

# 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<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 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

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

## Abstract

- 1 Report submitted by Duke; (3) consultation with Federal, State, and local agencies; (4) the
- 2 staff's own independent review, and (5) the staff's consideration of public comments received
- 3 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).<sup>(a)</sup>

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.

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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.

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

5  
6 The Commission has adopted the following statement of purpose and need for license renewal  
7 from the GEIS:

8  
9 The purpose and need for the proposed action (renewal of an operating license)  
10 is to provide an option that allows for power generation capability beyond the  
11 term of a current nuclear power plant operating license to meet future system  
12 generating needs, as such needs may be determined by State, utility, and, where  
13 authorized, Federal (other than NRC) decisionmakers.

14  
15 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is  
16 to determine

17  
18 ... whether or not the adverse environmental impacts of license renewal are so  
19 great that preserving the option of license renewal for energy planning  
20 decisionmakers would be unreasonable.

21  
22 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that  
23 there are factors, in addition to license renewal, that will ultimately determine whether an  
24 existing nuclear power plant continues to operate beyond the period of the current OLS.

25  
26 NRC regulations [10 CFR 51.95(c)(2)] contain the following statement regarding the content of  
27 SEISs prepared at the license renewal stage:

28  
29 The supplemental environmental impact statement for license renewal is not  
30 required to include discussion of need for power or the economic costs and  
31 economic benefits of the proposed action or of alternatives to the proposed  
32 action except insofar as such benefits and costs are either essential for a  
33 determination regarding the inclusion of an alternative in the range of  
34 alternatives considered or relevant to mitigation. In addition, the supplemental  
35 environmental impact statement prepared at the license renewal stage need not  
36 discuss other issues not related to the environmental effects of the proposed  
37 action and the alternatives, or any aspect of the storage of spent fuel for the  
38 facility within the scope of the generic determination in § 51.23(a) ["Temporary  
39 storage of spent fuel after cessation of reactor operations—generic determination  
40 of no significant environmental impact"] and in accordance with § 51.23(b).

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

7  
8 SMALL - Environmental effects are not detectable or are so minor that they will  
9 neither destabilize nor noticeably alter any important attribute of the resources.

10  
11 MODERATE - Environmental effects are sufficient to alter noticeably, but not to  
12 destabilize, important attributes of the resource.

13  
14 LARGE - Environmental effects are clearly noticeable and are sufficient to  
15 destabilize important attributes of the resource.

16  
17 For 69 of the 92 issues considered in the GEIS, the analysis in the GEIS led to the following  
18 conclusions:

- 19  
20 (1) The environmental impacts associated with the issue have been determined to apply either  
21 to all plants or, for some issues, to plants having a specific type of cooling system or other  
22 specified plant or site characteristics.
- 23  
24 (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the  
25 impacts (except for collective offsite radiological impacts from the fuel cycle and from  
26 high-level waste and spent fuel disposal).
- 27  
28 (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis,  
29 and it has been determined that additional plant-specific mitigation measures are likely not  
30 to be sufficiently beneficial to warrant implementation.

31  
32 These 69 issues were identified in the GEIS as Category 1 issues. In the absence of new and  
33 significant information, the staff relied on conclusions as amplified by supporting information in  
34 the GEIS for issues designated Category 1 in Table B-1 of 10 CFR Part 51, Subpart A,  
35 Appendix B.

36  
37 Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2  
38 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues,  
39 environmental justice and chronic effects of electromagnetic fields, were not categorized.  
40 Environmental justice was not evaluated on a generic basis and must be addressed in a plant-

## Executive Summary

1 specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields  
2 was not conclusive at the time the GEIS was prepared.

3  
4 This SEIS documents the staff's evaluation of all 92 environmental issues considered in the  
5 GEIS. The staff considered the environmental impacts associated with alternatives to license  
6 renewal and compared the environmental impacts of license renewal and the alternatives. The  
7 alternatives to license renewal that were considered include the no-action alternative (not  
8 renewing the OLS for McGuire, Units 1 and 2) and alternative methods of power generation.  
9 Based on projections made by the U.S. Department of Energy's Energy Information  
10 Administration, gas- and coal-fired generation appear to be the most likely power-generation  
11 alternatives if the power from Units 1 and 2 is replaced. These alternatives are evaluated  
12 assuming that the replacement power generation plant is located at either the McGuire site or  
13 some other unspecified location.

