

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50–369 and 50–370]

Duke Power Company, McGuire Nuclear Station, Units 1 and 2; Exemption

1.0 Background

Duke Power Company (the licensee) is the holder of Facility Operating License Nos. NPF–9 and NPF–17 that authorizes operation of the McGuire Nuclear Station, Units 1 and 2 (McGuire). The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of two pressurized water reactors located in Mecklenburg County, North Carolina.

2.0 Request/Action

Title 10 of the Code of Federal Regulations (10 CFR) section 50.60(a), requires that the fracture toughness and material surveillance requirements of Appendix G to part 50 must be met for the reactor coolant pressure boundary. Appendix G to part 50 requires that pressure and temperature (P/T) limits be established for reactor pressure vessels (RPVs) during normal operating and hydrostatic or leak rate testing conditions. Specifically, section IV.A.2.a of Appendix G to 10 CFR part 50 states that “The appropriate requirements on both the pressure-temperature limits and the minimum permissible temperature must be met for all conditions.” Further, section IV.A.2.b of Appendix G to 10 CFR part 50 requires that these P/T limits must be at least as conservative as limits obtained by following the methods of analysis and the margins of safety of Appendix G to section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). The current ASME Code of Record for McGuire is the 1995 edition through 1996 addenda of the ASME Code. The McGuire Code of Record does not incorporate the provisions of ASME Code Case N–641. Although the provisions of ASME Code Case N–641 were incorporated into Appendix G to section XI of the ASME Code in the 1998 edition through 2000 addenda, which is the latest edition and addenda codified in 10 CFR 50.55a, McGuire has not adopted this edition and consequently must meet its Code of Record to comply with Appendix G to part 50. Therefore, in this case, the

licensee is still required to obtain an exemption to apply Code Case N–641.

In order to address provisions of amendments to the McGuire Technical Specification (TS) P/T limit curves, the licensee requested in its submittal dated December 12, 2002, as supplemented by letters dated March 27 and April 23, 2003, that the NRC staff exempt McGuire from application of specific requirements of 10 CFR 50.60 and Appendix G to 10 CFR part 50, and substitute the use of ASME Code Case N–641. ASME Code Case N–641 permits the use of an alternate reference fracture toughness curve for RPV materials and permits the postulation of a circumferentially-oriented flaw for the evaluation of circumferential RPV welds when determining the P/T limits. The proposed exemption request is consistent with, and is needed to support, the McGuire TS amendment that was contained in the same submittal. The proposed McGuire TS amendment will revise the P/T limits for heatup, cooldown, and inservice test limitations for the reactor coolant system (RCS) through 34 effective full power years of operation.

Code Case N–641

The licensee has proposed an exemption to allow the use of ASME Code Case N–641 in conjunction with Appendix G to ASME section XI, 10 CFR 50.60(a) and 10 CFR part 50, Appendix G, to establish the P/T limits for the McGuire, Units 1 and 2 RPVs.

The proposed TS amendment to revise the P/T limits for McGuire, Units 1 and 2, relies in part, on the requested exemption. These revised P/T limits have been developed using the lower bound K_{IC} fracture toughness curve shown in ASME, section XI, Appendix A, Figure A–2200–1, in lieu of the lower bound K_{IA} fracture toughness curve of ASME, section XI, Appendix G, Figure G–2210–1, as the basis fracture toughness curve for defining the McGuire P/T limits. In addition, the revised P/T limits have been developed based on the use of a postulated circumferentially-oriented flaw for the evaluation of RPV circumferential welds in lieu of the axially-oriented flaw that would be required by Appendix G to section XI of the ASME Code. The other margins involved with the ASME section XI, Appendix G, process of determining P/T limit curves remain unchanged.

