & Secretary
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Michigan Department of Attorney General

-2-

Palisades Nuclear Plant

cc:

Douglas E. Cooper
Senior Vice President - Group Operations
Palisades Nuclear Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Robert A. Vincent
Licensing Lead - License Renewal Project
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Darrel G. Turner
License Renewal Project Manager
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Ms. Lois Bemis
South Haven Memorial Library
314 Broadway St.
South Haven, MI 49090

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 30, 2005

Mr. Craig Czarnecki
Field Supervisor
U.S. Fish and Wildlife Service
East Lansing Field Office
2651 Coolidge Road, Suite 101
East Lansing, MI 48823

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE PALISADES NUCLEAR PLANT LICENSE RENEWAL

Dear Mr. Czarnecki:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by Nuclear Management Company, LLC (NMC) for the renewal of the operating license for Palisades Nuclear Plant (Palisades). Palisades is located in Covert Township on the western side of Van Buren County, Michigan, and 50 miles west-southwest of Kalamazoo, Michigan. As part of the review of the license renewal application, the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) under the provisions of the National Environmental Policy Act (NEPA) of 1969, as amended, which include an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended, and the Fish and Wildlife Coordination Act of 1934, as amended.

The proposed action would include the use and continued maintenance of existing plant facilities and transmission lines and would not result in new construction or disturbance or change in operations. The area surrounding the Palisades property is characterized by agricultural lands and heavily wooded, rugged sand dunes along the Lake Michigan shoreline. Van Buren State Park is located on the northern border of the site.

Palisades uses an closed-cycle cooling system to dissipate waste heat to the environment. Cooling water is drawn from Lake Michigan through offshore, underwater intake cribs at an approximate water depth of 35 ft. After circulating through the condensers and cooling towers, the cooling water is discharged through two tunnels that end offshore with high-velocity underwater discharge elbows.

For the specific purpose of connecting Palisades to the regional transmission system, there is a Palisades-Argenta 345-kV line, which extends approximately 40 miles eastward from the Palisades Substation to the Argenta Substation near Plainwell, north of Kalamazoo, Michigan, and the initial 0.6 mile segment of the Palisades-Cook 345-kV line, transmission line corridors occupy approximately 2200 acres of land. These transmission line corridors are being evaluated as part of the SEIS process. The corridors pass through land that is primarily agricultural and forest land. The enclosed transmission line map shows the transmission

system that is being evaluated in the SEIS. The switchyards are shown in the enclosed Palisades site layout figure.

To support the SEIS preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of Palisades and its associated transmission lines. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

We plan to hold two public NEPA scoping meetings on July 28, 2005, at the Lake Michigan College, 125 Veterans Boulevard, South Haven, Michigan 49090. On July 26, 2005, we plan to conduct a site audit. You and your staff are invited to attend both the site audit and the public meetings. Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is February 2006.

If you have any questions concerning the NRC staff review of this license renewal application, please contact Mr. Robert Schaaf, Senior Environmental Project Manager, at 301-415-1312 or by e-mail at rgs@nrc.gov or Ms. Cristina Guerrero, Project Support, at 301-415-2981 or by e-mail at cxg3@nrc.gov.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-255

Enclosures: 1. Palisades Transmission Line Map
2. Palisades Site Layout

cc w/encls.: See next page

Palisades Nuclear Plant

cc:

Robert A. Fenech, Senior Vice President
Nuclear, Fossil, and Hydro Operations
Consumers Energy Company
1945 Parnall Rd.
Jackson, MI 49201

Arunas T. Udrys, Esquire
Consumers Energy Company
1 Energy Plaza
Jackson, MI 49201

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Supervisor
Covert Township
P.O. Box 35
Covert, MI 49043

Office of the Governor
P.O. Box 30013
Lansing, MI 48909

U.S. Nuclear Regulatory Commission
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Palisades Plant
27782 Blue Star Memorial Highway
Covert, MI 49043

Michigan Department of Environmental Quality
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Sixth Floor, G. Mennen Williams Building
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Manager, Regulatory Affairs
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

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Consumers Energy Company
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Mr. Daniel J. Malone
Site Vice President
Palisades Nuclear Plant
27780 Blue Star Highway
Covert, MI 49043

Mr. Douglas F. Johnson
Director, Plant Life Cycle Issues
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

John Paul Cowan
Executive Vice President & Chief Nuclear Officer
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Jonathan Rogoff, Esquire
Vice President, Counsel & Secretary
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Palisades Nuclear Plant

cc:

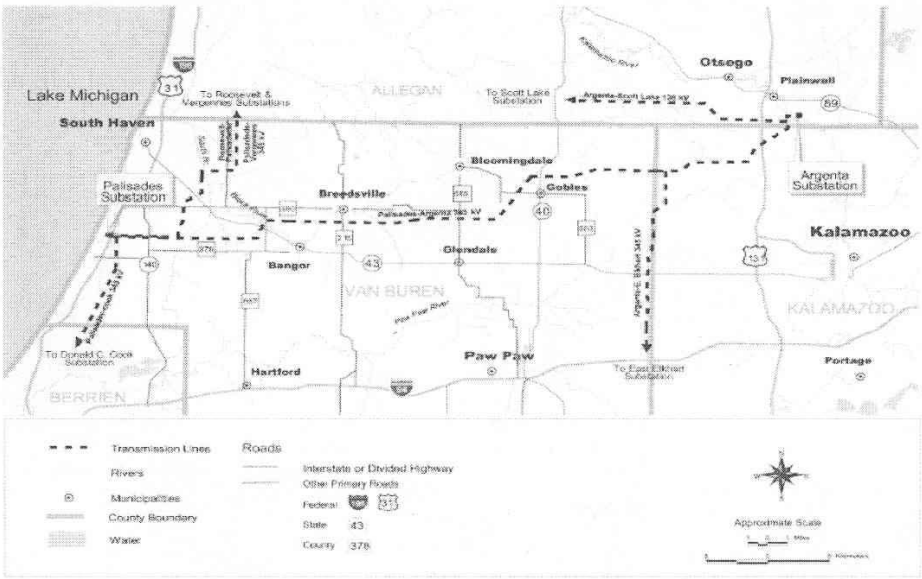
Douglas E. Cooper
Senior Vice President - Group Operations
Palisades Nuclear Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Robert A. Vincent
Licensing Lead - License Renewal Project
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Darrel G. Turner
License Renewal Project Manager
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

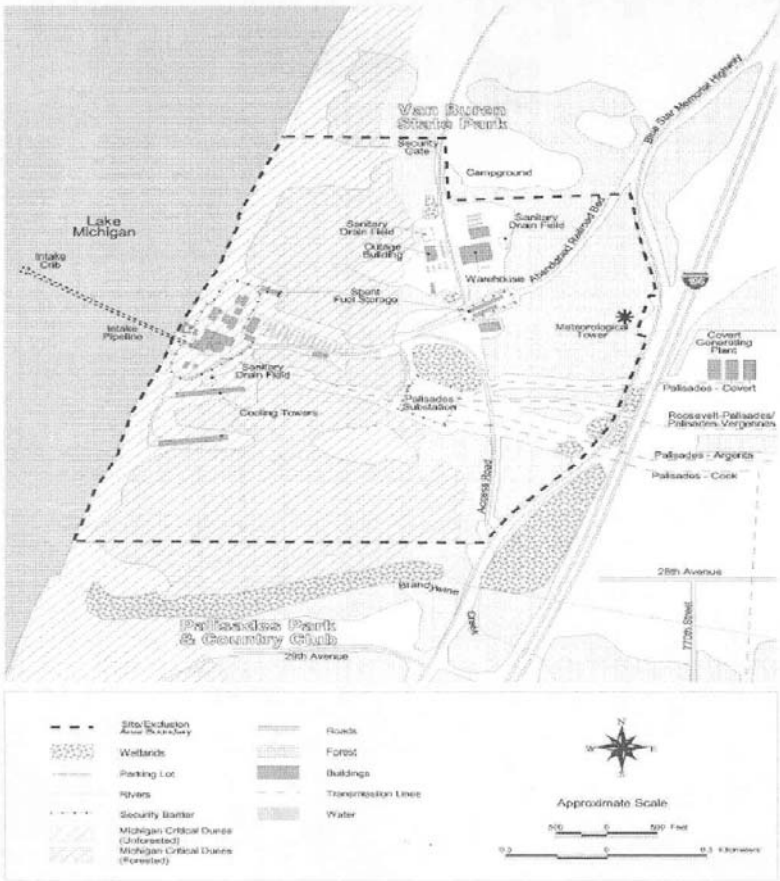
Ms. Lois Bemis
South Haven Memorial Library
314 Broadway St.
South Haven, MI 49090

FIGURE 3.1-1
TRANSMISSION LINES



Enclosure 1

FIGURE 2.1-3
SITE MAP



Enclosure 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 30, 2005

Mr. Don Klima, Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation
Old Post Office Building
1100 Pennsylvania Avenue, N.W., Suite 809
Washington, DC 20004

SUBJECT: PALISADES NUCLEAR PLANT LICENSE RENEWAL REVIEW

Dear Mr. Klima:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing an application to renew the operating licenses for the Palisades Nuclear Plant (Palisades), which is located in Covert Township on the western side of Van Buren County, Michigan. Palisades is operated by the Nuclear Management Company, LLC (NMC). The application for renewal was submitted by NMC on March 31, 2005, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54). The NRC has established that, as part of the staff review of any nuclear power plant license renewal request, a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437, will be prepared under the provisions of 10 CFR Part 51, which implements the National Environmental Policy Act of 1969 (NEPA). In accordance with 36 CFR 800.8, the SEIS will include analyses of potential impacts to historic and cultural resources. A draft SEIS is scheduled for publication in February of 2006, and will be provided to you for review and comment.

If you have any questions or require additional information, please contact Mr. Robert Schaaf, Senior Environmental Project Manager, by phone at 301-415-1312 or by email at rgs@nrc.gov, or Ms. Cristina Guerrero, Project Support, by phone at 301-415-2981 or by e-mail at cxg3@nrc.gov.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-255

cc: See next page

Palisades Nuclear Plant

cc:

Robert A. Fenech, Senior Vice President
Nuclear, Fossil, and Hydro Operations
Consumers Energy Company
1945 Parnall Rd.
Jackson, MI 49201

Arunas T. Udrys, Esquire
Consumers Energy Company
1 Energy Plaza
Jackson, MI 49201

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Supervisor
Covert Township
P.O. Box 35
Covert, MI 49043

Office of the Governor
P.O. Box 30013
Lansing, MI 48909

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Palisades Plant
27782 Blue Star Memorial Highway
Covert, MI 49043

Michigan Department of Environmental Quality
Waste and Hazardous Materials Division
Hazardous Waste and Radiological Protection Section
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Constitution Hall, Lower-Level North
525 West Allegan Street
P.O. Box 30241
Lansing, MI 48909-7741

Michigan Department of Attorney General
Special Litigation Division
525 West Ottawa St.
Sixth Floor, G. Mennen Williams Building
Lansing, MI 48913

Manager, Regulatory Affairs
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Director of Nuclear Assets
Consumers Energy Company
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Mr. Daniel J. Malone
Site Vice President
Palisades Nuclear Plant
27780 Blue Star Highway
Covert, MI 49043

Mr. Douglas F. Johnson
Director, Plant Life Cycle Issues
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

John Paul Cowan
Executive Vice President & Chief Nuclear Officer
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Jonathan Rogoff, Esquire
Vice President, Counsel & Secretary
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Palisades Nuclear Plant

cc:

Douglas E. Cooper
Senior Vice President - Group Operations
Palisades Nuclear Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Robert A. Vincent
Licensing Lead - License Renewal Project
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Darrel G. Turner
License Renewal Project Manager
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Ms. Lois Bemis
South Haven Memorial Library
314 Broadway St.
South Haven, MI 49090

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 13, 2005

The Honorable John A. Barrett, Jr., Chairperson
Citizen Potawatomi Nation
1601 South Gordon Cooper Drive
Shawnee, OK 74801

SUBJECT: REQUEST FOR COMMENTS CONCERNING PALISADES NUCLEAR PLANT APPLICATION FOR OPERATING LICENSE RENEWAL

Dear Chairperson Barrett:

The U.S. Nuclear Regulatory Commission (NRC) is seeking input for its environmental review of an application from the Nuclear Management Company, LLC (NMC) to renew the operating licenses for the Palisades Nuclear Plant (Palisades), located in Covert Township on the western side of Van Buren County, Michigan. Palisades is in close proximity to lands that may be of interest to the Citizen Potawatomi Nation. As described below, the NRC process includes an opportunity for public and inter-governmental participation in the environmental review. We want to ensure that you are aware of our efforts and, pursuant to Title 10 of the *Code of Federal Regulations* Part 51.28(b) (10 CFR 51.28(b)), the NRC invites the Citizen Potawatomi Nation to provide input to the scoping process relating to the NRC's environmental review of the application. In addition, as outlined in 36 CFR 800.8, the NRC plans to coordinate compliance with Section 106 of the National Historic Preservation Act of 1966 through the requirements of the National Environmental Policy Act of 1969.

Under NRC regulations, the original operating license for a nuclear power plant is issued for up to 40 years. The license may be renewed for up to an additional 20 years if NRC requirements are met. The current operating license for Palisades will expire in March 2011. NMC submitted its application for renewal of the Palisades operating license on March 31, 2005.

The NRC is gathering information for a Palisades-specific supplement to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), NUREG-1437. The supplement will contain the results of the review of the environmental impacts on the area surrounding the Palisades site that are related to terrestrial ecology, aquatic ecology, hydrology, cultural resources, and socioeconomic issues (among others) and will contain a recommendation regarding the environmental acceptability of the license renewal action. Provided for your information is the Palisades Site Layout (Enclosure 1) and Transmission Line Map (Enclosure 2).

The NRC will hold two public scoping meetings for the Palisades license renewal supplement to the GEIS on July 28, 2005, at the Lake Michigan College, 125 Veterans Boulevard, South Haven, Michigan 49090. There will be two sessions to accommodate interested parties. The first session will convene at 1:30 p.m. and will continue until 4:30 p.m., as necessary. The second session will convene at 7:00 p.m., with a repeat of the overview portions of the meeting, and will continue until 10:00 p.m., as necessary. Additionally, the NRC staff will host informal discussions one hour before the start of each session. To be considered, comments must be provided either at the transcribed public meetings or in writing. No formal comments on the proposed scope of the supplement to the GEIS will be accepted during informal discussions.

