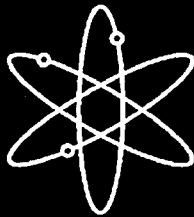




# **Generic Environmental Impact Statement for License Renewal of Nuclear Plants**



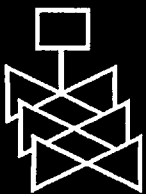
**Supplement 26**



**Regarding  
Monticello Nuclear Generating Plant**



**Final Report**



**U.S. Nuclear Regulatory Commission  
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**Generic Environmental  
Impact Statement for  
License Renewal of  
Nuclear Plants**

**Supplement 26**

**Regarding  
Monticello Nuclear Generating Plant**

**Final Report**

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Manuscript Completed: August 2006  
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Division of License Renewal  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001



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# 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 10 CFR Part 51. In the GEIS (and its Addendum 1), the 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 Nuclear Management Company, LLC (NMC), to renew the OL for the Monticello Nuclear Generating Plant (Monticello) 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 staff's recommendation regarding the proposed action.

Regarding the 69 issues for which the GEIS reached generic conclusions, neither NMC nor the staff has identified information that is both new and significant for any GEIS generic conclusion that applies to Monticello. In addition, the staff determined that information provided during the scoping process did not call into question the conclusions in the GEIS. Therefore, the staff concludes that the impacts of renewing the Monticello OL would not be greater than impacts identified for these issues in the GEIS. For each of these issues, the staff's conclusion in the GEIS is that the impact is of SMALL<sup>(a)</sup> 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 Monticello are addressed in this SEIS. The staff concludes that the significance of the potential environmental impacts of renewal of the OLs is SMALL for each applicable issue, with one exception. The magnitude of impact for the chronic effects of electromagnetic fields is "uncertain." The staff also concludes that additional mitigation measures are not likely to be sufficiently beneficial as to be warranted. The staff determined that information provided during the scoping process did not identify any new issue that has a significant environmental impact.

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<sup>(a)</sup> Environmental impacts are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.

## Abstract

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

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## Executive Summary

By letter dated March 16, 2005, Nuclear Management Company, LLC (NMC), submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license (OL) for Monticello Nuclear Generating Plant (Monticello) 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 on or before the expiration date of the current OL, which is September 8, 2010.

The NRC has implemented Section 102 of the National Environmental Policy Act (NEPA) (42 USC 4332) in Title 10 of the *Code of Federal Regulations* (CFR) Part 51 (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 Plants* (GEIS), NUREG-1437, Volumes 1 and 2.<sup>a</sup>

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. The staff visited the Monticello site in June 2005 and held public scoping meetings on June 30, 2005, in Monticello, Minnesota. In the preparation of this supplemental environmental impact statement (SEIS) for Monticello, the staff reviewed the NMC Environmental Report (ER) and compared it to the GEIS, consulted with other agencies, conducted an independent review of the issues, following the guidance set forth in NUREG-1555, *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 1, of this SEIS.

The staff held two public meetings in Monticello, Minnesota, in March 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 staff considered and dispositioned all of the comments received. These comments are addressed in Appendix A, Part 2 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, and measures for reducing or avoiding adverse effects. It also includes the staff's recommendation regarding the proposed action.

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<sup>(a)</sup> 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.

## Executive Summary

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) decisionmakers.

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

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

Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that there are factors, in addition to license renewal, that would 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 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 staff's consideration of all 92 environmental issues identified in the GEIS. The staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that were considered include the no-action alternative (not renewing the OL for Monticello) and alternative methods of power generation. Based on projections made by the U.S. Department of Energy's Energy Information Administration (DOE/EIA), gas- and coal-fired generation appear to be the most likely power-generation alternatives if the power from Monticello is replaced. These alternatives are evaluated assuming that the replacement power generation plant is located at either the Monticello site or some other unspecified alternate location.

## Executive Summary

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

NMC's license renewal application presents an analysis of the Category 2 issues plus environmental justice and chronic effects from electromagnetic fields. The staff has reviewed the NMC analysis for each issue and has conducted an independent review of each issue. Three Category 2 issues are not applicable, because they are related to plant design features or site characteristics not found at Monticello. 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 Monticello 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 Operation of Monticello Plant*.

Fourteen 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 this SEIS. Five 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 14 Category 2 issues and environmental justice, the staff concludes that the potential environmental effects are of SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, no further evaluation of this issue is required. For severe accident mitigation alternatives (SAMAs), the staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Based on its review of the SAMAs for Monticello, and the plant improvements already made, the staff concludes that one of the candidate SAMAs is potentially cost-beneficial. However, this SAMA does not relate to adequately managing the effects of aging during the period of extended operation. Therefore, it does not need to be implemented as part of license renewal pursuant to 10 CFR Part 54.

