



50-502

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 3, 1997

Mr. Roy A. Anderson
Senior Vice President,
Nuclear Operations
Florida Power Corporation
ATTN: Manager, Nuclear Licensing
Crystal River Energy Complex (SA2A)
15760 W Power Line Street
Crystal River, Florida 34428-6708

SUBJECT: CRYSTAL RIVER 3 - EXEMPTION FROM REQUIREMENTS OF 10 CFR 50.60,
ACCEPTANCE CRITERIA FOR FRACTURE PREVENTION FOR LIGHTWATER NUCLEAR
POWER REACTORS FOR NORMAL OPERATION (TAC NO. M98380)

Dear Mr. Anderson:

The Commission has issued the enclosed exemption from the requirements of 10 CFR 50.60, "Acceptance Criteria for Fracture Prevention for Lightwater Nuclear Power Reactors for Normal Operation," in response to your request of April 7, 1997. This exemption permits use of the safety margins recommended in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Case N-514, "Low Temperature Overpressure Protection," in lieu of the safety margins required by 10 CFR Part 50, Appendix G.

A copy of this Exemption has been forwarded to the Office of the Federal Register for publication.

Your April 7, 1997, letter indicated that you will lower the pressurizer pilot-operated relief valve (PORV) setpoint to 454 psig and administratively restrict the reactor coolant system pressure to a maximum of 100 psig. You provided a justification for continued operation (JCO) with the above administrative controls. By letter dated June 6, 1997, you confirmed implementation of the above and stated that these administrative controls will remain in effect until the technical specifications are revised to implement low temperature overpressure protection (LTOP) features.

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Mr. Roy A. Anderson

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Please note that the enclosed safety evaluation associated with your exemption request does not address the JCO for the administrative controls. This will be a subject of future audit or inspection, if any.

Sincerely,

Original signed by
Joseph F. Williams

L. Raghavan, Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosure: Exemption

cc w/enclosure: See next page

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Docket File PUBLIC CR-3 r/f Acting Director, DRPE JZwolinski
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Florida Power Corporation

CRYSTAL RIVER UNIT NO. 3
GENERATING PLANT

cc:

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
FLORIDA POWER CORPORATION) Docket No. 50-302
Crystal River Nuclear Generating)
Plant Unit 3)

EXEMPTION

I.

Florida Power Corporation (the licensee) is the holder of Facility Operating License No. DPR-72, which authorizes operation of the Crystal River Nuclear Generating Plant Unit 3 (CR3). The license provides, among other things, that the licensee is subject to all rules, regulations, and orders of the Commission now or hereafter in effect.

The facility is of a pressurized water reactor type and is located in Citrus County, Florida.

II.

In its letter dated April 7, 1997, the licensee requested an exemption from the Commission's regulations. Title 10 of the Code of Federal Regulations, Part 50, Section 60 (10 CFR 50.60), "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation," states that all lightwater nuclear power reactors must meet the fracture toughness and material surveillance program requirements for the reactor coolant pressure boundary as set forth in Appendices G and H to 10 CFR Part 50. Appendix G to 10 CFR Part 50 defines pressure/temperature (P/T) limits during any condition of normal operation, including anticipated operational occurrences and system hydrostatic tests to which the pressure boundary may be subjected over its service lifetime. Pursuant to 10 CFR 50.60(b), alternatives to

the Appendices G and H to 10 CFR Part 50 requirements may be used when an exemption is granted by the Commission under 10 CFR 50.12.

To prevent low-temperature overpressure transients that would produce pressure excursions exceeding the P/T limits of Appendix G to 10 CFR Part 50 while the reactor is operating at low temperatures, the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI requires that a low-temperature overpressure protection (LTOP) system shall be effective at coolant temperatures less than 200°F or at coolant temperatures corresponding to a reactor vessel metal temperature less than reference temperature nil-ductility (RT_{NDT})+50°F, whichever is greater.