The application is electronically available for inspection from the NRC's Agencywide Documents Access and Management System (ADAMS) under Accession Number ML050940449. ADAMS is accessible at http://www.nrc.gov/reading-rm/adams.html. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 1-301-415-4737, or by e-mail at pdr@nrc.gov. In addition, the application can be viewed on the Internet at http://www.nrc.gov/reactors/operating/licensing/renewal/applications.html.

A paper copy of the application can be viewed at the NRC's PDR, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, 20855-2738. Copies will also be available at the South Haven Memorial Library, 314 Broadway St, South Haven, MI 49090. The GEIS, which assesses the scope and impact of environmental effects that would be associated with license renewal at any nuclear power plant site, can also be found on the NRC's Web site or at the NRC's PDR.

Please submit any written comments that the Citizen Potawatomi Nation may have to offer on the scope of the environmental review by August 22, 2005. Comments should be submitted by mail to the Chief, Rules and Directives Branch, Division of Administrative Services, Mail Stop T-6D59, U.S. Nuclear Regulatory Commission, Washington, D.C., 20555-0001. At the conclusion of the scoping process, the NRC staff will prepare a summary of the significant issues identified and the conclusions reached and will mail a copy to you.

The NRC will issue the draft supplemental environmental impact statement (SEIS) for public comment (anticipated publication date, February 2006), and will hold another set of public meetings in the site vicinity to solicit comments on the draft. A copy of the draft SEIS will be sent to you for your review and comment. After consideration of public comments received on the draft, the NRC will prepare a final SEIS. The issuance of the final SEIS for Palisades is planned for October 2006. If you need additional information regarding the environmental review process, please contact Mr. Robert Schaaf, Senior Environmental Project Manager, at 301-415-1312 or by e-mail at rgs@nrc.gov, or Ms. Cristina Guerrero, Project Support, at 301-415-2981 or by e-mail at cxg3@nrc.gov.

Sincerely,

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-255

Enclosures: 1. Palisades Site Layout
2. Palisades Transmission Line Map

cc w/encls.: See next page

Palisades Nuclear Plant

cc:

Robert A. Fenech, Senior Vice President
Nuclear, Fossil, and Hydro Operations
Consumers Energy Company
1945 Parnall Rd.
Jackson, MI 49201

Arunas T. Udrys, Esquire
Consumers Energy Company
1 Energy Plaza
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Manager, Regulatory Affairs
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Director of Nuclear Assets
Consumers Energy Company
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Paul A. Harden
Site Vice President
Palisades Nuclear Plant
27780 Blue Star Highway
Covert, MI 49043

Mr. Douglas F. Johnson
Director, Plant Life Cycle Issues
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

John Paul Cowan
Executive Vice President & Chief Nuclear Officer
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Jonathan Rogoff, Esquire
Vice President, Counsel & Secretary
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Palisades Nuclear Plant

cc:

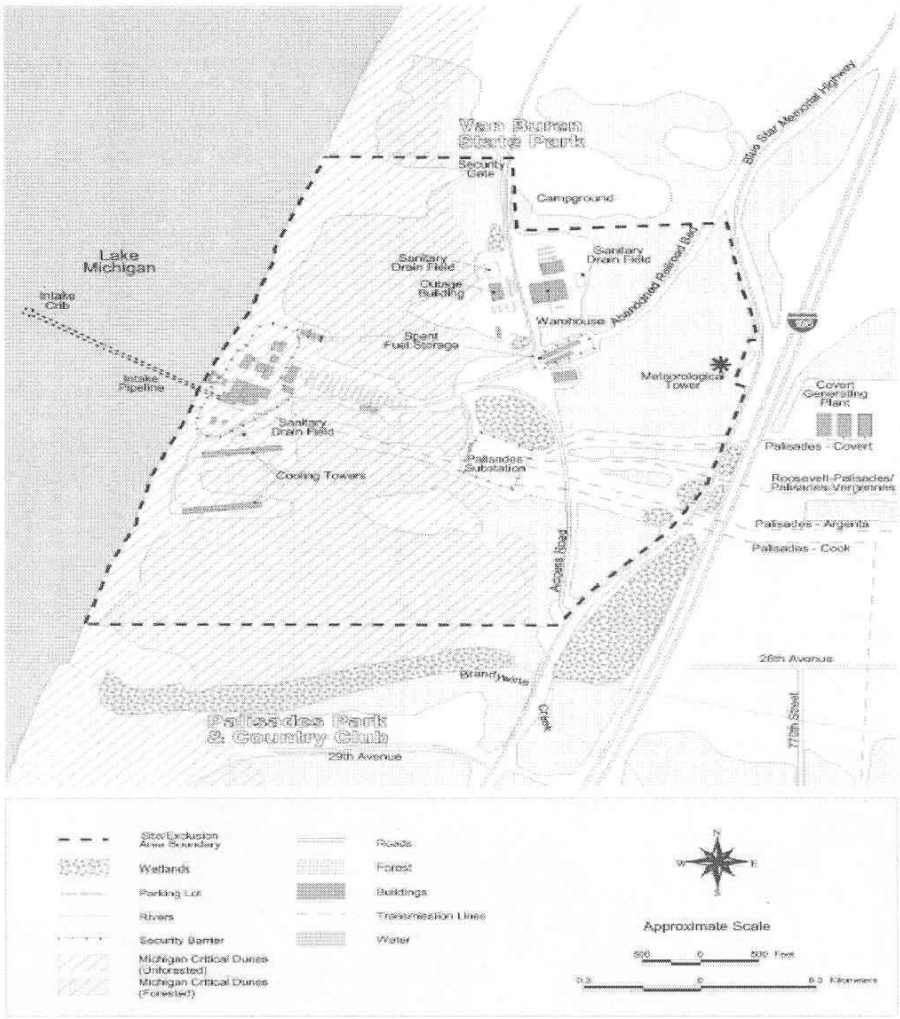
Douglas E. Cooper
Senior Vice President - Group Operations
Palisades Nuclear Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Robert A. Vincent
Licensing Lead - License Renewal Project
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Darrel G. Turner
License Renewal Project Manager
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

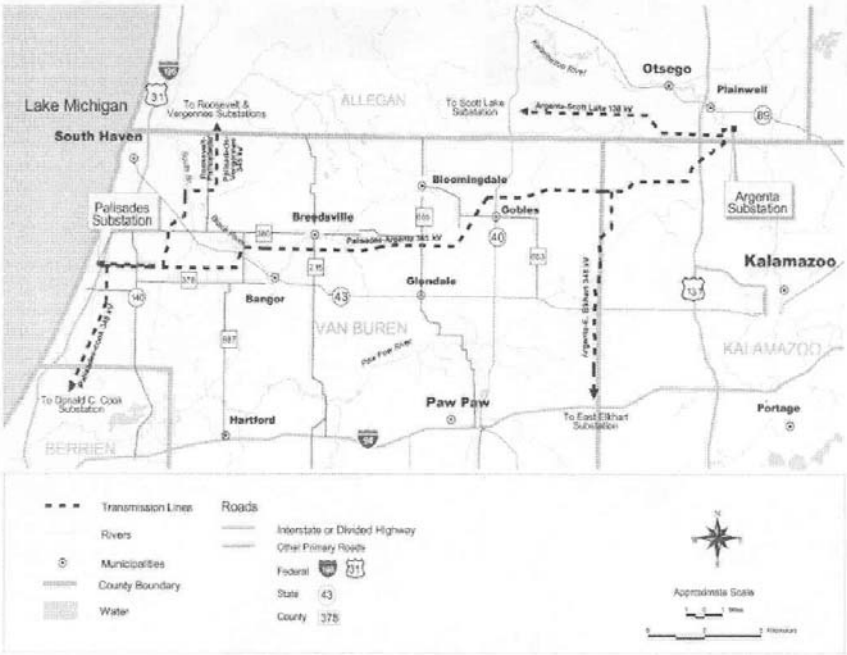
Ms. Lois Bemis
South Haven Memorial Library
314 Broadway St.
South Haven, MI 49090

FIGURE 2.1-3
SITE MAP



Enclosure 1

FIGURE 3.1-1
TRANSMISSION LINES



Enclosure 2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
East Lansing Field Office (ES)
2651 Coolidge Road, Suite 101
East Lansing, Michigan 48823-6316

IN REPLY REFER TO:

July 29, 2005

Mr. Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

Re: Endangered Species List Request, Proposed Palisades Nuclear Plant (Palisades) License Renewal Project, Allegan, Berrien, Kalamazoo, and Van Buren Counties, Michigan

Dear Mr. Kuo:

Thank you for your June 30, 2005 request for information regarding federally listed and proposed threatened and endangered species, candidate species, or critical habitat near your proposed project. Your request and this response are made pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act).

Based on your proposed project area and surrounding landscape, the possibility exists for the endangered Indiana bat (*Myotis sodalis*) to occur within suitable habitat near Palisades and its transmission lines. The summer range of Indiana bats in Michigan includes the southern half and most of the western coastal counties of the Lower Peninsula. Suitable Indiana bat habitat typically consists of highly variable forested landscapes in riparian, bottomland, and upland areas, and is composed of roosting trees with crevices or exfoliating bark.

Our records also indicate the following endangered species: Karner blue butterfly (*Lycaeides melissa samuelis*) and Mitchell's satyr butterfly (*Neonympha mitchelli mitchelli*), and threatened Pitcher's thistle (*Cirsium pitcheri*) may occur near Palisades or its associated transmission lines. The Karner blue butterfly may occur near the Argenta-E. Elkhart transmission line in Van Buren County; Mitchell's satyr butterfly may occur near the Palisades-Cook transmission line in Berrien County; and Pitcher's thistle may occur near the Palisades Substation in Van Buren County.

Karner blue butterfly is dependent on wild lupine (*Lupinus perennis*); it's only known larval food plant, grasses and nectar plants. These plants and its habitat occur in remnant barrens and oak savanna ecosystems, as well as other locations such as highway and powerline rights-of-way, gaps within forest stands, young forest stands, forest roads and trails, airports, and military bases. Mitchell's satyr butterflies

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C001

rely on wetland habitats characterized as fen communities, which are dominated by sedges (usually *Carex stricta*), with scattered deciduous and/or coniferous trees, most often tamarack, and red cedar. The Pitcher's thistle is endemic to the non-forested dunes of the western Great Lakes and requires active sand dune processes to maintain its early successional habitat. It is a perennial, herbaceous plant, which flowers once in its lifetime, generally after a five to eight year juvenile stage, after which it dies.

You should assess potential effects of future projects on these species. If you determine that implementation of any projects may affect these species, we recommend you conduct the appropriate habitat and species surveys to determine with certainty whether and where these species occur in relation to your project. The individual performing the survey must possess a current U. S. Fish & Wildlife Service permit specific to the surveyed species and use approved survey techniques. Depending on your assessment, the preparation of a biological assessment may be necessary to determine the potential effects, both direct and indirect, of any proposed action upon listed species or critical habitat, and initiate informal consultation with this office.

Please see Enclosure B for a discussion of the responsibilities of federal agencies under the Act and the conditions that require preparation of a biological assessment by the lead federal agency or its designee. We have provided information concerning the distribution, life history, and habitat requirements of the Indiana bat. This information may help you prepare a biological assessment for this project, should it require one. Additional species information may be located at the Michigan Natural Features Inventory website, http://web4.msue.msu.edu/mnfi/pub/abstracts.cfm.

Our records also indicate that a candidate species, eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*), may occur near Palisades and all its associated transmission lines. Eastern massasauga habitat is typically associated with open shallow wetland systems. The rattlesnake prefers habitat with open canopy and a sedge or grass ground cover. If early evaluation of your project indicates that it is likely to adversely impact a candidate, your agency may request technical assistance from this office. While the Act does not extend protection to candidate species, we encourage their consideration in resource planning. Avoidance of unnecessary impacts to candidate species will reduce the likelihood that they will require the protection of the Act in the future.

Section 7 of the Act requires federal agencies, or their designees, to consider impacts to federally listed threatened and endangered species for all federally funded, constructed, permitted, or licensed projects. Should the federal action agency determine that a listed species may be affected (adversely or beneficially) by the project, the action agency should request section 7 consultation with this office. Even if the determination is a "no effect", we would appreciate receiving a copy for our records. We are available to discuss the proposed action and assist you in analyzing potential effects of the action on the species.

Section 7(d) of the Act underscores the requirement that federal agencies or their designees shall not make any irreversible or irretrievable commitment of resources during the consultation period, which in effect would deny the formulation or implementation of reasonable alternatives regarding their actions on any endangered or threatened species. Therefore, in order to comply with the Act, we advise you not to finalize any construction plans until you assure protection of the species and conclude any requisite section 7 consultation with this office.

Since endangered species data changes continuously, we recommend you contact this office for an updated species list if more than six months passes prior to issuance of a permit for proposed activities. In addition, if the project requires modifications or new information becomes available that indicates the presence of listed species or species proposed for listing, or their critical habitat, you should consult with this office.

The Michigan Department of Natural Resources (MDNR) protects endangered and threatened species through Part 365, Endangered Species Protection, of the Natural Resources and Environmental Protection Act, 1994, P.A. 451. For a preliminary check of your project areas for any State natural resources issues, please refer to the MDNR Endangered Species Assessment website located at www.michigan.gov. Click on Online Services then scroll down to Business Online Services and select Endangered Species Assessment. Upon completing the website search, contact the Endangered Species Coordinator of the MDNR at (517) 373-3337 for information regarding the protection of threatened and endangered species under state law. State law requires a permit in advance of any work that could potentially damage, destroy, or displace state listed species.

The opportunity to provide comments is appreciated. Any questions should be directed to Burr Fisher of this office at 517/351-8286 or burr_fisher@fws.gov.

