

May 21, 2003

Mr. Dhiaa Jamil
Vice President, McGuire Site
Duke Energy Corporation
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION, UNIT NOS. 1 AND 2 RE: ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT RELATED TO EXEMPTION FROM THE REQUIREMENTS OF 10 CFR PART 50, APPENDIX G (TAC NOS. MB6972 AND MB6973)

Dear Mr. Jamil:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for an exemption from the requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix G, for McGuire Nuclear Station, Units 1 and 2 (McGuire). The proposed exemption would allow application of American Society of Mechanical Engineers Boiler and Pressure Vessel Code Case N-641 in establishing the reactor vessel pressure limits at low temperatures for McGuire. This action is in response to your letter dated December 12, 2002, as supplemented by letters dated March 27 and April 23, 2003.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Robert E. Martin, Senior Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosure: Environmental Assessment

cc w/encl: See next page

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*See previous concurrence

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UNITED STATES NUCLEAR REGULATORY COMMISSIONDUKE POWER COMPANYDOCKET NOS. 50-369 AND 50-370MCGUIRE NUCLEAR STATION, UNIT NOS. 1 AND 2ENVIRONMENTAL ASSESSMENT AND FINDING OFNO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of an exemption from Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix G, for Facility Operating License Nos. NPF-9 and NPF-17, issued to Duke Power Company (the licensee), for operation of the McGuire Nuclear Station, Unit Nos. 1 and 2 (McGuire), nuclear power plant, located in Mecklenburg County, North Carolina. Therefore, as required by 10 CFR 51.21, the NRC is issuing this environmental assessment and finding of no significant impact.

ENVIRONMENTAL ASSESSMENTIdentification of the Proposed Action:

The proposed action would exempt the licensee from the requirements of 10 CFR Part 50, Appendix G, which would allow the use of American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code) Code Case N-641 as the basis for revised reactor vessel pressure (RVP) and temperature (P/T) curves, and low temperature overpressure protection system setpoints in the McGuire, Unit Nos. 1 and 2 Technical Specifications.

The regulation at 10 CFR Part 50, Section 50.60(a), requires, in part, that except where an exemption is granted by the Commission, all light-water nuclear power reactors must meet the fracture toughness requirements for the reactor coolant pressure boundary set forth in

Appendix G to 10 CFR Part 50. Appendix G to 10 CFR Part 50 requires that P/T limits be established for reactor pressure vessels (RPVs) during normal operating and hydrostatic or leak-rate testing conditions. Specifically, 10 CFR Part 50, Appendix G, states, "The appropriate requirements on both the pressure-temperature limits and the minimum permissible temperature must be met for all conditions." Appendix G of 10 CFR Part 50 specifies that the requirements for these limits are the ASME Code, Section XI, Appendix G, limits.

ASME Code Case N-641 permits the use of alternate reference fracture toughness for reactor vessel materials in determining the P/T curves and low temperature overpressure protection system setpoints for effective temperature and allowable pressure. The alternate reference fracture toughness involves the use of the " K_{IC} fracture toughness curve" instead of the " K_{IA} fracture toughness curve," where K_{IC} and K_{IA} are "Reference Stress Intensity Factors," as defined in ASME Code, Section XI, Appendices A and G, respectively. Since the K_{IC} fracture toughness curve shown in ASME Code, Section XI, Appendix A, Figure A-2200-1 (the K_{IC} fracture toughness curve), provides a higher fracture toughness value than the corresponding K_{IA} fracture toughness curve of ASME Code, Section XI, Appendix G, Figure G-2210-1 (the K_{IA} fracture toughness curve), using ASME Code Case N-641 to establish the P/T curves and low temperature overpressure protection system setpoints would be less conservative than the methodology currently endorsed by 10 CFR Part 50, Appendix G. The provisions of ASME Code Case N-641 were incorporated into the Appendix G to Section XI of the ASME Code in the 1998 Edition through 2000 Addenda which is the Edition and Addenda of record in the 2003 edition of 10 CFR Part 50. However, in this case, the McGuire licensing basis has only been updated to include the 1995 Edition through 1996 Addenda of the ASME Code. Therefore, an exemption to apply ASME Code Case N-641 is required.

The proposed action is in accordance with the licensee's application dated December 12, 2002, as supplemented by letters dated March 27 and April 23, 2003.

The Need for the Proposed Action:

The proposed exemption is needed to allow the licensee to implement ASME Code Case N-641 in order to revise the method used to determine the P/T curves and because the continued use of the method specified by Appendix G to 10 CFR Part 50, to develop low temperature overpressure protection system setpoints unnecessarily restricts the P/T operating window.