14  
15 Mitigation measures were considered for each Category 2 issue. Current measures to mitigate  
16 the environmental impacts of plant operation were found to be adequate, and no additional  
17 mitigation measures were deemed sufficiently beneficial to be warranted.

18  
19 If the McGuire OLS are not renewed and the units cease operation on or before the expiration  
20 of their current OLS, then the adverse impacts of likely alternatives will not be smaller than  
21 those associated with continued operation of McGuire. The impacts may, in fact, be greater in  
22 some areas.

23  
24 The preliminary recommendation of the NRC staff is that the Commission determine that the  
25 adverse environmental impacts of license renewal for McGuire are not so great that preserving  
26 the option of license renewal for energy planning decisionmakers would be unreasonable. This  
27 recommendation is based on (1) the analysis and findings in the GEIS; (2) the ER submitted by  
28 Duke; (3) consultation with other Federal, State, and local agencies; (4) the staff's own  
29 independent review; and (5) the staff's consideration of public comments received during the  
30 scoping process.

# Abbreviations/Acronyms

1		
2		
3		
4	°	degree
5	μm	micrometer
6	μCi	microcurie
7		
8	AADT	Annual Average Daily Traffic
9	ac	acre
10	ac.	Alternating current
11	ACC	averted cleanup and decontamination costs
12	AEA	Atomic Energy Act
13	AEC	Atomic Energy Commission
14	AOC	averted offsite property damage costs
15	AOE	averted occupational exposure
16	AOSC	averted onsite costs
17	APE	averted public exposure
18	APRC	averted power replacement cost
19	ATWS	anticipated transient without scram
20		
21	Bq	becquerel
22	Btu	British thermal unit
23	Btu/kWh	British thermal units per kilowatt hour
24	Btu/lb	British thermal units per pound
25	BWR	boiling water reactor
26		
27	C	Celsius
28	CAA	Clean Air Act
29	CDC	Center for Disease Control and Prevention
30	CDF	core damage frequency
31	CEQ	Council on Environmental Quality
32	CET	containment event tree
33	CFR	Code of Federal Regulations
34	Ci	curie
35	CMUD	Charlotte-Mecklenburg Utilities District
36	COE	Cost of enhancement
37	CWA	Clean Water Act
38		
39	DBA	design-basis accident
40	DCH	direct containment heating
41	DG	diesel generator
42	DOE	U.S. Department of Energy
43	DSM	demand-side management

## Abbreviations/Acronyms

1	Duke	Duke Energy Corporation
2		
3	E	endangered
4	ECCS	emergency core cooling system
5	EIA	Energy Information Agency
6	EIS	Environmental Impact Statement
7	ELF	extremely low frequency
8	EMF	electromagnetic field
9	EPA	U.S. Environmental Protection Agency
10	EPZ	Emergency Planning Zone
11	ER	Environmental Report
12	ESRP	Environmental Standard Review Plan
13	EX	extirpated
14		
15	F	Fahrenheit
16	FAA	Federal Aviation Administration
17	FERC	Federal Energy Regulatory Commission
18	FES	Final Environmental Statement
19	FR	Federal Register
20	FSAR	Final Safety Analysis Report
21	FSC	Federal species of concern
22	ft	feet
23	ft/s	feet per second
24	ft <sup>3</sup>	cubic feet
25	F-V	Fussell-Vesely
26	FWPCA	Federal Water Pollution Control Act
27	FWS	U. S. Fish and Wildlife Service
28	FWST	refueling water storage tank
29		
30	gal	gallon
31	GEIS	Generic Environmental Impact Statement
32	gpd	gallons per day
33	gpm	gallons per minute
34	GSI	Generic Safety Issue
35		
36	ha	hectare
37	HEPA	high-efficiency particulate air (filter)
38	HLW	high-level waste
39	hr	hour(s)
40	Hz	hertz