Sincerely,

Michael E. DeCapita

for Craig A. Czarnecki
Field Supervisor

Enclosures (2)

cc: MDNR, Wildlife Division, Lansing, MI (Attn: Todd Hogrefe) w/o enclosures
Kirk LaGory, Argonne National Laboratory, Argonne, IL w/o enclosures

g: admin/archives/july05/Consumers-PalisadesNuclearRelicense.bdf.doc

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO:

TAKE PRIDE IN AMERICA

May 15, 2006

ER 06/144

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TFR 9383
13

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RULES AND DIRECTIVES BRANCH USNRC

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

Dear Sir:

The U.S. Department of the Interior (Department) has reviewed the Generic Environmental Impact Statement (EIS) for License Renewal of Nuclear Plants, NUREG-1437, Draft Supplement 27 (dated February 2006), regarding the Palisades Nuclear Plant, Van Buren County, Michigan.

The license renewal does not involve any major construction or physical alteration of the project area. The Generic EIS and Draft Supplement 27 adequately address the concerns of the Department regarding fish and wildlife resources, as well as species protected by the Endangered Species Act. We concur with the preliminary conclusions of the U. S. Nuclear Regulatory Commission staff with respect to the impacts of continued operations on these resources and species. We have no comment on the adequacy of other resource discussions presented in the documents.

We appreciate the opportunity to provide these comments.

Sincerely,

Michael T. Chezik

Michael T. Chezik
Regional Environmental Office

cc:

L. MacLean, FWS, Fort Snelling, MN

ISP Review Complete
Template = ADM-013

E-RIDS = ADM-03
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C. Gruenes (cxg3)

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From: <Valincia_Darby@ios.doi.gov>

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Priority: Standard
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Security: Standard

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 26 2006

REPLY TO THE ATTENTION OF
B-19J

2/23/06
71FR9383
(14)

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RULES AND DIRECTIVES BRANCH

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, D.C. 20555-0001

Re: Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 27: Palisades Nuclear Plant, Van Buren County, Michigan, Draft Report, NUREG-1437, EIS No. 20060052

Dear Sir or Madam:

In accordance with Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) has reviewed the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 27 (SEIS): Palisades Nuclear Plant, which is a draft report. According to the SEIS, the operating license for Palisades Nuclear Plant will expire on March 24, 2011. The proposed Federal action would renew the current operating license for an additional 20 years.

The Nuclear Regulatory Commission (NRC) developed the Generic Environmental Impact Statement (GEIS) to streamline the license renewal process on the premise that environmental impacts of most nuclear power plant license renewals are similar, in most cases. NRC develops facility-specific SEISs for individual plants as the facilities apply for license renewal. EPA provided comments on the GEIS during its development process--for the draft version in 1992, and for the final version in 1996.

Palisades Nuclear Plant is located in Covert Township, Van Buren County, Michigan, on the southeastern shoreline of Lake Michigan. The plant has a single pressurized light-water reactor. The maximum authorized power level of its reactor is 2,565 megawatts thermal. The plant's current net summer capacity is 786 megawatts electric. The plant is refueled on an 18-month cycle. Palisades Nuclear Plant uses a closed-loop cooling system.

Based on our review of the Palisades Nuclear Plant draft SEIS, we have given the project an EC-2 rating. The "EC" means that we have environmental concerns with the proposed action, and the "2" means that additional information needs to be provided in the final SEIS. Our concerns relate to:

1. Adequacy and clarity of the information provided,

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Add = Bor Pham (BMP)
C. Guerrero (CKG3)

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2. Risk estimates,
3. Entrainment of fish and shellfish in early life stages, and
4. Threatened and endangered species.

We have enclosed our comments and the U.S. EPA rating system summary.

If you have any questions or wish to discuss any aspect of the comments, please contact Newton Ellens (for NEPA-related issues) at (312) 353-5562, or Michael Murphy (for radiation-related issues) at (312) 353-6686.

Sincerely,

Kenneth A. Westlake, Chief
NEPA Implementation Section
Office of Science, Ecosystems, and Communities

Enclosures.

U.S. Environmental Protection Agency Comments on
The U.S. Nuclear Regulatory Commission's Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 27: Palisades Nuclear Plant, Draft Report, NUREG-1437

General Comments:

The supplement to the Generic Environmental Impact Statement (GEIS) for Renewal of Nuclear Power Plant Licenses should be a Site Specific Environmental Impact Statement instead. This would follow after forty years of operation, with a forty year data collection history, and where site specific conditions could be utilized to provide a specific response to the Environmental Impact requirements instead of a generalized one.

Specific Comments:

1. Section 2.1.4.2, *Gaseous Waste Processing Systems and Effluent Controls*, Page 2-12, second paragraph. Citations of dose values should include the dose value, in addition to the citation, to make the values clearer.

2. Section 2.2.7, *Radiological Impacts*, pages 2-49, 2-50. The references to the environmental standards need to be more complete citations, including title of the rule or regulation along with the basic standard for comparison provided consistently. All of the environmental standards that could be used for comparison should be used, including 40 CFR 61 Radionuclide National Emission Standards for Hazardous Air Pollutants values. This will reduce the time needed to look up these citations and verify values that are cited in the text.

3. Section 2.2.7, *Radiological Impacts*, page 2-49. We are concerned about the level of information provided in the draft supplemental environmental impact statement (SEIS) on direct and cumulative radiological impacts. According to the draft SEIS, Nuclear Management Company, LLC (NMC), the applicant for the operating license, has conducted a radiological environmental monitoring program (REMP) around the Palisades site since 1971. Through this program, NMC has monitored and documented radiological impacts to workers, the public, and the environment. The draft SEIS states:

> The REMP includes monitoring of the waterborne environment (ground water, surface water, and sediments), ingestion pathways (milk, fish and vegetation), direct radiation (gamma dose at thermoluminescent dosimeter [TLD] locations), and atmospheric environment (airborne radioiodine, particulates, gross beta, and gamma). [Page 2-49]

The draft SEIS cites two annual reports which summarizes information from the REMP, but the draft SEIS does not contain this summary information itself. Summarized

quantitative information about radiation and exposure pathways in the environment is relevant in determining radiological impacts from the continued operation of Palisades. We are unable to make such a determination from the draft SEIS as it is written. In addition, the draft SEIS lacks a comprehensive assessment of cumulative radiological impacts, since it does not include quantitative information about the D.C. Cook Nuclear Plant, located about 28 miles south-southwest of Palisades on Lake Michigan's shores. Therefore, we suggest that the final SEIS include (1) current annual summary information from the REMP, and (2) a quantitative cumulative impact assessment of radiological impacts which accounts for impacts from the D.C. Cook Nuclear Plant.

4. Section 2.2.7, *Radiological Impacts*, pages 2-49, 2-50. Providing the estimated total effective dose equivalents (TEDE's) for comparisons helps in providing the public with additional assurances that doses are monitored and do meet the As Low As Reasonably Achievable (ALARA) principals of the U.S. Nuclear Regulatory Commission (NRC).

5. Section 4.2.2, *Electromagnetic Fields - Chronic Effects*, page 4-17. We commend NRC for providing the reference to the National Institute of Environmental Health Sciences results and recommendations on chronic exposures to electromagnetic fields. This will provide the public with valuable information on these types of exposures.

6. Section 4.8.3, *Cumulative Radiological Impacts*, page 4-38, 4-39. Information or procedures used to generate values to support the assertions in this section need to be provided in a clearer manner to reduce the possibility of misunderstandings and the reasoning on procedures to reach these conclusions.

7. Section 5.2.2, *Estimate of Risk*, page 5-6. It is stated that "The baseline core damage frequency (CDF) for the purpose of the SAMA [Severe Accident Mitigation Alternatives] evaluation is approximately 4.05×10^{-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 Palisades risk estimates; however it did account for the potential risk reduction benefits associated with external events by increasing the estimated benefits for internal events by a factor of two."

   The estimates for risks from both types of events should be evaluated and presented, along with a rationale for not basing risk decisions on the external events or including them in the considerations as necessary to get an accurate portrayal of the risk of the licensing renewal.

8. Section 6.1, *The Uranium Fuel Cycle*, page 6-3. Under the bullet point for <u>Off-site radiological impacts (individual effects from other than disposal of spent fuel and high level waste disposal)</u>, no consideration appears to be given to the potential long-term storage of the spent fuel and high-level waste materials on site until such time as a

permanent facility is finally licensed and begins to accept these materials for disposal. A reference to other sections that this evaluation may have been included in should be provided here as well as in other sections, or if this evaluation has not been adequately conducted, the issue needs to be considered and an appropriate evaluation conducted.

9. Section 6.1, *The Uranium Fuel Cycle*, page 6-8, under the bullet point for On-Site Spent Fuel. A more thorough evaluation for the volume of spent fuel expected to be generated during the additional licensed time needs to be provided, along with more specific information as to site specific circumstances that may impair or improve the risk values for potential exposures to this spent fuel storage.

10. Section 7.1, *Decommissioning*, page 7-2, under bullet point Radiation Doses. As the GEIS is based on a forty-year licensing period, an extension of this period would have an impact that needs to be quantified and reported. This information should have been included specifically in the draft SEIS as part of the risk that would be associated with the license extension. The specific methodology needs to be provided and explained.

11. Section 8.1, *No-Action Alternative*, page 8-5, under the bullet point Human Health. The actual value representing the cited percent value should be specifically provided in addition to the citation. This will reduce unnecessary additional research by readers, except for value verifications, and potential misunderstandings or confusion as to the actual value(s) being specified.

12. Section 8.2.1, *Coal-Fired Generation*, page 8-17, under bullet point Human Health. Any dose estimate that would have the potential to fall in the risk range of 10^{-6} to 10^{-4} or greater needs to be specifically evaluated for potential regulatory requirements or risk impacts to the public health. This should be estimated conservatively using the data that is currently available or that can be logically extrapolated from currently available information.

13. Section 8.2.3, *Nuclear Power Generation*, page 8-34. The changes in power production would provide a difference in potential risk to the public and needs to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination in this section of the document.

14. Section 8.2.3.1, *Closed -Cycle Cooling System*, page 8-39, under bullet point Waste. Waste impacts need to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination made in this section of the document.

15. Section 8.2.3.1, *Closed -Cycle Cooling System*, page 8-40, under bullet point Human Health. Human-health impacts need to be specified, rather than merely referenced, to provide a clearer understanding of the risk determination in this section of the document.

16. Section 2.1.4.1, *Liquid Waste Processing Systems and Effluent Controls*, Page 2-12. The draft SEIS does not provide quantitative details about the planned modification of the liquid radioactive waste processing system. The draft SEIS states that NMC is planning to replace the current system, which is based on evaporation, to a system using resins for ion exchange. The draft SEIS does not provide quantitative details about the estimated change in collection efficiency between the two systems. This information should be provided in the final SEIS.

17. Section 4.1, *Cooling System*, page 4-9. We are concerned about entrainment of fish and shellfish in early life stages. Under a U.S. EPA rule, codified in 40 C.F.R. § 125 (U.S. EPA Rule), Palisades Nuclear Plant is required to reduce its entrainment of fish and shellfish in early life stages. Under the U.S. EPA Rule, Palisades Nuclear Plant is required to choose one of five compliance alternatives to reduce entrainment, and the compliance alternative must meet a regulatory performance standard. We understand that Palisades will comply with the U.S. EPA rule through conditions in a NPDES permit issued by the Michigan Department of Environmental Quality. However, we believe that the project proponents should have a proposed compliance alternative and regulatory performance standard for Palisades, because the project proponents must assess the feasibility of complying with the rule. Listing this information would provide a comprehensive public disclosure of plans to reduce entrainment. Therefore, we request the project proponents to determine and disclose the proposed compliance alternative and performance standard that would most likely be proposed in the NPDES permit application for Palisades in the final SEIS.

18. Section 4.6, *Threatened and Endangered Species*, pages 4-32 to 4-35. We are concerned because the draft SEIS does not evaluate impacts on state-listed threatened and endangered species. The draft SEIS includes an evaluation of federal and state-listed threatened and endangered species in the study area. However, the draft SEIS only evaluates impacts to federal-listed threatened and endangered species. We believe that the final SEIS should include a more comprehensive evaluation of threatened and endangered species, by including an evaluation of impacts to state-listed species.

SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION*

Environmental Impact of the Action

LO-Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impacts. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Correctiv ures may require substantial changes to the preferred alternative or consideration of some other project alter ncluding the no action alternative or a new alternative). EPA intends to work with the lead agency to r hese impacts.

EU-Environmentally Unsatisfactory
The EPA review has identified advers ment l impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS sate, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1-Adequate
The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alterative and those of the alternatives reasonably available to the project or action. No further analysis or data collecting is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information
The draft EIS does not contain sufficient information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment

STATE OF MICHIGAN

JENNIFER GRANHOLM
GOVERNOR

DEPARTMENT OF HISTORY, ARTS AND LIBRARIES
LANSING

DR. WILLIAM ANDERSON
DIRECTOR

June 19, 2006

MR BO PHAM
U S NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON DC 20555-0001

RE: ER-05-249 Palisades Nuclear Power Plant License Renewal, Covert Township, Van Buren County (NRC)

Dear Mr. Pham:

Under the authority of Section 106 of the National Historic Preservation Act of 1966, as amended, we have reviewed the above-cited undertaking at the location noted above. With respect to archaeological resources, *Supplement 27: Regarding Palisades Nuclear Plant* to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* makes reference to a letter from Malone and Wawro to MacFarlane-Faes, dated February 11, 2005 (page 2-64). That letter outlines policies and procedures to be followed in the course of construction or modification activities or projects that will insure that archaeological resources are taken into account. It is our opinion that adherence to those policies and procedures will result in the renewal of the Palisades Nuclear Power Plant license having no effect on historic archaeological resources. Based on the information provided for our review, it is the opinion of the State Historic Preservation Officer (SHPO) that **no historic properties are affected** within the area of potential effects of this undertaking.

The views of the public are essential to informed decision making in the Section 106 process. Federal Agency Officials or their delegated authorities must plan to involve the public in a manner that reflects the nature and complexity of the undertaking, its effects on historic properties and other provisions per 36 CFR § 800.2(d). We remind you that Federal Agency Officials or their delegated authorities are required to consult with the appropriate Indian tribe and/or Tribal Historic Preservation Officer (THPO) when the undertaking may occur on or affect any historic properties on tribal lands. **In all cases**, whether the project occurs on tribal lands or not, Federal Agency Officials or their delegated authorities are also required to make a reasonable and good faith effort to identify any Indian tribes or Native Hawaiian organizations that might attach religious and cultural significance to historic properties in the area of potential effects and invite them to be consulting parties per 36 CFR § 800.2(c-f).