Use of the K_{IC} curve as the basis fracture toughness curve for the development of P/T operating limits is technically correct. The K_{IC} curve appropriately implements the use of a relationship based on static initiation

fracture toughness behavior to evaluate the controlled heatup and cooldown process of a RPV, whereas the K_{IA} fracture toughness curve codified into Appendix G to section XI of the ASME Code was developed from more conservative crack arrest and dynamic fracture toughness test data. The application of the K_{IA} fracture toughness curve was initially codified in Appendix G to section XI of the ASME Code in 1974 to provide a conservative representation of RPV material fracture toughness. This initial conservatism was necessary due to the limited knowledge of RPV material behavior in 1974. However, additional knowledge has been gained about RPV materials that demonstrates the lower bound on fracture toughness provided by the K_{IA} fracture toughness curve is well beyond the margin of safety required to protect the public health and safety from potential RPV failure.

Likewise, the use of a postulated circumferentially-oriented flaw in lieu of an axially-oriented one for the evaluation of a circumferential RPV weld is more technically correct. The size of flaw required to be postulated for P/T limit determination has a depth of one-quarter of the RPV wall thickness and a length six times the depth. Based on the direction of welding during the fabrication process, the only technically reasonable orientation for such a large flaw is for the plane of the flaw to be circumferentially-oriented (*i.e.*, parallel to the direction of welding). Prior to the development of ASME Code Case N–641 (and the similar ASME Code Case N–588), the required postulation of an axially-oriented flaw for the evaluation of a circumferential RPV weld has provided an additional, unnecessary level of conservatism to the overall evaluation.

In addition, P/T limit curves based on the K_{IC} fracture toughness curve and postulation of a circumferentially-oriented flaw for the evaluation of RPV circumferential welds will enhance overall plant safety by expanding the P/T operating window with the greatest safety benefit being in the region of low temperature operations. The operating window through which the operator heats up and cools down the RCS is determined by the difference between the maximum allowable pressure determined by Appendix G of ASME section XI, and the minimum required pressure for the reactor coolant pump seals adjusted for instrument uncertainties. A narrow operating window could potentially have an adverse safety impact by increasing the possibility of inadvertent overpressure protection system actuation due to

pressure surges associated with normal plant evolutions such as RCS pump starts and swapping operating charging pumps with the RCS in a water-solid condition.

Since application of ASME Code Case N-641 provides appropriate procedures to establish maximum postulated defects and to evaluate those defects in the context of establishing RPV P/T limits, this application of the Code Case maintains an adequate margin of safety for protecting RPV materials from brittle failure. The NRC staff has reviewed the exemption request submitted by the licensee and has concluded that an exemption should be granted from the requirements of 10 CFR 50.60 and section IV.A.2.b of Appendix G to 10 CFR part 50 to permit the licensee to use the provisions of ASME Code Case N-641 for the purpose of developing the McGuire Units 1 and 2 RPV P/T limit curves. However, the NRC staff does not agree with the special circumstances cited by the licensee in its December 12, 2002, application regarding the basis for granting the exemption. The NRC staff did not conclude that the circumstances cited above constitute "undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated," pursuant to 10 CFR 50.12(a)(2)(iii). Rather, the NRC staff concluded that the application of the technical provisions of ASME Code Case N-641 provided sufficient margin in the development of RPV P/T limit curves such that the underlying purpose of the regulations, Appendix G to 10 CFR part 50, will continue to be met and that the specific conditions required by the regulations (*i.e.*, use of all provisions in Appendix G to section XI of the ASME Code) were not necessary. Therefore, the NRC staff grants the requested exemption to the licensee based on the special circumstances of 10 CFR 50.12(a)(2)(ii), "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

In summary, the ASME section XI, Appendix G, procedure was conservatively developed based on the level of knowledge existing in 1974 concerning reactor coolant pressure boundary materials and the estimated effects of operation. Since 1974, the level of knowledge about the fracture mechanics behavior of RCS materials has been greatly expanded, especially regarding the effects of radiation embrittlement and the understanding of fracture toughness properties under

static and dynamic loading conditions. The NRC staff concurs that this increased knowledge permits relaxation of the ASME section XI, Appendix G requirements by application of ASME Code Case N-641, while maintaining, pursuant to 10 CFR 50.12(a)(2)(ii), the underlying purpose of the ASME Code and the NRC regulations to ensure an acceptable margin of safety against brittle failure of the RPV.