## Abbreviations/Acronyms

1	I&C	instrumentation and control
2	IBA	Important Bird Area
3	IEEE	Institution of Electrical and Electronic Engineers
4	IPE	individual plant examination
5	IPEEE	individual plant examination for external events
6	ISFSI	Independent Spent Fuel Storage Installation
7	ISLOCA	interfacing loss of coolant accident
8		
9	J	joule
10		
11	km	kilometer
12	kV	kilovolt
13	kWh	kilowatt-hour
14		
15	L	liter
16	L/s	liters per second
17	LNG	liquefied natural gas
18	LOCA	loss-of-coolant accident
19	LOOP	loss of offsite power
20	LOS	level of service
21	LWR	light-water reactor
22		
23	m	meter
24	m/s	meter per second
25	m <sup>3</sup>	cubic meter
26	m <sup>3</sup> /d	cubic meter per day
27	MAAP	Modular Accident Analysis Program
28	MACCS2	MELCOR Accident Consequence Code System 2
29	McGuire	McGuire Nuclear Station
30	mgd	million gallons per day
31	mGy	milligray
32	mi	mile
33	MJ/kg	million joules per kilogram
34	mL	milliliter
35	mph	miles per hour
36	mrad	millirad
37	mrem	millirem
38	mSv	millisievert
39	MT	metric ton
40	MTHM	metric tonnes of heavy metal (uranium, etc.)
41	MUMPO	Mecklenburg-Union Metropolitan Planning Organization

## Abbreviations/Acronyms

1	MW	megawatt
2	MW(e)	megawatts electric
3	MW(t)	megawatts thermal
4	MWd/MTU	megawatt days per metric ton uranium
5	MWh	megawatt hour
6		
7	NA	not applicable
8	NAS	National Academy of Sciences
9	NC	North Carolina
10	NCDCR	North Carolina Department of Cultural Resources
11	NCDENR	North Carolina Department of Environmental and Natural Resources
12	NCDHHS	North Carolina Department of Health and Human Services
13	NCDNRCD	North Carolina Department of Natural Resources and Community Development
14	NCDOT	North Carolina Department of Transportation
15	NCWRC	North Carolina Wildlife Resource Commission
16	NEPA	National Environmental Policy Act
17	NESC	National Electrical Safety Code
18	ng/J	nanograms per joule
19	NHPA	National Historic Preservation Act
20	NIEHS	National Institute of Environmental Health Sciences
21	NO <sub>2</sub>	nitrogen dioxide
22	NO <sub>x</sub>	nitrogen oxide
23	NPDES	National Pollutant Discharge Elimination System
24	NRC	U.S. Nuclear Regulatory Commission
25	NRR	Nuclear Reactor Regulation
26	NWPPC	Northwest Power Planning Council
27		
28	ODCM	Offsite Dose Calculation Manual
29	OL	operating license
30		
31	PAME	primary amebic meningoencephalitis
32	PAR	passive autocatalytic recombiner
33	PDS	plant damage state
34	PM	particulate matter
35	PM <sub>10</sub>	particulate matter having aerodynamic diameter less than or equal to 10 $\mu$ m
36	PRA	Probabilistic Risk Assessment
37	PSD	prevention of significant deterioration
38	PW	present worth
39	PWR	pressurized water reactor
40	PU <sub>RP</sub>	present valve replacement power cost

## Abbreviations/Acronyms

1	RAI	request for additional information
2	RCRA	Resource Conservation and Recovery Act
3	REMP	radiological environmental monitoring program
4	RN	service water
5	RPV	reactor pressure vessel
6	RV	reactor vessel
7		
8	SAMA	severe accident mitigation alternative
9	SAMDA	severe accident mitigation design alternatives
10	SBO	station blackout
11	SAR	Safety Analysis Report
12	SC	State species of concern
13	SEIS	Supplemental Environmental Impact Statement
14	SER	Safety Evaluation Report
15	SHPO	State Historical Preservation Officer
16	SR	significantly rare
17	SR	state route
18	SGTR	steam generator tube rupture
19	SS	safe shutdown
20	SSF	standby shutdown facility
21	Sv	sieverts
22		
23	T	threatened
24	TBq	terabecquerel
25		
26	UFSAR	Updated Final Safety Analysis Report
27	$U_{RP}$	long term replacement power cost
28	U.S.	United States
29		
30	yr	year