This letter evidences the U. S. Nuclear Regulatory Commission's compliance with 36 CFR § 800.4 "Identification of historic properties", and the fulfillment of the U. S. Nuclear Regulatory Commission's responsibility to notify the SHPO, as a consulting party in the Section 106 process, under 36 CFR § 800.4(d)(1) "No historic properties affected".

The State Historic Preservation Office is not the office of record for this undertaking. You are therefore asked to maintain a copy of this letter with your environmental review record for this undertaking. If the scope of work changes in any way, or if artifacts or bones are discovered, please notify this office immediately.

STATE HISTORIC PRESERVATION OFFICE, MICHIGAN HISTORICAL CENTER
702 WEST KALAMAZOO STREET • P.O. BOX 30740 • LANSING, MICHIGAN 48909-8240
(517) 373-1630
www.michigan.gov/hal

If you have any questions, please contact Brian Grennell, Environmental Review Specialist, at (517) 335-2721 or by email at ER@michigan.gov. **Please reference our project number in all communication with this office regarding this undertaking.** Thank you for this opportunity to review and comment, and for your cooperation.

Sincerely,

Martha MacFarlane Faes
Environmental Review Coordinator

for Brian D. Conway
State Historic Preservation Officer

MMF:DLA:BGG

Appendix F

GEIS Environmental Issues Not Applicable to Palisades Nuclear Plant

Appendix F

GEIS Environmental Issues Not Applicable to Palisades Nuclear Plant

Table F-1 lists those environmental issues listed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (NRC 1996, 1999)[(a)] and in Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 51), Subpart A, Appendix B, Table B-1, that are not applicable to Palisades Nuclear Plant (Palisades) because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to Palisades

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
SURFACE-WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Impacts of refurbishment on surface-water quality	1	3.4.1	No refurbishment is planned at Palisades.
Impacts of refurbishment on surface-water use	1	3.4.1	No refurbishment is planned at Palisades.
Altered salinity gradients	1	4.2.1.2.2	The Palisades cooling system does not discharge to an estuary.
Water-use conflicts (plants with once-through cooling systems)	1	4.2.1.3	Palisades does not use a once-through cooling system.
Water-use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	2	4.3.2.1	The Palisades cooling system does not use makeup water from a small river with low flow.

(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.

Table F.1 (contd)

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
AQUATIC ECOLOGY (FOR ALL PLANTS)			
Refurbishment	1	3.5	No refurbishment is planned at Palisades.
AQUATIC ECOLOGY (FOR PLANTS WITH ONCE-THROUGH AND COOLING POND HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	2	4.2.2.1.2 4.4.3	This issue is related to heat-dissipation systems that are not installed at Palisades.
Impingement of fish and shellfish	2	4.2.2.1.3 4.4.3	This issue is related to heat-dissipation systems that are not installed at Palisades.
Heat shock	2	4.2.2.1.4 4.4.3	This issue is related to heat-dissipation systems that are not installed at Palisades.
GROUNDWATER USE AND QUALITY			
Impacts of refurbishment on groundwater use and quality	1	3.4.2	No refurbishment is planned at Palisades.
Groundwater-use conflicts (potable and service water, and dewatering; plants that use >100 gpm)	2	4.8.1.1 4.8.2.1	Palisades uses <100 gpm of groundwater.
Groundwater-use conflicts (plants using cooling towers withdrawing makeup water from a small river)	2	4.8.1.3 4.4.2.1	The Palisades cooling system does not use makeup water from a small river.

Table F.1 (contd)

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
Groundwater-use conflicts (Ranney wells)	2	4.8.1.4	Palisades does not have or use Ranney wells.
Groundwater-quality degradation (Ranney wells)	1	4.8.2.2	Palisades does not have or use Ranney wells.
Groundwater-quality degradation (saltwater intrusion)	1	4.8.2.1	Palisades uses <100 gpm of groundwater and is not located near a saltwater body.
Groundwater-quality degradation (cooling ponds in salt marshes)	1	4.8.3	This issue is related to heat-dissipation systems that are not installed at Palisades.
Groundwater-quality degradation (cooling ponds at inland sites)	2	4.8.3	Palisades is not located at an inland site.
TERRESTRIAL RESOURCES			
Refurbishment impacts	2	3.6	No refurbishment is planned at Palisades.
Cooling-pond impacts on terrestrial resources	1	4.4.4	This issue is related to a heat-dissipation system that is not installed at Palisades.
AIR QUALITY			
Air quality during refurbishment (nonattainment and maintenance areas)	2	3.3	No refurbishment is planned at Palisades.

Table F.1 (contd)

ISSUE–10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
HUMAN HEALTH			
Radiation exposure to the public during refurbishment	1	3.8.1	No refurbishment is planned at Palisades.
Occupational radiation exposures during refurbishment	1	3.8.2	No refurbishment is planned at Palisades.
Microbial organisms (public health) (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river).	2	4.3.6	The Palisades cooling system does not discharge to a small river.
SOCIOECONOMICS			
Public services, education (refurbishment)	2	3.7.4.1	No refurbishment is planned at Palisades.
Offsite land use (refurbishment)	2	3.7.5	No refurbishment is planned at Palisades.
Aesthetic impacts (refurbishment)	1	3.7.8	No refurbishment is planned at Palisades.

F.1 References

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

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

Appendix G

NRC Staff Evaluation of Severe Accident Mitigation Alternatives (SAMAs) for Palisades Nuclear Plant in Support of License Renewal Application

Appendix G

NRC Staff Evaluation of Severe Accident Mitigation Alternatives (SAMAs) for Palisades Nuclear Plant in Support of License Renewal Application

Section 51.53(c)(3)(ii)(L) of Title 10 of the *Code of Federal Regulations* (10 CFR) requires that license renewal applicants consider alternatives to mitigate severe accidents if the U.S. Nuclear Regulatory Commission (NRC) staff has not previously evaluated severe accident mitigation alternatives (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 Palisades Nuclear Plant (Palisades); therefore, the remainder of Appendix G addresses those alternatives.

G.1 Introduction

Nuclear Management Company, LLC (NMC), submitted an assessment of SAMAs for Palisades as part of the Environmental Report (ER) (NMC 2005a). This assessment was based on the most recent Palisades Probabilistic Safety Assessment (PSA) 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 Palisades Individual Plant Examination (IPE) (Consumers Power 1993) and Individual Plant Examination of External Events (IPEEE) (Consumers Power 1995). In identifying and evaluating potential SAMAs, NMC considered SAMA candidates that addressed the major contributors to core damage frequency (CDF) and population dose at Palisades, as well as SAMA candidates for other operating plants that have submitted license renewal applications. NMC identified 23 potential SAMA candidates. The list was reduced to eight unique SAMA candidates by eliminating SAMAs that are not applicable at Palisades because of (1) design differences; (2) the required extensive changes that would involve implementation costs known to exceed any possible benefit; (3) the excessive dollar value associated with completely eliminating all internal and external event severe accident risk at Palisades, or (4) having only effects on systems with low risk significance based on the plant-specific PSA. NMC assessed the costs and benefits associated with each of the potential SAMAs and concluded that several of the candidate SAMAs evaluated would be cost-beneficial and warrant further review for potential implementation.

On the basis of a review of the SAMA assessment, the NRC issued a request for additional information (RAI) to NMC by letter dated August 24, 2005 (NRC 2005), and in a teleconference with NMC on November 10, 2005. Key questions concerned peer reviews of the PSA and the potential impact of unresolved peer review comments; major plant and modeling changes

incorporated within each evolution of the PSA model; source term and economic assumptions used in the Level 3 PSA; detailed information on some specific candidate SAMAs; and consideration of additional lower cost SAMAs. NMC submitted additional information by letters dated October 21, 2005 (NMC 2005b), and November 18, 2005 (NMC 2005c). In the responses, NMC provided summaries of PSA peer review comments and the resolution status of each; a summary of the major changes made to each PSA model version and resultant changes to dominant risk contributors to CDF; additional detail on source term and economic assumptions used in the Level 3 PSA; additional information regarding specific SAMAs; and a description of future plans for evaluating potentially cost-beneficial SAMAs. NMC's responses addressed the NRC staff's concerns and resulted in the identification of additional potentially cost-beneficial SAMAs.

An assessment of SAMAs for Palisades is presented below.

G.2 Estimate of Risk for Palisades

NMC's estimates of offsite risk at Palisades are summarized in Section G.2.1. The summary is followed by the NRC staff's review of NMC's risk estimates in Section G.2.2.

G.2.1 NMC's Risk Estimates

Two distinct analyses were combined to form the basis for the risk estimates used in the SAMA analysis: (1) the Palisades Level 1 and 2 PSA model, which is an updated version of the IPE (Consumers Power 1993), and (2) a supplemental analysis of offsite consequences and economic impacts (essentially a Level 3 PSA model) developed specifically for the SAMA analysis. The SAMA analysis was based on the most recent Palisades Level 1 and Level 2 PSA model available at the time of the ER, referred to as PSA version PSAR1c. The scope of the Palisades PSA does not include external events.

The baseline CDF for the purpose of the SAMA evaluation was approximately 4.05×10^{-5} per year. The CDF was based on the risk assessment for internally initiated events. NMC did not include the contribution from external events within the Palisades risk estimates; however, it did account for the potential risk reduction benefits associated with external events by doubling the estimated benefits for internal events. This is discussed further in Section G.6.2.

Table G-1 provides the breakdown of CDF by initiating event. As shown in this table, events initiated by loss of offsite power (LOOP), small break loss-of-coolant accidents (LOCAs), and steam generator tube rupture (SGTR) are the dominant contributors to CDF. The contribution of internal flooding to the CDF is approximately 1.0×10^{-7} per year (NMC 2005a).

Table G-1. Palisades Core Damage Frequency for Internal Events

Initiating Event	CDF (per year)	% Contribution to CDF
LOOP (including station blackout)	1.24×10^{-5}	31
Small break LOCA	1.02×10^{-5}	25
SGTR	6.06×10^{-6}	15
General transient with main condenser available	2.94×10^{-6}	7
Loss of instrument air	2.41×10^{-6}	6
Loss of service water	1.84×10^{-6}	5
Loss of main feedwater	9.07×10^{-7}	2
Loss of the main condenser	6.46×10^{-7}	2
Pressurizer safety valve spurious opening	4.08×10^{-7}	1
Other Initiators	2.69×10^{-6}	6
Total CDF (internal events)	4.05×10^{-5}	100[(a)]

(a) Total may not equal 100% because of rounding.

The Level 2 Palisades PSA model is based on the original 1993 IPE submittal. Subsequent to the IPE submittal, the containment event tree (CET) was updated to reflect improvements in the state of knowledge on severe accidents and the implementation of a plant modification to prevent early core relocation into the Palisades auxiliary building. The Level 2 PSA consists of a detailed CET to represent dependencies among phenomenological assumptions. The CET was quantified by a relatively detailed process involving the development of probability distributions for a number of key phenomena, along with point estimate values for other issues. The CET end states were grouped into release categories by magnitude and timing of the expected releases. The result of the Level 2 PSA was a set of release categories with their respective frequency and release characteristics. The results of the updated analysis for Palisades are provided in Table E.3-5 of the ER. The frequency of each release category was obtained from the quantification of the CET for each Level 1 accident sequence. The release characteristics were obtained from the results of accident analyses of representative sequences for each release category using the Modular Accident Analysis Program (MAAP) computer code.

The offsite consequences and economic impact analyses use the MACCS2 code to determine the offsite risk impacts on the surrounding environment and public. Inputs for this analysis include plant-specific and site-specific input values for core radionuclide inventory, source term and release characteristics, site meteorological data, projected population distribution (within a 50-mi radius) for the year 2031, emergency response evacuation modeling, and economic data. The core radionuclide inventory is based on Palisades plant-specific Oak Ridge Isotope

Generator (ORIGEN) calculations. In response to an RAI (NMC 2005b), NMC stated that the core inventory calculations were developed in response to Generic Letter (GL) 2003-01 concerning control room habitability (NRC 2003a) and represent best-estimate fuel cycle data for Palisades for 23 GWd/MTU, 18-month fuel cycles. The magnitude of the onsite impacts (in terms of cleanup and decontamination costs and occupational dose) is based on information provided in NUREG/BR-0184 (NRC 1997a).

In response to an RAI (NMC 2005b), NMC estimated the dose to the population within 50 mi of the Palisades site to be approximately 31.9 person-rem per year. The breakdown of the total population dose by containment release mode is summarized in Table G-2. Basemat failures and SGTRs dominate the population dose risk at Palisades.

Table G-2. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Population Dose (Person-rem[(a)] per year)	% Contribution
SGTR	7.6	23.9
Early containment failure	1.6	5
Intermediate containment failure	0	0
Late containment failure	0.3	0.9
Intact containment	0.6	1.9
Basemat failure	21.6	67.8
Containment isolation failure	0.2	0.6
Total population dose	31.9	100[(b)]

(a) One person-rem = 0.01 person-Sv.
(b) Total may not equal 100% because of rounding.

G.2.2 NRC Staff's Review of NMC's Risk Estimates

NMC's determination of offsite risk at Palisades is based on the following three major elements of analysis:

- The Level 1 and 2 risk models that form the bases for the 1993 IPE submittal (Consumers Power 1993) and the original and revised IPEEE submittals (Consumers Power 1995, 1996).

- The major modifications to the IPE model that have been incorporated into the Palisades PSA, and

- The MACCS2 analyses performed to translate fission product source terms and release frequencies from the Level 2 PSA model into offsite consequence measures.

Each of these analyses was reviewed to determine the acceptability of NMC's risk estimates for the SAMA analysis, as summarized below.

The Palisades PSA model evolved through several stages, starting with development of an initial Level 1 PSA model in 1982 to address the risk associated with failing to satisfy single failure design criteria with respect to the main steam isolation valves (MSIVs). This model was subsequently updated and submitted to NRC in 1993 in response to GL 88-20 (NRC 1988). Palisades has several atypical design features that can affect accident progression. Consequently, instead of relying on the results of previous Level 2 PSAs, plant-specific, detailed, deterministic evaluations were performed in support of the IPE submittal for the key severe accident phenomena. These evaluations included reviewing available experimental data, as well as creating a plant-specific version of MAAP, version 3.0B, referred to as CPMAAP.

