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. The GEIS (and its Addendum 1) 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 draft Supplemental Environmental Impact Statement (SEIS) has been prepared in response to an application submitted to the NRC by Duke Energy Corporation (Duke) to renew the OLs for McGuire Nuclear Station, Units 1 and 2 (McGuire) for an additional 20 years under 10 CFR Part 54. This draft 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 preliminary recommendation regarding the proposed action.

Regarding the 69 issues for which the GEIS reached generic conclusions, neither Duke nor the staff has identified information that is both new and significant for any of these issues that apply to McGuire. 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 McGuire OLs will not be greater than impacts identified for these issues in the GEIS. For each of these issues, the GEIS conclusion 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 single significance levels).

Regarding the remaining 23 issues, those that apply to McGuire are addressed in this draft SEIS. For each applicable issue, the staff concludes that the significance of the potential environmental impacts of renewal of the OLs is SMALL. 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.

The NRC staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for McGuire 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

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

Abstract

Report submitted by Duke; (3) consultation with 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.

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Executive Summary

By letter dated June 13, 2001, Duke Energy Corporation (Duke) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses (OLs) for McGuire Nuclear Station, Units 1 and 2 (McGuire) for up to an additional 20-year period. If the OLs are renewed, State regulatory agencies and Duke will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. If the OLs are not renewed, the plant must be shut down at or before the expiration dates of the current OLs, which are June 12, 2021, for Unit 1, and March 3, 2023, for Unit 2.

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

Upon acceptance of the Duke 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 McGuire site in September 2001 and held public scoping meetings on September 25, 2001, in Huntersville, North Carolina. In preparing this draft Supplemental Environmental Impact Statement (SEIS) for McGuire, the staff reviewed the McGuire 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, Supplement 1, the *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 scope of the environmental review are provided in Appendix A, Part 1, of this SEIS.

The staff will hold two public meetings in the vicinity of the McGuire site in June 2002 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 comment period ends, the staff will consider and disposition all of the comments received. These comments will be addressed in Appendix A, Part 2, of the SEIS.

(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.

This SEIS includes the staff's preliminary analysis that considers and weighs the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures for reducing or avoiding adverse effects. It also includes the staff's preliminary 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) decisionmakers.

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

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

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

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 operations–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. In the GEIS, the staff evaluated 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 resources.
>
> 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 led to 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 likely not 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 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 evaluation of all 92 environmental issues considered 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 OLs for McGuire, Units 1 and 2) 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 Units 1 and 2 is replaced. These alternatives are evaluated assuming that the replacement power generation plant is located at either the McGuire site or some other unspecified location.

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.

If the McGuire OLs are not renewed and the units cease operation on or before the expiration of their current OLs, then the adverse impacts of likely alternatives will not be smaller than those associated with continued operation of McGuire. The impacts may, in fact, be greater in some areas.

The preliminary recommendation of the NRC staff is that the Commission determine that the adverse environmental impacts of license renewal for McGuire 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 Duke; (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
μm	micrometer
μCi	microcurie
AADT	Annual Average Daily Traffic
ac	acre
ac.	Alternating current
ACC	averted cleanup and decontamination costs
AEA	Atomic Energy Act
AEC	Atomic Energy Commission
AOC	averted offsite property damage costs
AOE	averted occupational exposure
AOSC	averted onsite costs
APE	averted public exposure
APRC	averted power replacement cost
ATWS	anticipated transient without scram
Bq	becquerel
Btu	British thermal unit
Btu/kWh	British thermal units per kilowatt hour
Btu/lb	British thermal units per pound
BWR	boiling water reactor
C	Celsius
CAA	Clean Air Act
CDC	Center for Disease Control and Prevention
CDF	core damage frequency
CEQ	Council on Environmental Quality
CET	containment event tree
CFR	Code of Federal Regulations
Ci	curie
CMUD	Charlotte-Mecklenburg Utilities District
COE	Cost of enhancement
CWA	Clean Water Act
DBA	design-basis accident
DCH	direct containment heating
DG	diesel generator
DOE	U.S. Department of Energy
DSM	demand-side management