The underlying purpose of Appendix G, is to protect the integrity of the reactor coolant pressure boundary (RCPB) in nuclear power plants. This is accomplished through regulations that, in part, specify fracture toughness requirements for ferritic materials of the RCPB. Pursuant to 10 CFR Part 50, Appendix G, it is required that P/T limits for the reactor coolant system (RCS) be at least as conservative as those obtained by applying the methodology of the ASME Code, Section XI, Appendix G. Current P/T limits produce operational constraints by limiting the P/T range available to the operator to heat up or cool down the plant. The operating window through which the operator heats up and cools down the RCS becomes more restrictive with continued reactor vessel service. Reducing this operating window could potentially have an adverse safety impact by increasing the possibility of inadvertent low temperature overpressure protection system actuation due to pressure surges associated with normal plant evolutions, such as reactor coolant pump start and swapping operating charging pumps with the RCS in a water-solid condition. P/T limits for an increased service period of operation of 34 effective full-power years for McGuire, Unit Nos. 1 and 2, based on ASME Code, Section XI, Appendix G requirements, would significantly restrict the ability to perform plant heatup and cooldown, and would create an unnecessary burden to plant operations, and challenge control of plant evolutions required with the Over Pressure Protection feature enabled. Continued operation of McGuire, Unit Nos. 1 and 2, with P/T curves developed to satisfy ASME Code, Section XI, Appendix G, requirements without the relief provided by ASME Code Case N-641

would unnecessarily restrict the P/T operating window, especially at low temperature conditions. Use of the K_{IC} curve in determining the lower bound fracture toughness of RPV steels is more technically correct than use of the K_{IA} curve, since the rate of loading during a heatup or cooldown is slow and is more representative of a static condition than a dynamic condition. The K_{IC} curve appropriately implements the use of static initiation fracture toughness behavior to evaluate the controlled heatup and cooldown process of a reactor vessel. The staff has required use of the conservatism of the K_{IA} curve since 1974, when the curve was adopted by the ASME Code. This conservatism was initially necessary due to the limited knowledge of the fracture toughness of RPV materials at that time. Since 1974, additional knowledge has been gained about RPV materials, which demonstrates that the lower bound on fracture toughness provided by the K_{IA} curve greatly exceeds the margin of safety required, and that the K_{IC} curve is sufficiently conservative to protect the public health and safety from potential RPV failure. Application of ASME Code Case N-641 will provide results that are sufficiently conservative to ensure the integrity of the RCPB, while providing P/T curves and low temperature overpressure protection system setpoints that are not overly restrictive. Implementation of the proposed P/T curves and low temperature overpressure protection system setpoints, as allowed by ASME Code Case N-641, does not significantly reduce the margin of safety.

In the associated exemption, the NRC staff has determined that, pursuant to 10 CFR Part 50, Section 50.12(a)(2)(ii), the underlying purpose of the regulation will continue to be served by the implementation of ASME Code Case N-641.

Environmental Impacts of the Proposed Action:

The NRC has completed its evaluation of the proposed action and concludes that there are no significant environmental impacts associated with the use of the alternative analysis method to support the revision of the RCS P/T limits.

The proposed action will not significantly increase the probability or consequences of accidents, no changes are being made in the types of effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential nonradiological impacts, the proposed action does not have a potential to affect any historic sites. It does not affect nonradiological plant effluents and has no other environmental impact. Therefore, there are no significant nonradiological environmental impacts associated with the proposed action.

Accordingly, the NRC concludes that there are no significant environmental impacts associated with the proposed action.

Environmental Impacts of the Alternatives to the Proposed Action:

As an alternative to the proposed action, the staff considered denial of the proposed action (i.e., the “no-action” alternative). Denial of the application would result in no change in current environmental impacts. The environmental impacts of the proposed action and the alternative action are similar.

Alternative Use of Resources:

The action does not involve the use of any resources not previously considered in NUREG-0063, “Final Environmental Statement Related to the Operation of William B. McGuire Nuclear Station, Units 1 and 2,” April 1976 and the Addendum to NUREG-0063 issued in January 1981.

Agencies and Persons Consulted:

In accordance with its stated policy, on May 19, 2003, the staff consulted with the North Carolina State official, Mr. Johnny James of the Division of Environmental Health, Radiation Protection Section, North Carolina Department of Environment and Natural Resources,

regarding the environmental impact of the proposed amendments. The State official had no comments.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated December 12, 2002, as supplemented by letters dated March 27 and April 23, 2003.

Documents may be examined, and/or copied for a fee, at the NRC's Public Document Room (PDR), located at One White Flint North, Public File Area O1 F21, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records will be accessible electronically from the Agencywide Documents Access and Management System (ADAMS) Public Electronic Reading Room on the Internet at the NRC Web site, <http://www.nrc.gov/reading-rm/adams.html>.

Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC PDR Reference staff by telephone at 1-800-397-4209 or 301-415-4737, or by e-mail to pdrr@nrc.gov.

Dated at Rockville, Maryland, this 21st day of May 2003.

FOR THE NUCLEAR REGULATORY COMMISSION

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McGuire Nuclear Station

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