The NRC staff's review of the Palisades IPE is described in an NRC report dated February 7, 1996 (NRC 1996). On the basis of a review of the IPE submittal and responses to RAIs, the NRC staff concluded that the IPE submittal met the intent of GL 88-20 (NRC 1988); that is, the IPE was of adequate quality to be used to look for design or operational vulnerabilities. The NRC staff, however, encouraged the licensee to improve the human reliability analysis "to make it a valuable tool for other applications."

Numerous revisions have been to the IPE model since its submittal. A comparison of internal events risk profiles between the IPE and the PSA used in the SAMA analysis indicates a decrease of approximately 1.0×10^{-5} per year in the total internal events CDF (from 5.07×10^{-5} per year in the IPE to 4.05×10^{-5} per year in PSAR1c). The PSA updates have involved the examination of plant operating logs, corrective action documents, out-of-service time histories for selected components, industry data, implemented plant modifications, model review comments, and suggested peer review changes. A summary listing of those changes that resulted in the greatest impact on the internal events CDF was provided in the ER (NMC 2005a) and further discussed in the response to an RAI (NMC 2005b). The major changes are summarized in Table G-3.

The CDF values for Palisades are comparable to the CDF values reported in the IPEs for other combustion engineering plants. Figure 11.6 of NUREG-1560 shows that the IPE-based total internal events CDF for combustion engineering plants ranges from approximately 1.0×10^{-5} per year to 2.0×10^{-4} per year, with an average CDF for the group of 7.0×10^{-5} per year (NRC 1997c). It is recognized that other plants have updated the values for CDF subsequent to the IPE submittals to reflect modeling and hardware changes. The current internal events CDF

Table G-3. Palisades PSA Historical Summary

PSA Version	Summary of Changes from Prior Version	CDF (per year)
IPE (1993)	IPE submittal	5.07×10^{-5}
PSAR1 (1999)	Moved the internal events CDF model from Set Equation Transformation System (SETS) to Systems Analysis Programs for Hands-On Integrated Reliability Evaluations (SAPHIRE)	5.95×10^{-5}
PSAR1a (2000)	Removed the auxiliary feedwater (AFW) alternate steam supply line to AFW pump P-8B from the model to reflect a plant modification	5.47×10^{-5}
	Updated the main steam line break and SGTR initiating event frequencies	
	Updated selected human error probabilities	
PSAR1b (2000)	Updated selected common cause failure logic for control and solenoid valves	6.18×10^{-5}
	Incorporated a plant modification that swapped the high-pressure air power supplies for motor control centers MCC-7 and MCC-8; added additional direct current (DC) bus faults and added certain DC demand failure modes	
	Set the summertime emergency diesel generator heating, ventilation, and air-conditioning system success criteria to True for all nominal baseline calculations	
	Eliminated the independent anticipated transient without scram (ATWS) event trees by transferring all event trees to a single ATWS event tree	
PSAR1b-modified (2001)	Corrected a conservative shutdown cooling heat exchanger modeling assumption	6.16×10^{-5}
PSAR1b-modified w/HELB (2002)	Updated the model to include main steam line breaks in the component cooling-water (CCW) rooms	6.24×10^{-5}
PSAR1c (SAMA; 2004)	Corrected diesel generator repair/recovery logic	4.05×10^{-5}
	Added modeling of failure of the primary coolant pump seals, inadvertent primary coolant system safety relief valve opening, and failure of the AFW flow control valves to close	
	Incorporated modifications to the plant recirculation actuation system and instrument air compressor	
	Removed modeling conservatism in the service-water header valve logic	

Table G-3. (contd)

PSA Version	Summary of Changes from Prior Version	CDF (per year)
PSAR1c (SAMA; 2004) (contd)	Modified modeling of fire protection system (FPS) makeup to AFW pump P-8C logic to include failure of condensate storage tank T-2; FPS logic to include reliance on traveling screens; condensate pump logic to include availability of both the gland seal condenser and air ejector after condenser rupture; CCW pumps P-52A, P-52B, and P-52C logic to include failures as a result of steam line breaks outside of containment; and MSIV autoclose logic for "containment high pressure" and "low steam generator pressure" to correctly account for steam line break and LOCA event initiators Updated common cause failure data	

results for Palisades are comparable to the updated estimates for other plants of similar vintage and characteristics.

The NRC staff considered the peer reviews performed for the Palisades PSA and the potential impact of the review findings on the SAMA evaluation. In the ER and in response to an RAI, NMC described the Combustion Engineering Owners Group (CEOG) Peer Review of the PSA. The CEOG peer review of the PSAR1a model resulted in 9 Level A comments (important and necessary to address before the next regular PSA update) and 50 Level B comments (important and necessary to address, but disposition may be deferred until the next PSA update). The resolution of the peer review comments is described in the ER (NMC 2005a) and in response to an RAI (NMC 2005b). All Level A and Level B comments have either been addressed in the PSAR1c model used for the SAMA analysis, or further evaluated and judged to have no significant impact on the SAMA evaluation.

Given that the Palisades PSA has been peer reviewed and the peer review findings have either been addressed or judged to have no impact on the SAMA evaluation, that NMC has satisfactorily addressed the NRC staff's questions regarding the PSA (NMC 2005b), and that the CDF falls within the range of contemporary CDFs for combustion engineering plants, the NRC staff concludes that the Level 1 PSA model is of sufficient quality to support the SAMA evaluation.

As indicated above, the current Palisades PSA does not include external events. In the absence of such an analysis, NMC used the Palisades IPEEE in the SAMA analysis to identify the highest risk accident sequences and the potential means of reducing the risk posed by those sequences, as discussed below.

NMC submitted an IPEEE by letter dated June 30, 1995 (Consumers Power 1995), in response to Supplement 4 of GL 88-20. NMC did not identify any fundamental weaknesses or vulnerabilities to severe accident risk in regard to the external events related to seismic, fire, or other external events. However, a number of areas were identified for improvement in both the seismic and fire areas and were subsequently addressed as discussed below. In a letter dated November 29, 1999, the NRC staff concluded that the Palisades IPEEE met the intent of Supplement 4 to GL 88-20, and that the licensee's IPEEE process is capable of identifying the most likely severe accidents and severe accident vulnerabilities (NRC 1999).

Palisades performed a relatively robust seismic analysis as part of the IPEEE. The seismic analysis utilized the existing plant PSA with event trees specifically developed to evaluate seismic events. The resulting seismic CDF was estimated as 8.88×10^{-6} per year (NMC 2005a), about 20 percent of the internal events CDF. While the seismic analysis did not identify any significant seismic concerns, several insights were gained about the most important equipment failures during and after seismic events. The IPEEE identified four groups of equipment that contributed most of the seismic CDF; specifically, the fire protection system (FPS), the MSIVs, the emergency diesel generator (EDG) fuel oil supply (storage tank T-10), and the bus under-voltage relay for safety bus 1D. NMC reviewed these groups to identify potential SAMAs. For three of these contributors, no additional SAMAs were identified. That is, (1) the FPS failures (and possible SAMAs) were already identified as important contributors to the Class 1A and 1B sequences from the internal events analysis; (2) given MSIV modeling more closely representing actual operation, MSIV seismic interactions would not be risk significant; and (3) since EDG fuel storage tank T-10 is not necessary to support a 24-hour mission duration, there is no measurable benefit to strengthening or replacing tank T-10. For the fourth contributor, NMC identified that the under-voltage relay for bus 1D was important to start the EDG, and a SAMA was added to the list of candidate SAMAs to replace this relay with one that is less susceptible to seismic activity (i.e., SAMA 22).

On the basis of consideration of important random failures in the Palisades seismic analysis, NMC also identified the importance of EDG 1-2 during a seismic event because it provides power to auxiliary feedwater (AFW) pump P-8C, which is the only AFW pump with a seismically durable water supply. Adding an electrical cross-tie to provide alternate power to this pump (SAMA 9), which had been identified to address internal initiating events based on the PSA results, was also identified as a plant improvement that would limit the impact of this random failure.

The IPEEE also found that some relays were vulnerable to seismic activity and that some equipment anchorage improvements were required. These were addressed as part of the closeout of unresolved safety issue (USI) A-46 (NRC 1997b), and all actions with respect to USI A-46 have now been completed. The NRC review and closure of USI A-46 for Palisades is documented in a letter dated September 25, 1998 (NRC 1998). Completion of the last item requiring resolution was documented in a letter to the NRC in June 2003 (NMC 2003).

Based on the licensee's IPEEE efforts to identify and address seismic outliers and their incorporation into the SAMA process, the NRC staff concludes that the opportunity for seismic-related SAMAs has been adequately explored.

A revised internal fire analysis for the Palisades IPEEE was submitted in Revision 1 of the IPEEE, dated May 31, 1996 (Consumers Power 1996). The internal fire analysis was revised as the Fire Protection Program and Appendix R analyses were in the process of being upgraded when the original IPEEE was submitted (Consumers Power 1995). The Palisades fire analysis was based on the Electric Power Research Institute's (EPRI's) fire-induced vulnerability evaluation (FIVE) methodology. The methodology employs a graduated focus on the most important fire zones using qualitative and quantitative screening criteria (EPRI 1992). The fire zones or compartments were subjected to at least two screening phases. In the first phase, a compartment was screened out if it was found to not contain any equipment or cables associated with safe shutdown or an initiating event. In the second phase, the licensee used the IPE model of internal events to estimate the CDF resulting from a fire initiating event. The conditional core damage probability associated with each fire compartment was based on the equipment and systems unaffected by the fire. The CDF for each compartment was obtained by multiplying the frequency of a fire in a given fire compartment by the conditional core damage probability associated with that fire compartment. The most important fire areas/rooms identified in Revision 1 of the IPEEE are the cable spreading room, the control room, the 1D switchgear room, the turbine building, and the 1C switchgear room. The resulting fire CDF was estimated as 3.31×10^{-5} per year (NMC 2005a), about 80 percent of the internal events CDF.

Revision 1 of the IPEEE fire document also provides a summary of the most important contributors to each of the accident classes. NMC used the event rankings within these categories to identify the largest contributors to risk and to identify additional SAMAs to prevent or mitigate the loss of functions represented by these events. For example:

- The contribution from failures to initiate once-through cooling following a successfully suppressed fire, failures of AFW pump P-8B, or random failures of the AFW system could all be mitigated by providing an alternate means of secondary heat removal. The installation of a direct drive diesel-driven injection pump (DDDIP) to back up the AFW system was identified by NMC to address these failures and was included as SAMA 3. The DDDIP also provides long-term steam generator makeup, assuming a portable generator is included.

- Failure to control AFW steam supply or injection could be mitigated by enhancing primary side cooling. The addition of another high-pressure injection (HPI) pump or the conversion of AFW pump P-8C back to a high-pressure safety injection (HPSI) pump was identified to address these failures and included as SAMA 4.

- Station blackout (SBO) sequences were identified as important contributors in the Level 1 model. A SAMA to proceduralize the use of a steam-driven AFW pump to operate without support systems was included to address these events (SAMA 10).

Each of these SAMAs had also been identified to address internal initiating events established on the basis of the PSA results.

The licensee noted that in the IPEEE fire analysis, operator action was required to manually open subcooling valves to the suction of the HPSI pumps after the recirculation actuation signal to ensure adequate HPSI net positive suction head, and that the alignment of these valves was subsequently automated. The hardware modification addressed the importance of the action to align the subcooling valves; accordingly, no additional SAMAs were suggested for this contributor.

On the basis of the licensee's IPEEE efforts to identify and address internal fire outliers and their incorporation into the SAMA process, the NRC staff concludes that the opportunity for internal fire-related SAMAs has been adequately explored.

Other external events considered in the IPEEE included high wind events, external flooding, transportation, and nearby facility accidents. The risk associated with these events is small, with the total CDF from other external events about 1.0×10^{-6} per year. The licensee reviewed the insights from previous assessments of these events performed as part of the NRC Systematic Evaluation Program and the IPEEE, and considered the potential for additional SAMAs to reduce these risks. A detailed discussion is provided in Section E.5.1.6 of the ER. NMC concluded that no further modifications would be cost-beneficial. It is noted that the risks from deliberate aircraft impacts were explicitly excluded since this was being considered in other forums along with other sources of sabotage.

In light of the external events CDF being approximately equal to the internal events CDF, NMC doubled the benefit that was derived from the internal events model to account for the contribution from external events. This doubling was not applied to the one SAMA that specifically addressed seismic risks (i.e., SAMA 22), since this SAMA is specific to only seismic risk and does not have a corresponding risk reduction in internal events. However, this doubling was applied to those SAMAs that addressed both fire or seismic and internal events (i.e., SAMAs 3, 4, 9, and 10), since these SAMAs do have a corresponding risk reduction in internal events. The fire risk analysis is described in the IPEEE and in the ER as producing conservative CDF results. While conservative assumptions were used for the majority of fire areas, other aspects of the analysis were considered to be optimistic (NRC 1999). Thus, the degree of conservatism in the result is not clear. Furthermore, the risks due to external events that are discussed above are the results of analyses that were performed at varying times prior to the current Palisades internal events PSA. The methodologies also vary in the degree of completeness and conservatism. Consequently, the results cannot be directly compared with

those from the current PSA. Not withstanding the above, the NRC staff agrees with the applicant's conclusion that the risk posed by external events is approximately equal to that due to internal events. Therefore, the NRC staff concludes that the applicant's use of a multiplier of 2 to account for external events is reasonable for the purposes of the SAMA evaluation.

The NRC staff reviewed the general process used by NMC to translate the results of the Level 1 PSA into containment releases, as well as the results of this Level 2 analysis. NMC characterized the releases for the spectrum of possible radionuclide release scenarios using a set of six release categories, defined on the basis of the timing and magnitude of the release. The frequency of each release category was obtained from the quantification of a linked Level 1-Level 2 model, which effectively evaluates a CET for each Level 1 accident sequence. Each end state from the Level 2 analysis is assigned to one of the release categories. The process for assigning accident sequences to the various release categories and selecting a representative accident sequence for each release category is described in the ER. The release categories and their frequencies are presented in Section E.2.5.5 of the ER (NMC 2005a), as are the source terms used for the SAMA evaluation based on the MAAP 3.0B computer code. The NRC staff concludes that the process used for determining the release category frequencies and source terms is reasonable and appropriate for the purposes of the SAMA analysis.