The NRC staff has reviewed the exemption request submitted by the licensee and has concluded that an exemption should be granted from the requirements of 10 CFR 50.60(a) and section IV.A.2.b of Appendix G to 10 CFR part 50 to permit the licensee to utilize the provisions of ASME Code Case N-641 for the purpose of developing McGuire Units 1 and 2 RPV P/T limit curves.

3.0 Discussion

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present.

Special circumstances, pursuant to 10 CFR 50.12(a)(2)(ii), are present in that continued operation of McGuire, Units 1 and 2, pursuant to the requirements of 10 CFR 50.60 and section IV.A.2.b of Appendix G to 10 CFR part 50, using P/T curves developed in accordance with ASME section XI, Appendix G, without the relief provided by ASME Code Case N-641, is not necessary to achieve the underlying purpose of 10 CFR 50.60 and Appendix G to 10 CFR part 50. Application of ASME Code Case N-641 in lieu of the requirements of ASME Code section XI, Appendix G, provides an acceptable alternate methodology that will continue to meet the underlying purpose of 10 CFR 50.60 and Appendix G to 10 CFR part 50. The underlying purpose of the regulations in 10 CFR 50.60 and Appendix G to 10 CFR part 50 is to provide an acceptable margin of safety against brittle failure of the RCS during any condition of normal operation to which the pressure boundary may be subjected over its service lifetime.

The NRC staff examined the licensee's rationale to support the exemption request, and accepts the licensee's determination that an exemption would be required to approve the use of Code Case N-641. The NRC staff agrees that the use of ASME Code Case N-641

would meet the underlying intent of 10 CFR 50.60 and Appendix G to 10 CFR part 50. The NRC staff concludes that the application of the technical provisions of ASME Code Case N-641 provides sufficient margin in the development of RPV P/T limit curves such that the underlying purpose of the regulations (10 CFR 50.60 and Appendix G to 10 CFR part 50) continues to be met and that the specific conditions required by the regulations (*i.e.*, use of all provisions in Appendix G to section XI of the ASME Code) were not necessary. Therefore, the NRC staff concludes that the exemption requested by the licensee is justified based on the special circumstances of 10 CFR part 50(a)(2)(ii), "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

Based upon a consideration of the conservatism that is explicitly incorporated into the methodologies of Appendix G to 10 CFR part 50; Appendix G to section XI of the ASME Code; and Regulatory Guide 1.99, Revision 2; the NRC staff concludes that application of ASME Code Case N-641, as described, will provide an adequate margin of safety against brittle failure of the RPV. This conclusion is also consistent with the determination that the NRC staff has reached for other licensees under similar conditions based on the same considerations. Therefore, the NRC staff concludes that granting the exemption under the special circumstances of 10 CFR 50.12(a)(2)(ii) is appropriate, and that the methodology of Code Case N-641 may be used to revise the P/T limits for the McGuire, Unit 1 and 2 RPVs.

4.0 Conclusion

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants the licensee an exemption from the requirements of 10 CFR 50.60(a), and 10 CFR part 50, Appendix G, section IV.A.2.b, to allow application of ASME Code Case N-641 in establishing TS requirements for the RPV limits for McGuire, Units 1 and 2.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (68 FR 31735).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 3rd day of July 2003.

For the Nuclear Regulatory Commission.

Ledyard B. Marsh,

Acting Director, Division of Licensing Project Management, Office of Nuclear Reactor Regulation.

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NUCLEAR REGULATORY COMMISSION

[Docket No. 72-22-ISFSI]

In the Matter of Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation); Notice of Appointment of Adjudicatory Employee

Commissioners: Nils J. Diaz, Chairman, Edward McGaffigan, Jr., Jeffrey S. Merrifield.

Pursuant to 10 CFR 2.4, notice is hereby given that Dr. Yong Li of the NRC's Office of Research has been appointed as a Commission adjudicatory employee within the meaning of section 2.4, to advise the Commission regarding issues relating to the pending petition for review of LBP-03-08 in the matter of *Private Fuel Storage, L.L.C.* Dr. Li has not previously performed any investigative or litigating function in connection with this or any related proceeding. Until such time as a final decision is issued in this matter, interested persons outside the agency and agency employees performing investigative or litigating functions in this proceeding are required to observe the restrictions of 10 CFR 2.780 and 2.781 in their communications with Dr. Li.

