

9.0 Summary and Conclusions

1 By letter dated June 13, 2001, Duke Energy Corporation (Duke) submitted an application to the
2 U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses (OLs) for McGuire
3 Nuclear Station, Units 1 and 2 (McGuire) up to an additional 20-year period (Duke 2001b). If
4 the OLs are renewed, State regulatory agencies and Duke and will ultimately decide whether
5 the plant will continue to operate based on factors such as the need for power or other matters
6 within the State's jurisdiction or the purview of the owners. If the OLs are not renewed, the
7 plant must be shut down at or before the expiration of the current OLs, which expire June 12,
8 2021, for Unit 1, and March 3, 2023, for Unit 2.

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

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19 Upon acceptance of the McGuire application, the NRC began the environmental review process
20 described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct
21 scoping (66 FR 44386 [NRC 2001]) on August 23, 2001. The staff visited the McGuire site in
22 September 2001 and held public scoping meetings on September 25, 2001, in Huntersville,
23 North Carolina (NRC 2001). The staff reviewed the Duke Environmental Report (ER)
24 (Duke 2001a) and compared it to the GEIS, consulted with other agencies, and conducted an
25 independent review of the issues following the guidance set forth in NUREG-1555,
26 Supplement 1, the *Standard Review Plans for Environmental Reviews for Nuclear Power
27 Plants, Supplement 1: Operating License Renewal* (NRC 2000). The staff also considered the
28 public comments received during the scoping process for preparation of this Supplemental
29 Environmental Impact Statement (SEIS) for McGuire. The public comments received during the
30 scoping process that were considered to be within the scope of the environmental review are
31 provided in Appendix A, Part 1, of this SEIS.

32
33 The staff will hold two public meetings in the proximity of McGuire in June 2002 to describe the
34 preliminary results of the NRC SEIS and to answer questions to provide members of the public

(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 with information to assist them in formulating their comments. When the comment period ends,
2 the staff will consider and disposition all of the comments received. These comments will be
3 addressed in Appendix A, Part 2, of the final SEIS.

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5 This SEIS includes the NRC staff's preliminary analysis that considers and weighs the environ-
6 mental effects of the proposed action, the environmental impacts of alternatives to the
7 proposed action, and mitigation measures available for reducing or avoiding adverse effects. It
8 also includes the staff's preliminary recommendation regarding the proposed action.

9
10 The NRC has adopted the following statement of purpose and need for license renewal from
11 the GEIS:

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

18
19 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is
20 to determine

21
22 ... whether or not the adverse environmental impacts of license renewal are so great
23 that preserving the option of license renewal for energy planning decisionmakers would
24 be unreasonable.

25
26 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that
27 there are factors, in addition to license renewal, that will ultimately determine whether a licensee
28 continues to operate a nuclear power plant beyond the period of the OL.

29
30 NRC regulations (10 CFR 51.95[c][2]) contain the following statement regarding the content of
31 SEISs prepared at the license renewal stage:

32
33 The supplemental environmental impact statement for license renewal is not required to
34 include discussion of need for power or the economic costs and economic benefits of
35 the proposed action or of alternatives to the proposed action except insofar as such
36 benefits and costs are either essential for a determination regarding the inclusion of an
37 alternative in the range of alternatives considered or relevant to mitigation. In addition,
38 the supplemental environmental impact statement prepared at the license renewal stage

1 need not discuss other issues not related to the environmental effects of the proposed
2 action and the alternatives, or any aspect of the storage of spent fuel for the facility within
3 the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b).^(a)
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5 The GEIS contains the results of a systematic evaluation of the consequences of renewing an
6 OL and operating a nuclear power plant for an additional 20 years. In the GEIS, the NRC staff
7 evaluated 92 environmental issues using the NRC's three-level standard of significance—
8 SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality
9 guidelines. The following definitions of the three significance levels are set forth in the
10 footnotes to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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12 SMALL – Environmental effects are not detectable or are so minor that they will neither
13 destabilize nor noticeably alter any important attribute of the resource.

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15 MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize,
16 important attributes of the resource.

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18 LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize
19 important attributes of the resource.
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21 For 69 of the 92 issues considered in the GEIS, the staff made the following findings:

- 22
23 (1) The environmental impacts associated with the issue have been determined to apply either
24 to all plants or, for some issues, to plants having a specific type of cooling system or other
25 specified plant or site characteristics.
26
27 (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the
28 impacts (except for collective offsite radiological impacts from the fuel cycle and from high-
29 level waste [HLW] and spent fuel disposal).
30
31 (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis,
32 and it has been determined that additional plant-specific mitigation measures are likely not
33 to be sufficiently beneficial to warrant implementation.
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35 These 69 issues were identified by the staff in the GEIS as Category 1 issues. In the absence
36 of new and significant information, the staff relied on conclusions as amplified by supporting

(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."