In response to an RAI (NMC 2005b), NMC identified that the core inventory used for the Palisades MACCS2 analysis was based on plant-specific data, and that fuel cycle parameters were best estimates and consistent with expected Palisades fuel cycles. The NRC staff concludes that the best plant-specific estimate provides a reasonable basis for estimating the reactor core radionuclide inventory in the consequence assessment.

The NRC staff reviewed the process NMC used to extend the containment performance (Level 2) portion of the PSA to an assessment of offsite consequences (essentially a Level 3 PSA). This included consideration of the major input assumptions used in the offsite consequence analyses. The MACCS2 code was utilized to estimate offsite consequences. Plant-specific input to the code includes the source terms for each release category and the reactor core radionuclide inventory (both discussed above), site-specific meteorological data, projected population distribution within a 50-mi radius for the year 2031, emergency evacuation modeling, and economic data. This information is provided in Appendix E of the ER (NMC 2005a).

NMC used a composite set of site-specific meteorological data obtained from the plant meteorological tower and the nearby Benton Harbor Ross Field National Weather Station (for hourly precipitation). The data were processed from hourly measurements for the 2000 calendar year as input to the MACCS2 code. The data for 2000 were nearly complete, missing only 4 hours of scattered data. Data from these locations and from this year were selected because they provided an adequate representation of the Palisades meteorological

data. Site meteorological data for 2001, 2002, and 2003 were also evaluated as sensitivity cases to ensure that the 2000 data composed a representative data set. Population dose and economic costs were only minimally impacted (less than 8 percent change) because of the use of different data sets. The meteorological data for 2000 were found to result in the highest population dose and economic costs, and were therefore chosen as the basis for the SAMA analysis. The NRC staff notes that previous SAMA analyses results have also shown little sensitivity to year-to-year differences in meteorological data and considers use of the 2000 data to be reasonable.

The population distribution that the applicant used as input to the MACCS2 analysis was estimated for 2031, based on extrapolation from U.S. Census population data for 1990 and 2000. U.S. Census data from 1990 and 2000 were used to determine a total annual average population growth rate (1.1 percent per year). It was assumed that the growth rate would remain the same as that reported between 1990 and 2000. The annual population growth was applied uniformly to all sectors to calculate the 2031 population distribution. A population sensitivity case was performed by using a 30 percent uniform increase in population for all sectors. The 30 percent population case showed about a 20 percent change in population dose and about a 50 percent change in cost risk. The NRC staff considers NMC's methods and assumptions for estimating population doses reasonable and acceptable for purposes of the SAMA evaluation.

The emergency evacuation model assumed a single evacuation zone extending out 10 mi from the plant. It was assumed that 95 percent of the population would move at an average speed of approximately 0.81 m/s with a delayed start time of 15 to 30 minutes (NMC 2005a). This assumption is conservative relative to the NUREG-1150 study (NRC 1990), which assumed evacuation of 99.5 percent of the population within the emergency planning zone. Two evacuation sensitivity cases were performed, one with an evacuation speed of 0.41 m/s (a factor of 2 decrease), and one with a 90-minute delay. The results demonstrated that the population dose and economic costs are relatively insensitive to this parameter. The evacuation assumptions and analysis are deemed reasonable and acceptable for the purposes of the SAMA evaluation.

Much of the site-specific economic data were provided from SECPOP2000 (NRC 2003b) by specifying the data for each of the counties surrounding the plant, to a distance of 50 mi. In addition, generic economic data that are applied to the region as a whole were revised from the MACCS2 sample problem input when better information was available. The agricultural economic data were updated using available data from the 1997 Census of Agriculture (USDA 1998). These included per diem living expenses, relocation costs, value of farm and nonfarm wealth, and fraction of farm wealth from improvements (e.g., buildings). In response to an RAI, NMC provided additional information on several economic parameter input values used in the MACCS2 calculations.

The NRC staff concludes that the methodology NMC used to estimate the offsite consequences for Palisades provides an acceptable basis from which to proceed with an assessment of risk reduction potential for candidate SAMAs. Accordingly, the NRC staff based its assessment of offsite risk on the CDF and offsite doses reported by NMC.

G.3 Potential Plant Improvements

The process for identifying potential plant improvements, an evaluation of that process, and the improvements evaluated in detail by NMC are discussed in this section.

G.3.1 Process for Identifying Potential Plant Improvements

NMC's process for identifying potential plant improvements (SAMAs) consisted of the following elements:

- Review of the most significant basic events from the Palisades PSAR1c Levels 1 and 2 PSA;
- Review of potentially cost-beneficial SAMAs from license renewal applications for six other U.S. nuclear sites;
- Review of potential plant improvements identified in the Palisades IPE and IPEEE; and
- Review of the dominant fire areas and seismic risk contributors, and SAMAs that could reduce the associated fire and seismic risk at Palisades.

To provide consistency with previous industry SAMA analyses and to provide a recognized source of ideas for the types of enhancements that could be proposed to address plant-specific insights, NMC also reviewed a generic list of 266 SAMAs developed from previous industry SAMA analyses.

On the basis of this process, an initial set of 23 candidate SAMAs, referred to as Phase 1 SAMAs, was identified. In Phase 2 of the evaluation, NMC performed a qualitative screening of the initial list of SAMAs and eliminated SAMAs from further consideration using the following criteria:

- The SAMA is not applicable at Palisades because of design differences;
- The SAMA requires extensive changes that would involve implementation costs known to exceed any possible benefit; or

- The SAMA costs more than $5.6 million to implement (the modified maximum averted cost-risk (MMACR), which represents the dollar value associated with completely eliminating all internal and external event severe accident risk at Palisades).

Based on this screening, 14 SAMAs were eliminated, leaving 9 for further evaluation. These remaining SAMAs, referred to as Phase 2 SAMAs, are listed in Table E.5-4 of the ER (NMC 2005a). During the initial stage of the Phase 2 evaluation, NMC qualitatively screened out one of the nine remaining SAMA candidates based on plant-specific insights regarding the low risk significance of systems affected by the SAMA (i.e., SAMA 17), bringing the number of remaining SAMAs to eight. A detailed cost-benefit analysis was performed for each of the eight remaining SAMA candidates. To account for the potential impact of external events, the estimated benefits based on internal events were multiplied by a factor of 2 (except for the SAMA specific to seismic risk, since this SAMA would not have a corresponding benefit on the risk from internal events).

NMC also assessed the impact on initial screening if the MMACR were based on a 3 percent discount rate rather than 7 percent, or if the MMACR were increased by a factor of 2.3 to reflect the potential impact of uncertainties. As a result, four additional SAMAs would have been retained for the Phase 2 analyses. These SAMAs are discussed further in Section G.6.2.

G.3.2 Review of NMC's Process

NMC's efforts to identify potential SAMAs focused primarily on areas associated with internal initiating events, but also included explicit consideration of SAMAs for seismic and fire events. The initial list of SAMAs generally addressed the accident sequences considered to be important to CDF and population dose from functional, initiating event, and risk reduction worth (RRW) perspectives at Palisades, and included selected SAMAs from other plants.

A preliminary review of NMC's SAMA identification process raised some concerns regarding the set of 23 SAMAs evaluated in the initial screening and how this set relates to the generic list of 266 SAMAs developed from industry sources. In response to an RAI, NMC clarified that the generic list of 266 SAMAs was used only as a source of ideas for the types of enhancements that could be proposed to address the plant-specific risk insights for Palisades (NMC 2005b).

In its ER (NMC 2005a), NMC provided a list of basic events ranked by RRW for both CDF (Level 1 PSA) and population dose (Level 2 PSA). For the Level 1 importance list, NMC considered all basic events with a RRW greater than 1.01. For the Level 2 importance list, NMC reviewed a composite file composed of those basic events representing the top 97 percent of all population doses and again considered all basic events with a RRW greater than 1.01. NMC correlated the top risk contributors to CDF and population dose with the SAMAs evaluated in the ER. The two tables provided basic event identifiers, RRW, and potential SAMAs for each basic event. Two events in the CDF importance list (Table E.5-1 of the ER) were estimated by the

NRC staff to have a very large risk achievement worth (e.g., RXC-MECH-FAULTS and RXC-ELEC-FAULTS). In the case of mechanical faults alone, the NRC staff estimated that an order-of-magnitude increase in the failure probability would increase the CDF to 6.8 x 10-5 per year. The NRC staff requested an NMC assessment of whether a SAMA is warranted to ensure that these subsystems do not degrade (NRC 2005). In its response, NMC agreed that there may be demonstrable value in assuring that there is no degradation in performance over time. However, given the significant routine testing that already is required by existing plant procedures, NMC stated that what would be considered appropriate as a SAMA has already been implemented at Palisades (NMC 2005b). On the basis of this information, the NRC staff concludes that the set of SAMAs evaluated in the ER addresses the major contributors to CDF and offsite dose, and that the review of the top risk contributors does not reveal any new SAMAs.

NMC identified Palisades-specific candidate SAMAs for seismic and fire events using a combination of the Palisades PSA models and insights from the IPEEE. As a result, one SAMA related specifically to seismic events was identified and retained for evaluation. Furthermore, four SAMAs already identified and retained for evaluation to address internal initiating events were also recognized as being effective in seismic and fire events. Potential plant enhancements for other external events (high wind events, external flooding and probable maximum precipitation events, and transportation and nearby facility accidents) were determined to be too costly, sufficiently addressed by existing plant features/capabilities, or already addressed by an existing SAMA. The NRC staff considers the applicant's rationale for eliminating these enhancements from further consideration to be reasonable.

The NRC staff questioned NMC about several candidate SAMAs that were identified as potentially cost-beneficial at other combustion engineering plants but not addressed by NMC (NRC 2005). In response, NMC provided an assessment of the applicability/feasibility of each of these enhancements and concluded that most of these SAMAs would not be warranted at Palisades because they are not applicable to Palisades, would not provide a significant benefit at Palisades, or are already addressed by existing SAMAs for Palisades (NMC 2005b,c). However, NMC determined that two of the NRC-staff-identified enhancements could be applicable to Palisades. These enhancements are as follows:

- Add the capability to flash the field on the EDG to enhance SBO recovery, and
- Replace an existing air-operated containment sump valve with a motor-operated valve to reduce common cause failures.

NMC did not provide a further assessment of these SAMAs as part of its response, but instead, indicated that these two SAMAs have been entered into the Palisades corrective action system for further review and, if determined to be cost-beneficial, they will be further evaluated for possible implementation in accordance with Palisades plant design processes (NMC 2005c).

The NRC staff requested further justification from NMC concerning the elimination of three SAMAs as part of the Phase 1 screening (NRC 2005). The qualitative arguments presented for eliminating these SAMAs were either incomplete, unclear, or unconvincing to the NRC staff. In its response to the RAIs, NMC provided further information (NMC 2005b). The NRC staff's concern and NMC's response for each of the three SAMAs are discussed below:

- SAMA 12 – automate boron injection for anticipated transient without scram (ATWS) conditions. NMC eliminated this SAMA because it is a boiling-water reactor mitigation feature that is not applicable to a pressurized-water reactor. The NRC staff then questioned why it was identified as a modification to the existing chemical volume control system injection system to reduce ATWS sequences. In its response, NMC noted that the basic events impacted by this SAMA were conservatively modeled in the PSA, thus artificially increasing their RRW importance measure. NMC reevaluated the RRWs, considering both updated reliability data and hardware changes made at Palisades in the 1990s, and showed that none of the basic events would be above the 1.01 RRW threshold for SAMA consideration. On the basis of this, SAMA 12 was screened from further consideration in the final evaluation.

- SAMA 19 – provide an HPI suction cross-tie to the opposite heat exchanger. This SAMA specifically addresses failures of the HPSI pump suction subcooling valves between the heat exchangers and the HPI pumps, and was eliminated by NMC because failure of these same valves is addressed by SAMA 17. The NRC staff questioned whether the two different sets of plant enhancements would accomplish the same effect since each of these SAMAs addresses different initiating events. In its response, NMC noted that the basic events impacted by this SAMA were conservatively modeled in the PSA, thus artificially increasing their RRW importance measure. NMC indicated that, if containment integrity is preserved, adequate net positive suction head is available regardless of the state of the two HPSI pump suction subcooling valves. Given that the conditional likelihood of containment failure is about 1×10^{-2}, the importance of these valve failures is actually much less than the current PSA model results. On the basis of this, SAMA 19 was screened from further consideration in the final evaluation.

- SAMA 20 – improve performance of the traveling screens. NRC eliminated this SAMA based on the assumption that existing plant procedures were adequate to prevent traveling screen failure. The NRC staff questioned whether this was a good assumption given the potential for human error during procedure implementation. In its response, NMC noted that the current analysis does not include a human error. NMC reevaluated the RRW by incorporating the impact of human error and showed that the event would be below the 1.01 RRW threshold for SAMA consideration. On the basis of this, SAMA 20 was screened from further consideration in the final evaluation.

The NRC staff considers the applicant's rationale for eliminating these three enhancements from further consideration to be reasonable.

On the basis of the initial screening, NMC eliminated SAMAs 1, 15, and 18 from further consideration because their implementation cost was estimated to exceed the MMACR. The NRC staff identified possible lower cost alternatives for these SAMAs and requested that NMC provide an evaluation of these alternatives (NRC 2005). In its response, NMC provided further information (NMC 2005b):

- SAMA 1 – This SAMA involves installing an additional EDG. The NRC staff questioned whether there were lower cost alternatives such as providing nonsafety-grade backup power from the gas turbine generating facility co-located near the Palisades Plant or installation of a nonsafety-grade diesel generator. NMC responded that it had previously looked into the possibility of an agreement with the gas facility to reduce plant risk from SBO events. However, the gas plant is operated as a peaking unit, is online only when there is a need for additional power, and does not have a black start capability. This alternative is therefore not considered feasible. Relative to the installation of a nonsafety-grade diesel generator, NMC noted that 87 percent of the CDF from LOOP events is associated with the dominant SBO scenario. While SAMA 1 was identified to address the broad category of LOOP events, SAMA 10 was developed as a mitigating strategy to deal specifically with the SBO scenario. NMC's position is that SAMA 10 is a lower cost alternative to the nonsafety-grade EDG and will provide a significant percentage of the expected benefit of SAMA 1. However, NMC did commit to conducting an evaluation to determine the potential risk reduction and cost benefit of installing a nonsafety-grade diesel generator as a lower cost alternative to an additional EDG, subsequent to the evaluation of SAMA 10, and has entered this action into the Palisades corrective action program for further review. If determined to be cost-beneficial, the lower cost alternative will be evaluated for possible implementation in accordance with Palisades plant design processes (NMC 2005c).