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

Cumulative impacts of past, present, and reasonably foreseeable future actions were considered, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. For purposes of this analysis, where Monticello license renewal impacts are deemed to be SMALL, the staff concluded that these impacts would not result in significant cumulative impacts on potentially affected resources.

If the Monticello operating license is not renewed and the unit ceases operation on or before the expiration of the current operating license, then the adverse impacts of likely alternatives will not be smaller than those associated with continued operation of Monticello. 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 Monticello are not so great that preserving the option of license renewal for energy planning decisionmakers 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 staff's own independent review; and (5) the staff's consideration of public comments received during the scoping process.



## Abbreviations/Acronyms

|                 |  |
|-----------------|--|
| °               | degree   |
| μCi             | microcurie(s)  |
| μCi/mL          | microcurie(s) per milliliter                           |
| μm              | micrometer(s) (microns)                                |
| ac              | acre(s)  |
| AC              | alternating current                                    |
| ACC             | averted cleanup and decontamination costs              |
| ADAMS           | NRC documents access and management system             |
| AEC             | U.S. Atomic Energy Commission                          |
| ALARA           | as low as reasonably achievable                        |
| AOC             | present value of averted offsite property damage costs |
| AOE             | present value of averted occupational exposure         |
| AOSC            | present value of averted onsite costs                  |
| APE             | present value of averted public exposure               |
| ASDS            | automatic (or alternate) shutdown system               |
| B.C.            | before the common era                                  |
| BTU             | British thermal unit(s)                                |
| BTU/kWh         | British thermal unit(s) per kilowatt-hour              |
| BWR             | boiling water reactor                                  |
| BWROG           | boiling water reactor owners group                     |
| CAIR            | Clean Air Interstate Rule                              |
| CDF             | core damage frequency                                  |
| CEQ             | Council on Environmental Quality                       |
| CFR             | Code of Federal Regulations                            |
| cfs             | cubic feet per second                                  |
| Ci              | curie(s)   |
| CO              | carbon monoxide  |
| CO <sub>2</sub> | carbon dioxide   |
| COE             | cost of enhancement                                    |
| CRD             | control rod drive                                      |
| CST             | condensate storage tank                                |
| CT              | combustion turbine                                     |
| CWA             | Clean Water Act  |
| DBA             | design-basis accident                                  |
| dc              | direct current   |

## Abbreviations/Acronyms

|                    |   |
|--------------------|---|
| DOE                | U.S. Department of Energy   |
| DOI                | U.S. Department of the Interior   |
| DOT                | U.S. Department of Transportation   |
| DSM                | demand-side management  |
| EDG                | emergency diesel generator  |
| EIA                | Energy Information Administration (of DOE)  |
| 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  |
| ESW                | emergency service water   |
| F                  | Fahrenheit  |
| FES                | final environmental statement   |
| FIVE               | fire-induced vulnerability evaluation   |
| FPS                | fire protection system  |
| FR                 | Federal Register  |
| FSAR               | final safety analysis report  |
| FSW                | fire service water  |
| ft                 | foot/feet   |
| ft/s               | foot/feet per second  |
| ft <sup>3</sup>    | cubic foot/feet   |
| ft <sup>3</sup> /s | cubic foot/feet per second  |
| FWS                | U.S. Fish and Wildlife Service  |
| GEIS               | <i>Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437</i> |
| GL                 | generic letter  |
| gpd                | gallons per day   |
| gpm                | gallons per minute  |
| GWh                | gigawatt-hours  |
| HLW                | high-level waste  |
| HPCI               | high-pressure coolant injection   |
| hr                 | hour(s)   |
| HRSG               | heat recovery steam generator   |
| Hp                 | horsepower  |
| Hz                 | hertz   |
| in.                | inch(es)  |