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1 information in the GEIS for issues designated Category 1 in Table B-1 of 10 CFR Part 51,
2 Subpart A, Appendix B.

3
4 Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2
5 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues,
6 environmental justice and chronic effects of electromagnetic fields, were not categorized.
7 Environmental justice was not evaluated on a generic basis and must also be addressed in a
8 plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic
9 fields was not conclusive at the time the GEIS was prepared.

10
11 This SEIS documents the staff's evaluation of all 92 environmental issues considered in the
12 GEIS. The staff considered the environmental impacts associated with alternatives to license
13 renewal and compared the environmental impacts of license renewal and the alternatives. The
14 alternatives to license renewal that were considered include the no-action alternative (not
15 renewing the McGuire OLS) and alternative methods of power generation. Based on
16 projections made by the U.S. Department of Energy's (DOE's) Energy Information
17 Administration (EIA), natural-gas- and coal-fired generation appear to be the most likely power-
18 generation alternatives if the power from McGuire is replaced. These alternatives were
19 evaluated assuming that the replacement power generation plant is located at either the
20 McGuire site or some other unspecified location.

21 22 **9.1 Environmental Impacts of the Proposed** 23 **Action—License Renewal**

24
25 Duke and the NRC staff have established independent processes for identifying and evaluating
26 the significance of any new information on the environmental impacts of license renewal.
27 Neither Duke nor the staff has identified any information that is both new and significant related
28 to Category 1 issues that would call into question the conclusions in the GEIS. Similarly,
29 neither the scoping process, Duke, nor the staff has identified any new issue applicable to
30 McGuire that has a significant environmental impact. Therefore, the staff relies upon the
31 conclusions of the GEIS for all Category 1 issues that are applicable to McGuire.

32
33 Duke's license renewal application presents analyses of the Category 2 issues that are
34 applicable to McGuire plus environmental justice and chronic effects from electromagnetic
35 fields. The staff has reviewed the Duke analysis for each issue and has conducted an
36 independent review of each issue. Five Category 2 issues are not applicable because they are
37 related to plant design features or site characteristics not found at McGuire. Four Category 2
38 issues are not discussed in this SEIS because they are specifically related to refurbishment.
39 Duke (2001a) has stated that its evaluation of structures and components, as required by 10

1 CFR 54.21, did not identify any major plant refurbishment activities or modifications as
2 necessary to support the continued operation of McGuire for the license renewal period. In
3 addition, any replacement of components or additional inspection activities are within the
4 bounds of normal plant component replacement and, therefore, are not expected to affect the
5 environment outside of the bounds of the plant operations evaluated in the *Final Environmental*
6 *Statement Related to the Proposed William B. McGuire Nuclear Station Units 1 & 2, Duke*
7 *Power Company* (AEC 1972).
8

9 Twelve Category 2 issues related to operational impacts and postulated accidents during the
10 renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are
11 discussed in detail in this draft SEIS. Five of the Category 2 issues and environmental justice
12 apply to both refurbishment and to operation during the renewal term and are only discussed in
13 this SEIS in relation to operation during the renewal term. For all 12 Category 2 issues and
14 environmental justice, the staff concludes that the potential environmental effects are of SMALL
15 significance in the context of the standards set forth in the GEIS. In addition, the staff
16 determined that appropriate Federal health agencies have not reached a consensus on the
17 existence of chronic adverse effects from electromagnetic fields. Therefore, no further
18 evaluation of this issue is required. For severe accident mitigation alternatives (SAMAs), the
19 staff concludes that a reasonable, comprehensive effort was made to identify and evaluate
20 SAMAs. Although one of the SAMAs related to hydrogen control in station blackout sequences
21 appears to be cost beneficial and to offer a level of risk reduction, this SAMA does not relate to
22 adequately managing the effects of aging during the period of extended operation. Therefore, it
23 need not be implemented as part of license renewal pursuant to 10 CFR Part 54, although it is
24 being pursued as a Generic Safety Issue for the current operating license.
25

26 Mitigation measures were considered for each Category 2 issue. Current measures to mitigate
27 the environmental impacts of plant operation were found to be adequate, and no additional
28 mitigation measures were deemed sufficiently beneficial to be warranted.
29

30 The following sections discuss unavoidable adverse impacts, irreversible or irretrievable
31 commitments of resources, and the relationship between local short-term use of the
32 environment and long-term productivity.
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34 **9.1.1 Unavoidable Adverse Impacts**

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

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

3
4 The adverse impacts of continued operation identified are considered to be of SMALL signifi-
5 cance, and none warrants implementation of additional mitigation measures. The adverse
6 impacts of likely alternatives if McGuire ceases operation at or before the expiration of the
7 current OLs will not be smaller than those associated with continued operation of these units,
8 and they may be greater for some impact categories in some locations.