Duke	Duke Energy Corporation
E	endangered
ECCS	emergency core cooling system
EIA	Energy Information Agency
EIS	Environmental Impact Statement
ELF	extremely low frequency
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
EPZ	Emergency Planning Zone
ER	Environmental Report
ESRP	Environmental Standard Review Plan
EX	extirpated
F	Fahrenheit
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FES	Final Environmental Statement
FR	Federal Register
FSAR	Final Safety Analysis Report
FSC	Federal species of concern
ft	feet
ft/s	feet per second
ft^3	cubic feet
F-V	Fussell-Vesely
FWPCA	Federal Water Pollution Control Act
FWS	U. S. Fish and Wildlife Service
FWST	refueling water storage tank
gal	gallon
GEIS	Generic Environmental Impact Statement
gpd	gallons per day
gpm	gallons per minute
GSI	Generic Safety Issue
ha	hectare
HEPA	high-efficiency particulate air (filter)
HLW	high-level waste
hr	hour(s)
Hz	hertz

I&C	instrumentation and control
IBA	Important Bird Area
IEEE	Institution of Electrical and Electronic Engineers
IPE	individual plant examination
IPEEE	individual plant examination for external events
ISFSI	Independent Spent Fuel Storage Installation
ISLOCA	interfacing loss of coolant accident
J	joule
km	kilometer
kV	kilovolt
kWh	kilowatt-hour
L	liter
L/s	liters per second
LNG	liquefied natural gas
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
LOS	level of service
LWR	light-water reactor
m	meter
m/s	meter per second
m^3	cubic meter
m^3/d	cubic meter per day
MAAP	Modular Accident Analysis Program
MACCS2	MELCOR Accident Consequence Code System 2
McGuire	McGuire Nuclear Station
mgd	million gallons per day
mGy	milligray
mi	mile
MJ/kg	million joules per kilogram
mL	milliliter
mph	miles per hour
mrad	millirad
mrem	millirem
mSv	millisievert
MT	metric ton
MTHM	metric tonnes of heavy metal (uranium, etc.)
MUMPO	Mecklenburg-Union Metropolitan Planning Organization

MW	megawatt
MW(e)	megawatts electric
MW(t)	megawatts thermal
MWd/MTU	megawatt days per metric ton uranium
MWh	megawatt hour
NA	not applicable
NAS	National Academy of Sciences
NC	North Carolina
NCDCR	North Carolina Department of Cultural Resources
NCDENR	North Carolina Department of Environmental and Natural Resources
NCDHHS	North Carolina Department of Health and Human Services
NCDNRCD	North Carolina Department of Natural Resources and Community Development
NCDOT	North Carolina Department of Transportation
NCWRC	North Carolina Wildlife Resource Commission
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
ng/J	nanograms per joule
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
NWPPC	Northwest Power Planning Council
ODCM	Offsite Dose Calculation Manual
OL	operating license
PAME	primary ameobic meningoencephalitis
PAR	passive autocatalytic recombiner
PDS	plant damage state
PM	particulate matter
PM_{10}	particulate matter having aerodynamic diameter less than or equal to 10μm
PRA	Probabilistic Risk Assessment
PSD	prevention of significant deterioration
PW	present worth
PWR	pressurized water reactor
PU_{RP}	present valve replacement power cost

RAI	request for additional information
RCRA	Resource Conservation and Recovery Act
REMP	radiological environmental monitoring program
RN	service water
RPV	reactor pressure vessel
RV	reactor vessel
SAMA	severe accident mitigation alternative
SAMDA	severe accident mitigation design alternatives
SBO	station blackout
SAR	Safety Analysis Report
SC	State species of concern
SEIS	Supplemental Environmental Impact Statement
SER	Safety Evaluation Report
SHPO	State Historical Preservation Officer
SR	significantly rare
SR	state route
SGTR	steam generator tube rupture
SS	safe shutdown
SSF	standby shutdown facility
Sv	sieverts
T	threatened
TBq	terabecquerel
UFSAR	Updated Final Safety Analysis Report
U_{RP}	long term replacement power cost
U.S.	United States
yr	year