## Abbreviations/Acronyms

|                 |   |
|-----------------|---|
| IPE             | individual plant examination  |
| IPEEE           | individual plant examination of external events                               |
|                 |   |
| J               | joule(s)  |
|                 |   |
| kV              | kilovolt(s)   |
| kW              | kilowatt(s)   |
| kWh             | kilowatt hour(s)  |
|                 |   |
| lb              | pound   |
| lb/MWh          | pound(s) per megawatt-hour  |
| LLW             | low-level waste   |
| LOS             | level of service  |
|                 |   |
| MAAP            | modular accident analysis program   |
| mA              | milliamper(s)   |
| MACCS2          | MELCOR Accident Consequence Code System 2                                     |
| MAPP            | Mid-Continent Area Power Pool   |
| MCBS            | Minnesota County Biological Survey  |
| MDC             | Minnesota Department of Commerce  |
| MDEED           | Minnesota Department of Employment and Economic Development                   |
| MDOT            | Minnesota Department of Transportation  |
| mi              | mile(s)   |
| mi <sup>2</sup> | square mile(s)  |
| mL              | milliliter(s)   |
| MMACR           | modified maximum averted cost-risk  |
| MNDNR           | Minnesota Department of Natural Resources                                     |
| MNSHPO          | Minnesota State Historic Preservation Office                                  |
| MOU             | Memorandum of Understanding   |
| mph             | miles per hour  |
| MPCA            | Minnesota Pollution Control Agency  |
| MPSDC           | Minnesota Planning State Demographic Center                                   |
| MPUC            | Minnesota Public Utilities Commission   |
| mrem            | millirem(s)   |
| mrem/yr         | millirem(s) per year  |
| MSA             | metropolitan statistical area   |
| mSv             | millisievert(s)   |
| mSv/yr          | millisievert(s) per year  |
| MTED            | Minnesota Trade and Economic Development                                      |
| MTHM            | metric tons of heavy metal (a conventional unit for high-level nuclear waste) |
| MTU             | metric ton(s) uranium   |

## Abbreviations/Acronyms

|                  |   |
|------------------|---|
| MW               | megawatt(s)   |
| MWd              | megawatt-days                                       |
| MWd/MTU          | megawatt-days per metric ton(s) uranium             |
| MW(e)            | megawatt(s) electric                                |
| MW(t)            | megawatt(s) thermal                                 |
| MWh              | megawatt hour(s)                                    |
|                  |   |
| N/A              | not applicable                                      |
| NAAQS            | National Ambient Air Quality Standards              |
| NAS              | National Academy of Sciences                        |
| NEPA             | National Environmental Policy Act of 1969           |
| NESC             | National Electrical Safety Code                     |
| ng/J             | nanogram(s) per joule                               |
| NHPA             | National Historic Preservation Act                  |
| NIEHS            | National Institute of Environmental Health Sciences |
| NMC              | Nuclear Management Company                          |
| NO <sub>2</sub>  | nitrogen dioxide                                    |
| NO <sub>x</sub>  | nitrogen oxide(s)                                   |
| NPDES            | National Pollutant Discharge Elimination System     |
| NPSH             | net positive suction head                           |
| NRC              | U.S. Nuclear Regulatory Commission                  |
| NRHP             | National Register of Historic Places                |
| NSP              | Northern States Power Company                       |
|                  |   |
| ODCM             | Offsite Dose Calculation Manual                     |
| OL               | operating license                                   |
|                  |   |
| PARS             | publically available records                        |
| PCB              | polychlorinated biphenyl                            |
| pCi/L            | picocuries per liter                                |
| PIO              | Public Information Officer                          |
| PM <sub>10</sub> | particulate matter, 10 microns or less in diameter  |
| ppm              | parts per million                                   |
| PRA              | probabilistic risk analysis                         |
| PSA              | probabilistic safety assessment                     |
| PSD              | prevention of significant deterioration             |
|                  |   |
| RAI              | request for additional information                  |
| RCIC             | reactor core isolation cooling                      |
| RCRA             | Resource Conservation and Recovery Act              |
| RDS              | rapid dewatering system                             |



## Abbreviations/Acronyms

|                 |  |
|-----------------|--|
| rem             | roentgen equivalent man, equal to 0.01 sievert                               |
| REMP            | radiological environmental monitoring program                                |
| RHR             | residual heat removal  |
| RM              | river mile(s)  |
| ROW             | right-of-way   |
| RPC             | replacement power costs  |
|                 |  |
| SAMA            | severe accident mitigation alternative                                       |
| SAR             | safety analysis report   |
| SBO             | station blackout   |
| scfm            | standard cubic feet per minute   |
| SCR             | selective catalytic reduction  |
| SEIS            | supplemental environmental impact statement                                  |
| SER             | safety evaluation report   |
| SHPO            | State Historic Preservation Officer  |
| SMITTR          | surveillance, monitoring, inspections, testing, trending, and record keeping |
| SO <sub>2</sub> | sulfur dioxide   |
| SO <sub>x</sub> | sulfur oxide(s)  |
| SRV             | safety/relief valve  |
| Sv              | sievert(s) (special unit of dose equivalent)                                 |
| SW              | service water  |
|                 |  |
| TB              | turbine building   |
| TVA             | Tennessee Valley Authority   |
|                 |  |
| U.S.            | United States  |
| USAR            | updated safety analysis report   |
| USC             | United States Code   |
| USCB            | U.S. Census Bureau   |
| USDA            | U.S. Department of Agriculture   |
| USGS            | U.S. Geological Survey   |
| USI             | unresolved safety issue  |
|                 |  |
| V               | volt(s)  |
|                 |  |
| WMD             | Wetland Management District  |
|                 |  |
| yr              | year   |