9 10 **9.1.2 Irreversible or Irretrievable Resource Commitments**

11
12 The commitment of resources related to construction and operation of McGuire during its
13 current license period was made when the plant was built. The resource commitments to be
14 considered in this SEIS are associated with continued operation of the plant for an additional 20
15 years. These resources include materials and equipment required for plant maintenance and
16 operation, the nuclear fuel used by the reactors, and ultimately, permanent offsite storage
17 space for the spent fuel assemblies.

18
19 The most significant resource commitments related to operation during the renewal term are
20 the fuel and the permanent storage space. Duke replaces approximately 63 fuel assemblies in
21 each of the two units during every refueling outage, which occurs on an 18- to 24-month cycle.
22 Assuming no change in use rate, about 1638 spent fuel assemblies would be required for
23 operation during a 20-year license renewal period (Duke 2001a).

24
25 The likely power generation alternatives if McGuire ceases operation on or before the expiration
26 of the current OLs will require a commitment of resources for construction of the replacement
27 plants as well as for fuel to run the plants.

28 29 **9.1.3 Short-Term Use Versus Long-Term Productivity**

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

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

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

The significance of the environmental impacts from the proposed action (approval of the application for renewal of the OLS), the no-action alternative (denial of the application), alternatives involving nuclear, or coal- or gas-fired generation of power at the McGuire site and an unspecified "greenfield site," and a combination of alternatives are compared in Table 9-1. Continued use of a once-through cooling system for McGuire is assumed for Table 9-1.

Substitution of a cooling tower for the once-through cooling system in the evaluation of the nuclear and gas- and coal-fired generation alternatives would result in some greater environmental impact differences in some impact categories. For example, use of cooling towers would have a greater aesthetic impact than once-through cooling.

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

9.3 Staff Conclusions and Recommendation

Based on (1) the analysis and findings in the GEIS (NRC 1996, 1999), (2) the ER submitted by Duke (Duke 2001a), (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, the preliminary recommendation of the 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.

9.4 References

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

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

Duke Energy Corporation (Duke). 2001a. *Applicant’s Environmental Report – Operating License Renewal Stage McGuire Nuclear Station, Units 1 and 2*. Charlotte, North Carolina.

Duke Energy Corporation (Duke). 2001b. *Application to Renew the Operating Licenses of McGuire Nuclear Station, Units 1 and 2 and Catwba Nuclear Station, Units 1 and 2*. Charlotte, North Carolina.

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

U.S. Atomic Energy Commission (AEC). 1972. *Final Environmental Statement Related to the Proposed William B. McGuire Nuclear Station Units 1 & 2, Duke Power Company*. Docket Nos. 50-369 and 50-370, Washington, D.C.

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

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

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). 2001. “Duke Energy Corporation, McGuire Nuclear Station, Units 1 and 2; Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process.” *Federal Register*. Vol. 66, No. 164, pp. 44386-44388. August 23, 2001.

Table 9-1. Summary of Environmental Significance of License Renewal, the No-Action Alternative, and Alternative Methods of Generation

Impact Category	Proposed Action—License Renewal	No Action Alternative—Denial of Renewal	Coal-Fired Generation		Natural-Gas-Fired Generation		New Nuclear Generation		Combination of Alternatives	
			McGuire Site	Greenfield Site ^(a)	McGuire Site	Greenfield Site ^(a)	McGuire Site	Greenfield Site ^(a)	McGuire Site	Greenfield Site ^(a)
Land Use	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	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	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE	SMALL	SMALL	MODERATE	MODERATE
Waste	SMALL	SMALL	MODERATE	MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Human Health ^(b)	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socio-economics	SMALL	SMALL to MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE
Aesthetics	SMALL	SMALL	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to LARGE	MODERATE	MODERATE to LARGE
Historic and Archaeological Resources	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE

(a) A greenfield site is assumed, for the purpose of bounding potential impacts, to be an undeveloped site with no previous construction.
 (b) Excludes 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.

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