- SAMA 15 – This SAMA involves adding a bypass line around the safety injection and refueling water tank (SIRWT) return lines. Adding this line would increase the number of potential leakage paths for contaminated containment sump water back to the SIRWT during the recirculation phase of an accident. Because of the proximity of the SIRWT vent to the main control room heating, ventilation, and air-conditioning (HVAC) normal intakes, this SAMA would increase the control room dose consequences significantly during an accident, thereby requiring plant modifications to the control room HVAC if implemented. The NRC staff questioned whether there were lower cost alternatives that would eliminate the need to modify the main control room HVAC system, such as locking open one of the return line valves as an alternative to adding a bypass line. NMC responded that the recirculation line valves perform two distinct functions, and that they are required to be open during the injection phase and closed when the SIRWT level

falls to the low-low setpoint. Improving the probability of opening by locking open one of the valves would increase the probability of failure of the isolation function. Accordingly, locking open one valve is not considered a viable option. However, NMC also indicated that Palisades is currently in a study phase with respect to GL 2003-01 (NRC 2003a) and Generic Safety Issue 191 ("Assessment of Debris Accumulation on PWR Sump Performance"), in which the performance of these valves is being analyzed. Required actions in response to these issues will override any changes considered solely for SAMA. Based on this, SAMA 15 was screened from further consideration in the final evaluation.

- SAMA 18 – This SAMA involves installing a permanent, dedicated pump and line to the EDGs to serve as the primary EDG cooling source. The NRC staff questioned whether there were lower cost alternatives such as installing an additional line or temporary connection directly from the FPS and bypassing the service-water lines. NMC did not provide a further assessment of these SAMAs as part of its response, but instead committed to conducting an evaluation to identify a lower cost alternative, and has entered this action into the Palisades corrective action system program for further review. If determined to be cost-beneficial, the lower cost alternative will be evaluated for possible implementation in accordance with Palisades plant design processes (NMC 2005c).

The NRC staff considers NMC's rationale for eliminating SAMA 15 from further consideration to be reasonable, and NMC's commitment to further evaluate lower cost alternatives for SAMAs 1 and 18 through the Palisades corrective action program to be acceptable.

The NRC staff notes that the set of SAMAs submitted is not all inclusive, since additional, possibly even less expensive, design alternatives can always be postulated. However, the NRC staff concludes that the benefits of any additional modifications are unlikely to exceed the benefits of the modifications evaluated and that the alternative improvements would not likely cost less than the least expensive alternatives evaluated, when the subsidiary costs associated with maintenance, procedures, and training are considered.

The NRC staff concludes that NMC used a systematic and comprehensive process for identifying potential plant improvements for Palisades, and that the set of potential plant improvements identified by NMC is reasonably comprehensive and therefore acceptable. This process included reviewing insights from the plant-specific risk studies, reviewing plant improvements considered in previous SAMA analyses, and using the knowledge and experience of its PSA personnel.

G.4 Risk Reduction Potential of Plant Improvements

NMC evaluated the risk reduction potential of the eight remaining SAMAs that were applicable to Palisades. Most 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 and are conservative.

NMC used model requantification to determine the potential benefits. The CDF and population dose reductions were estimated using Palisades PSA model PSAR1c. The changes made to the model to quantify the impact of SAMAs are detailed in Section E.6 of Attachment E to the ER (NMC 2005a) and in response to an RAI (NMC 2005b). Table G-4 lists the assumptions considered to estimate the risk reduction for each of the evaluated SAMAs, the estimated risk reduction in terms of percent reduction in CDF and population dose, and the estimated total benefit (present value) of the averted risk based on a 7 percent and a 3 percent discount rate. This analysis methodology was also used for the three SAMAs (SAMAs 3, 4, and 10) that were originally identified and retained for evaluation to address internal initiating events, but that were also recognized as being effective in fire events. The determination of the benefits for the various SAMAs is further discussed in Section G.6.

For the one SAMA that specifically addresses seismic events only (SAMA 22), the reduction in CDF and population dose was not directly calculated. For this SAMA, a bounding estimate of the impact of the SAMA was made by assuming that the contribution to risk from external events is approximately equal to that from internal events, that seismic events contribute 21 percent of the external events risk, and that 69 percent of the seismic risk could potentially be eliminated by this SAMA based on information from the IPEEE.

The NRC 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 NRC staff based its estimates of averted risk for the various SAMAs on NMC's risk reduction estimates.

G.5 Cost Impacts of Candidate Plant Improvements

NMC estimated the costs of implementing the remaining candidate SAMAs through the application of engineering judgment, use of estimates from other licensees' submittals for similar improvements, and development of site-specific cost estimates. The cost estimates conservatively did not include the cost of replacement power during extended outages required to implement the modifications, nor did they include contingency costs associated with unforeseen implementation obstacles (NMC 2005b). Estimates were presented in terms of dollar values at the time of implementation or estimation and were not adjusted to present-day

Table G-4. SAMA Cost-Benefit Screening Analysis for Palisades

SAMA[a]	Assumptions	% Risk Reduction		Total Benefit Using 7% Discount Rate ($)	Total Benefit Using 3% Discount Rate ($)	Cost ($)
		CDF	Population Dose			
3. Install a direct drive diesel-driven injection pump (DDDIP). Reduces the risk of station blackout (SBO) scenarios by providing an injection method to supplement the turbine-driven auxiliary feedwater (AFW) pump.	Reduced the existing AFW pump failure probabilities by factors ranging from 7 to 19 to simulate the addition of a DDDIP. Also eliminated common cause failures and random system failures to represent the independence of the DDDIP.	15	14	793,000	1,050,000	1,100,000
4. Install an additional high-pressure injection (HPI) pump. Increases HPI diversity and reduces the probability of requiring reactor pressure valve (RPV) depressurization early in an accident.	Reduced the “A” train pump and valve failure rates to reflect the installation of the additional pump and the fact that only one pump train of three is required for success. Modeled by squaring each of the independent failure probabilities of the “A” train, which ranged originally from 2.5E-07 to 2.6E-03. Also reduced the common cause failure term by an order of magnitude.	3	1	85,400	108,000	1,620,000

Table G-4. (contd)

SAMA[a]	Assumptions	% Risk Reduction CDF	% Risk Reduction Population Dose	Total Benefit Using 7% Discount Rate ($)	Total Benefit Using 3% Discount Rate ($)	Cost ($)
10. Modify the turbine-driven AFW train so that it can operate indefinitely without alternating current (AC), direct current (DC), or pneumatic support.	**Eliminated all AC power recovery failures to simulate the indefinite operation of the turbine-driven AFW pump.**	**27**	**33**	**1,750,000**	**2,340,000**	**200,000**
13. Provide a nitrogen station that would automatically provide a backup air supply to the CV-2010 valve. Reduces the importance of Loss of Instrument Air to the valve.	**Assumed a failure probability of 1E-02 for the nitrogen station.**	**5.2**	**4.4**	**262,000**	**346,100**	**220,000**
14. Enhance the main control room to include controls for the cross-tie between the service-water system and the fire protection system. Reduces the time required to establish the cross-tie.	Eliminated seal loss-of-coolant accidents (LOCAs) that would occur on loss of seal cooling.	5	7	344,000	463,000	2,900,000

Table G-4. (contd)

SAMA[a]	Assumptions	% Risk Reduction CDF	% Risk Reduction Population Dose	Total Benefit Using 7% Discount Rate ($)	Total Benefit Using 3% Discount Rate ($)	Cost ($)
16. Install new insulation and lagging on the emergency diesel generator (EDG) exhaust ducts inside the EDG rooms and make procedural changes to align alternate room cooling.	**Eliminated the EDG room cooling recovery event.**	**4**	**4**	**237,000**	**316,000**	**160,000**
22. Replace the under-voltage relays for EDGs 1-1 and 1-2 with seismically qualified relays.	**Eliminated all Class IA and IB external events.**	**15**	**15**	**414,000**	**550,000**	**110,000**
23. Make procedural changes to direct the cooldown of the primary coolant pump (PCP) seals on loss of PCP seal cooling.	**Eliminated seal LOCAs that would occur on loss of seal cooling.**	**5**	**7**	**344,000**	**463,000**	**100,000**

(a) SAMAs in bold are potentially cost-beneficial when either a 7 percent or 3 percent real discount rate is used in the NRC staff's analysis.

dollars. For some of the SAMAs considered, so little, if any, benefit would be obtained from implementation of the proposed enhancement that it was not necessary to develop a cost estimate.

The NRC staff reviewed the bases for the applicant's cost estimates (as presented in Section E.6 of Appendix E of the ER and in a response by NMC to an RAI (NMC 2005b)). For certain improvements, the NRC staff 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 NRC staff reviewed the costs and found them to be consistent with estimates provided in support of other plants' analyses.

The NRC staff questioned the applicant about the cost estimate for SAMA 21 and the use of the FPS as backup for the containment spray system. In the ER, the implementation cost for this SAMA is estimated to be $7,000,000. A similar SAMA at Brunswick was estimated to cost only $100,000. In response to an RAI, NMC provided a detailed breakdown of how the site-specific cost estimate was derived and noted that the Brunswick SAMA is for a procedural change, while SAMA 21 is a major plant modification (NMC 2005b). On the basis of a review of this additional information, the NRC staff considers the cost estimate for SAMA 21 to be reasonable.

The NRC staff concludes that the cost estimates provided by NMC are sufficient and appropriate for use in the SAMA evaluation.

G.6 Cost-Benefit Comparison

NMC's cost-benefit analysis and the NRC staff's review are described in the following sections.

G.6.1 NMC Evaluation

The methodology used by NMC was based primarily on NRC's guidance for performing cost-benefit analysis, that is, NUREG/BR-0184, *Regulatory Analysis Technical Evaluation Handbook* (NRC 1997a). The guidance involves determining the net value for each SAMA according to the following formula:

$$\text{Net Value} = (\text{APE} + \text{AOC} + \text{AOE} + \text{AOSC}) - \text{COE}$$

where,

APE = present value of averted public exposure ($),
AOC = present value of averted offsite property damage costs ($),
AOE = present value of averted occupational exposure costs ($),

AOSC = present value of averted onsite costs ($), and
COE = cost of enhancement ($).

If the net value of a SAMA is negative, the cost of implementing the SAMA is larger than the benefit associated with the SAMA and it is not considered cost-beneficial. NMC's derivation of each of the associated costs is summarized below.

NUREG/BR-0058 has recently been revised to reflect the agency's revised policy on discount rates. Revision 4 of NUREG/BR-0058 states that two sets of estimates should be developed: one at 3 percent and one at 7 percent (NRC 2004). NMC provided both sets of estimates (NMC 2005a).

Averted Public Exposure (APE) Costs

The APE costs were calculated using the following formula:

APE = Annual reduction in public exposure (Δ person-rem/year)
x monetary equivalent of unit dose ($2000 per person-rem)
x present value conversion factor (10.76 based on a 20-year period with a 7 percent discount rate).

As stated in NUREG/BR-0184 (NRC 1997a), it is important to note that the monetary value of the public health risk after discounting does not represent the expected reduction in public health risk due to a single accident. Rather, it is the present value of a stream of potential losses extending over the remaining lifetime (in this case, the renewal period) of the facility. Thus, it reflects the expected annual loss due to a single accident, the possibility that such an accident could occur at any time over the renewal period, and the effect of discounting these potential future losses to present value. NMC calculated an APE of approximately $688,000 for the 20-year license renewal period, which assumes elimination of all severe accidents.

Averted Offsite Property Damage Costs (AOC)

The AOCs were calculated using the following formula:

AOC = Annual CDF reduction
x offsite economic costs associated with a severe accident (on a per-event basis)
x present value conversion factor.

For the purposes of initial screening, which assumes all severe accidents are eliminated, NMC calculated an annual offsite economic risk of about $125,000 based on the Level 3 risk analysis. This results in a discounted value of approximately $1,345,000 for the 20-year license renewal period.

Averted Occupational Exposure (AOE) Costs

The AOE costs were calculated by using the following formula:

AOE = Annual CDF reduction
x occupational exposure per core damage event
x monetary equivalent of unit dose
x present value conversion factor.

NMC derived the values for averted occupational exposure from information provided in Section 5.7.3 of the regulatory analysis handbook (NRC 1997a). Best estimate values provided for immediate occupational dose (3300 person-rem) and long-term occupational dose (20,000 person-rem over a 10-year cleanup period) were used. The present value of these doses was calculated by using the equations provided in the handbook in conjunction with a monetary equivalent of unit dose of $2000 per person-rem, a real discount rate of 7 percent, and a time period of 20 years to represent the license renewal period. For the purposes of initial screening, NMC calculated an AOE of approximately $15,400 for the 20-year license renewal period, which assumes all severe accidents are eliminated.

Averted Onsite Costs

The AOSC include averted cleanup and decontamination costs and averted power replacement costs. Repair and refurbishment costs are considered for recoverable accidents only and not for severe accidents. NMC derived the values for AOSC based on information provided in Section 5.7.6 of the regulatory analysis handbook (NRC 1997a).

NMC divided this cost element into two parts: the Onsite Cleanup and Decontamination Cost, also commonly referred to as averted cleanup and decontamination costs, and the Replacement Power Cost.

Averted cleanup and decontamination costs (ACC) were calculated using the following formula:

ACC = Annual CDF reduction
x present value of cleanup costs per core damage event
x present value conversion factor.