It is so ordered.

Dated at Rockville, Maryland, this 3rd day of July, 2003.

For the Commission.

J. Samuel Walker,

Acting Secretary of the Commission.

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NUCLEAR REGULATORY COMMISSION

[Docket Nos. STN 50-528, STN 50-529, STN 50-530]

Arizona Public Service Company, et al.: Palo Verde Nuclear Generating Station, Units 1, 2 and 3; Environmental Assessment and Finding of No Significant Impact

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of an amendment to Title 10 of the Code of Federal Regulations (10 CFR) part 50, for Facility Operating License Nos. NPF-41, NPF-51, NPF-74, issued to Arizona Public Service Company (the licensee), for operation of the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3, located in Maricopa County, Arizona. Therefore, as required by 10 CFR 51.21, the NRC is issuing this environmental assessment and finding of no significant impact.

Environmental Assessment

Identification of the Proposed Action

The proposed action would extend the expiration date of the operating license from December 31, 2024, to June 1, 2025, for Unit 1; from December 9, 2025, to April 24, 2026, for Unit 2; and from March 25, 2027, to November 25, 2027, for Unit 3.

The proposed action is in accordance with the licensee's application dated August 28, 2002.

The Need for the Proposed Action

The proposed action would allow the licensee to operate PVNGS, Units 1, 2, and 3, until June 1, 2025, April 24, 2026, and November 25, 2027, respectively. This would allow the licensee to recapture approximately six months of additional plant operation for each unit.

Environmental Impacts of the Proposed Action

The NRC has completed its evaluation of the proposed action and concludes that there are no significant environmental considerations involved with the proposed action. The extension of the operating licenses does not affect the design or operation of the plants, does not involve any modifications to the plants or any increase in the licensed power for the plants, and will not create any new or unreviewed environmental impacts that were not considered in the Final Environmental Statement (FES) related to the operation of PVNGS, Units 1, 2, and 3, NUREG-0841, dated February 1982. The

evaluations presented in the FES were the environmental impacts of generating power at PVNGS and the basis for granting a 40-year operating license for PVNGS. The environmental impacts of the proposed action are based on the evaluations in the FES. The FES also considered the environmental impacts of operating Units 1, 2, and 3.

The FES which in general, assesses various impacts associated with operation of the facility in terms of annual impacts and balances these against the anticipated annual energy production benefits.

The offsite exposure from releases during postulated accidents has been previously evaluated in the Updated Final Safety Analysis Report (UFSAR) for PVNGS. The results are acceptable when compared with the criteria defined in 10 CFR part 100, as documented in the Commission's Safety Evaluation Report, NUREG-0857, dated November 1981, and its 12 supplements.

This conservative design-basis evaluation is a function of four parameters: (1) The type of accident postulated, (2) the radioactivity calculated to be released during the accident, (3) the assumed meteorological conditions at the site, and (4) the population distribution versus distance from the plant. An environmental assessment of accidents is also provided in section 5.9.2 of the FES. The type of accidents and the calculated radioactivity released do not change with the proposed action. The site meteorology as defined in Chapter 2 of the UFSAR is essentially constant. The NRC staff has concluded that the population size and distribution will not change significantly.

The NRC staff has concluded that the impacts associated with the addition of approximately six to eight months to each unit are not significantly different from operating license duration assessed in the PVNGS FES. Therefore, the staff concluded that the FES sufficiently addresses the environmental impacts associated with a full 40-year operating period for each unit.

The annual occupational exposure of workers at the plant, station employees and contractors, is reported in the Annual Operating Report submitted by the licensee. The lowest exposure value is for a year without a refueling outage and the highest value is for a year with a refueling outage. In section 5.9.1.1.1 of the FES, the average occupational exposure for a pressurized water reactor was reported as 440 person-rems. Therefore, the expected annual occupational exposure for the proposed extended period of operation does not