The total cost of cleanup and decontamination subsequent to a severe accident is estimated in the regulatory analysis handbook to be $\$1.5 \times 10^9$ (undiscounted). This value was converted to present costs over a 10-year cleanup period and integrated over the term of the proposed license extension. For the purposes of initial screening, which assumes all severe accidents are eliminated, NMC calculated an ACC of approximately $479,000 for the 20-year license renewal period.

Long-term replacement power costs (RPC) were calculated using the following formula:

RPC = Annual CDF reduction
x present value of replacement power for a single event
x factor to account for remaining service years for which replacement power is required
x reactor power scaling factor

NMC based its calculations on the value of 816 megawatts electric (MW(e)). Therefore, NMC applied a power scaling factor of 816 MW(e)/910 MW(e) to determine the replacement power costs. NMC calculated an RPC of approximately $287,000 for the 20-year license renewal period, which assumes all severe accidents are eliminated.

For the purposes of initial screening, which assumes all severe accidents are eliminated, NMC calculated an AOSC of approximately $766,000 for the 20-year license renewal period.

Using the above equations, NMC estimated the total present dollar value equivalent associated with completely eliminating all severe accidents at Palisades to be about $2,814,000. To account for additional risk reduction in external events, NMC doubled this value to $5,630,000, which is the MMACR and represents the dollar value of completely eliminating all internal and external event severe accident risk at Palisades.

NMC's Results

If the implementation costs for a candidate SAMA were greater than the MMACR of $5,630,000, then the SAMA was screened from further consideration. A more refined look at the costs and benefits was performed for the remaining SAMAs. If the expected cost for those SAMAs exceeded the calculated benefit, the SAMA was considered not to be cost-beneficial. The cost-benefit results for the individual analysis of the SAMA candidates are presented in Table G-4. In the baseline analyses contained in the ER (using a 7 percent discount rate), NMC identified five potentially cost-beneficial SAMAs. Based on an analysis using a 3 percent discount rate, as recommended in NUREG/BR-0058 (NRC 2004), no additional SAMA candidates were determined to be potentially cost-beneficial. The potentially cost-beneficial SAMAs are:

- SAMA 10 – modify the turbine-driven AFW so that it can operate indefinitely without AC, DC, or pneumatic support. This SAMA involves a procedural revision and analysis to direct AFW flow adjustments based on decay heat level so that the steam generator level can be maintained when instrumentation fails on DC power depletion.

- SAMA 13 – add a nitrogen station. This SAMA involves the use of a nitrogen station to automatically provide backup air supply for critical instrumentation and reduce the importance of loss of instrument air.

- SAMA 16 – add insulation to the EDG exhaust ducts. This SAMA involves insulating the EDG exhaust ducts and making procedural modifications to prevent overheating of EDG engines.

- SAMA 22 – replace under-voltage relays with a seismically qualified model. This SAMA involves replacing relays to reduce the likelihood of failure of automatic start of the EDGs and to reduce the contributions from loss of power due to the relays.

- SAMA 23 – modify procedures for primary coolant system cooldown and provide associated training. This SAMA involves procedural modifications to reduce the probability of reactor coolant pump seal failures related to long-term high-temperature exposure after recovery of component cooling water.

NMC performed additional analyses to evaluate the impact of parameter choices and uncertainties on the results of the SAMA assessment (NMC 2005a). NMC considered the impact of analysis uncertainties on the results of the SAMA analysis by increasing the benefits by a factor of 2.3. The result of the analysis is that one additional Phase 2 SAMA candidate was determined to be potentially cost-beneficial:

- SAMA 3 – add a DDDIP. This SAMA involves installing a non-safety-related DDDIP to supplement the turbine-driven AFW pump and reduce the risk of SBO scenarios.

In the ER, NMC stated that it will implement or continue to consider the above six SAMAs identified in the analysis (SAMAs 3, 10, 13, 16, 22, and 23) through the appropriate Palisades design process.

In response to RAIs by the NRC staff, NMC committed to further evaluate possible lower cost alternatives for two SAMAs originally eliminated in the Phase 1 screening analysis and to further evaluate two additional SAMAs determined to be applicable to Palisades but not yet evaluated by NMC:

- Lower cost alternative to SAMA 1 – installing an additional EDG,

- Lower cost alternative to SAMA 18 – installing a permanent, dedicated pump and line to the EDGs,

- Additional SAMA to add the capability to flash the field on the EDGs, and
- Additional SAMA to replace an existing air-operated containment sump valve with a motor-operated valve.

The potentially cost-beneficial SAMAs and NMC's plans for further evaluation of these SAMAs are discussed in more detail in Section G.6.2.

G.6.2 Review of NMC's Cost-Benefit Evaluation

The cost-benefit analysis performed by NMC was based primarily on NUREG/BR-0184 (NRC 1997a) and was executed consistent with this guidance.

To account for external events, NMC multiplied the internal event benefits by a factor of 2 for each SAMA, except the one Phase 2 SAMA that specifically addressed seismic risk only (SAMA 22). Doubling the benefit for SAMA 22 is not appropriate since this SAMA is specific to seismic risk only and would not have a corresponding benefit on the risk from internal events. While SAMAs 3, 4, and 10 were recognized as being effective in fire events, doubling of the benefit for these SAMAs is appropriate since they were also identified based on their importance in internal events. Given that the CDF of 4.3×10^{-5} per year from internal fires, seismic events, and other external events as reported by NMC (NMC 2005a) is about the same as the CDF of 4.0×10^{-5} per year from internal events, the NRC staff agrees that the factor of 2 multiplier for external events is reasonable.

NMC considered the impact that possible increases in benefits from analysis uncertainties would have on the results of the SAMA assessment. Information regarding the uncertainty distribution of the internal events CDF is summarized in Section E.7.2 of the ER (NMC 2005a). In the uncertainty assessment described therein, the 95th percent confidence level for the internal events CDF is approximately 2.3 times the point estimate CDF. NMC reexamined the initial set of SAMAs to determine if any additional Phase 1 SAMAs would be retained for further analysis if the benefits (and MMACR) were increased by a factor of 2.3. Four such SAMAs were identified: SAMA 11 – install an additional high-pressure boron injection system to increase the means of injecting boron into the reactor in an ATWS; SAMA 15 – add a bypass pipeline around the SIRWT return valves to prevent injection pump failure given failure of the return valves to open; SAMA 18 – provide a dedicated pump and pipeline to the EDGs for cooling, thereby reducing system dependencies; and SAMA 21 – enable the FPS as a backup for the containment spray system. However, based on further consideration of their costs and the limited benefit of eliminating the basic events addressed by three of these SAMAs, NMC concluded that SAMAs 11, 15, and 18 would not be cost-beneficial even if the systems were completely reliable. The specific rationale is provided in Section E.7.2.1 of the ER. The NRC staff considers the applicant's rationale for eliminating SAMAs 11, 15, and 18 from further

consideration in the final evaluation to be reasonable. SAMA 21 was retained for consideration in the final evaluation as discussed below.

NMC also considered the impact on the Phase 2 screening if the estimated benefits were increased by a factor of 2.3 (in addition to the factor of 2 multiplier already included in the baseline benefit estimates to account for external events). Of the SAMAs evaluated in the Phase 2 analysis, only SAMA 3, add a DDDIP, was found to be potentially cost-beneficial after having been classified as not cost-beneficial in the baseline analysis. Although not cost-beneficial in the baseline analysis, NMC included SAMA 3 within the set of potentially cost-beneficial SAMAs that it intends to evaluate further for potential implementation.

SAMA 21, which was retained for further evaluation as a result of an uncertainty assessment, was subsequently eliminated by NMC. The detailed cost-benefit analysis for this SAMA assumed that all loss of containment spray events would be eliminated. The PSA model result was about a 40 percent reduction in the population dose and, since the containment spray system has a minimal impact on CDF, no reduction in the CDF. The estimated total benefit (present value) of the averted risk, assuming a 7 percent discount rate, was calculated to be about $3,570,000 (which assumes a doubling of the benefit to account for external events). Since this total estimated benefit is significantly less than the estimated cost of implementation of $7,000,000, NMC concluded that this SAMA would not be cost-beneficial. The NRC staff has reviewed NMC's bases for calculating the risk reduction for this SAMA 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). The NRC staff also reviewed the bases for the estimated implementation cost of this SAMA and found it to be consistent with estimates provided in support of other plants' analyses. Accordingly, the NRC staff agrees with the NMC conclusion that this SAMA is not cost-beneficial.

During its review, the NRC noted that the offsite economic cost risk estimated for Palisades is larger than that estimated at other sites having similar CDF and population dose. The NRC staff asked NMC to provide additional information on the input assumptions used in the MACCS2 model and other factors that may contribute to this difference (NRC 2005). In response to the RAI, NMC provided additional detail on the input assumptions made for several MACCS2 economic parameters (NMC 2005b). The NRC staff concludes that the input assumptions are consistent with those used in other recent industry analyses, and that the noted differences in offsite economic cost risk are most likely due to population differences.

In its ER, NMC stated that several SAMAs are cost-beneficial based on the methodology applied in the analysis and warrant further review for potential implementation. Five SAMAs were found to have positive net values in NMC's baseline analysis (SAMAs 10, 13, 16, 22, and 23). One additional SAMA candidate was determined by NMC to be potentially cost-beneficial based on consideration of uncertainties (SAMA 3). NMC noted that three SAMAs in particular

show the largest potential for delivering a cost-beneficial risk reduction at Palisades, specifically, SAMAs 10, 13, and 16.

NMC performed a probabilistic evaluation to investigate the impact on the remaining cost-beneficial SAMAs if SAMA 10 were to be implemented. On the basis of information provided in Section E.6.9 of the ER, implementation of SAMA 10 would alter the cost-effectiveness of the remaining SAMAs such that several of the aforementioned SAMAs would no longer be cost-beneficial.

NMC noted in the ER that while the above results are believed to accurately reflect areas for improvement at the plant, additional engineering reviews are necessary to determine ultimate implementation. NMC stated that it will implement or continue to consider the six SAMAs identified in the analysis through the appropriate Palisades design process (SAMAs 3, 10, 13, 16, 22, and 23). In response to RAIs by the NRC staff, NMC also committed to further evaluate possible lower cost alternatives for two SAMAs originally eliminated in the Phase 1 screening analysis (SAMAs 1 and 18), and to further evaluate two additional SAMAs determined to be applicable to Palisades but not yet evaluated by NMC (add the capability to flash the field on the EDG, and replace an existing air-operated containment sump valve with a motor-operated valve). NMC has entered these 10 potentially cost-beneficial items into the Palisades corrective action system for further review. If determined to be cost-beneficial, these alternatives will be evaluated for possible implementation in accordance with Palisades plant design processes.

The NRC staff notes that all of the potentially cost-beneficial SAMAs identified in either the baseline analysis or the uncertainty analysis are included within the set of SAMAs that NMC plans to further evaluate. Several additional SAMAs, representing lower cost alternatives to SAMAs originally eliminated in the Phase 1 screening analysis and SAMAs determined to be applicable to Palisades but not yet evaluated by NMC, will be assessed as part of this evaluation. The NRC staff concludes that, with the exception of the 10 potentially cost-beneficial SAMAs discussed above, the costs of the SAMAs evaluated would be higher than the associated benefits.

G.7 Conclusions

NMC compiled a list of 23 SAMA candidates based on a review of the most significant basic events from the plant-specific PSA, Phase 2 SAMAs from license renewal activities for other plants, and insights from the plant-specific IPE and IPEEE. A qualitative screening removed 14 SAMA candidates that (1) were not applicable at Palisades because of design differences, (2) require extensive changes that involve implementation costs known to exceed any possible benefit, or (3) cost more than $5,600,000 to implement (the modified maximum averted cost-risk). An additional SAMA candidate was eliminated based on plant-specific insights regarding the low risk significance of systems affected by the SAMA, leaving eight SAMA candidates for further evaluation.

For the remaining SAMA candidates, a more detailed design and cost estimate was developed as shown in Table G-4. The cost-benefit analyses showed that five of the SAMA candidates were potentially cost-beneficial in the baseline analysis (SAMAs 10, 13, 16, 22, and 23). NMC performed additional analyses to evaluate the impact of parameter choices and uncertainties on the results of the SAMA assessment. As a result, one additional SAMA was identified as potentially cost-beneficial (SAMA 3). NMC has indicated that a further evaluation of these six potentially cost-beneficial SAMAs will be performed.

In response to RAIs by the NRC staff, NMC committed to further evaluate possible lower cost alternatives for two SAMAs originally eliminated in the Phase 1 screening analysis (SAMAs 1 and 18) and to further evaluate two NRC-staff-identified plant enhancements determined to be applicable to Palisades but not yet evaluated by NMC (add the capability to flash the field on the EDG, and replace an existing air-operated containment sump valve with a motor-operated valve). NMC has entered these 10 potentially cost-beneficial items into the Palisades corrective action system for further review. If determined to be cost-beneficial, they will be further evaluated for possible implementation in accordance with Palisades plant design processes.

The NRC staff 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 support the general conclusion that the SAMA evaluations performed by NMC are reasonable and sufficient for the license renewal submittal. Although the treatment of SAMAs for external events was somewhat limited by the unavailability of an external event PSA, the likelihood of there being cost-beneficial enhancements in this area was minimized by inclusion of a candidate SAMA related to dominant seismic events, inclusion of several candidate SAMAs related to dominant fire events, improvements that have been realized as a result of the IPEEE process, and inclusion of a multiplier to account for external events.

The NRC staff concurs with NMC's identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of all or a subset of the identified, potentially cost-beneficial SAMAs. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that further evaluation of these SAMAs by NMC is warranted. However, these SAMAs do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

G.8 References

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11. ABSTRACT *(200 words or less)*

This final supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted to the Nuclear Regulatory Commission (NRC) by Nuclear Management Company, LLC (NMC) to renew the operating license for the Palisades Nuclear Plant (Palisades) for an additional 20 years under 10 CFR Part 54. This final SEIS includes the NRC staff's analysis that considers and weighs the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts.

The NRC staff's recommendation is that the Commission determine that the adverse environmental impacts of license renewal for Palisades are not so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable. This preliminary recommendation is based on the following: (1) the analysis and findings in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437); (2) the Environmental Report submitted by NMC; (3) consultation with other Federal, State, Tribal, and Local agencies; (4) the staff's own independent review; and (5) the staff's consideration of public comments.

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