At CR3, the LTOP system includes a pressure-relieving device; power-operated relief valve (PORV). The PORV is to be set at a pressure low enough so that if an LTOP transient occurred, the mitigation system would prevent the pressure in the reactor vessel from exceeding the P/T limits of Appendix G to 10 CFR Part 50. To prevent the PORVs from lifting as a result of normal operating pressure surges (e.g., reactor coolant pumps starting or stopping) with the reactor coolant system (RCS) in a water solid condition, the operating pressure must be maintained below the PORV setpoint. The licensee indicates that its LTOP PORV setpoint, based on the 10 CFR Part 50, Appendix G, would restrict the P/T operating window and could potentially result in undesired actuation of the PORV during normal heatup and cooldown operation. The operating window is restricted by the difference between the P/T limit curves and the reactor coolant pump net positive suction head curve.

The licensee indicates that plant operation with this restriction places an unnecessary burden on plant operators to ensure safety limits

are maintained, and could potentially result in an undesired actuation of the PORV during normal heatup and cooldown operation. Therefore, the licensee proposed that the PORV setpoint for LTOP events be determined using the safety margins developed in an alternate methodology in lieu of the safety margins required by 10 CFR Part 50, Appendix G. The alternate methodology would be consistent with ASME Code Case N-514, "Low Temperature Overpressure Protection," which allows exceeding the pressure of the P/T limits of 10 CFR Part 50, Appendix G, by 10 percent. ASME Code Case N-514 is consistent with guidelines developed by the ASME Working Group on Operating Plant Criteria to define pressure limits during LTOP events. The code case methodology is intended to avoid certain unnecessary operational restrictions, provide adequate margins against failure of the reactor pressure vessel, and reduce the potential for unnecessary activation of pressure-relieving devices used for LTOP. ASME Code Case N-514 has been approved by the ASME Code Committee. The content of this code case has been incorporated into Appendix G of Section XI of the ASME Code and published in the 1993 Addenda to Section XI.

An exemption from 10 CFR 50.60 is required to use the alternate methodology for calculating the maximum allowable pressure for LTOP considerations. By application dated April 7, 1997, the licensee requested an exemption from 10 CFR 50.60 to allow it to utilize the alternate methodology of Code Case N-514 for computing its LTOP setpoints.

III.

Presently, CR3 Technical Specifications (TS) do not include LTOP features. By letter dated June 7, 1997, the licensee confirmed lowering

the PORV setpoint to 454 psig. These values are based on the approved 15 effective full power years (EFPY) P/T curves for normal cooldown and heatup, using the methodology described in ASME Code, Appendix G, with no reactor coolant pumps running. The licensee also confirmed that it currently controls LTOP features administratively using operating procedures (OPs). These OPs:

- 1) limit the Pressurizer level to less than 220 inches to accommodate a water level surge, and RCS pressure to 100 psig,
- 2) require both trains of High Pressure Injection (HPI) valves to be closed and breakers secured to prevent inadvertent HPI into the RCS during LTOP conditions, and
- 3) require the Core Flood Tank (CFT) pressure to be maintained within maximum allowable RCS P/T when CFT isolation valves are open, or these valves are closed to prevent inadvertent CFT injection into the RCS.

The licensee stated that these administrative controls will remain in effect until the TS are revised to include LTOP features addressing the full range of RCS pressures.

IV.

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 are present whenever, according to 10 CFR 50.12(a)(2)(ii), "Application 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."

The underlying purpose of 10 CFR 50.60, Appendix G, is to establish fracture toughness requirements for ferritic materials of pressure-retaining components of the reactor coolant pressure boundary to provide adequate margins of safety during any condition of normal operation, including anticipated operational occurrences, to which the pressure boundary may be subjected over its service lifetime. Section IV.A.2 of this appendix requires that the reactor vessel be operated with P/T limits at least as conservative as those obtained by following the methods of analysis and the required margins of safety of Appendix G of the ASME Code, Section XI.

Appendix G of Section XI of the ASME Code requires that the P/T limits be calculated (a) using a safety factor of 2 on the principal membrane (pressure) stresses, (b) assuming a flaw at the surface with a depth of one-quarter (1/4) of the vessel wall thickness and a length of 6 times its depth, and (c) using a conservative fracture toughness curve that is based on the lower bound of static, dynamic, and crack arrest fracture toughness tests on material similar to the Point Beach reactor vessel material.

In determining the setpoint for LTOP events, the licensee proposed to use safety margins based on an alternate methodology consistent with the ASME Code Case N-514 guidelines. The ASME Code Case N-514 allows determination of the setpoint for LTOP events such that the maximum pressure in the vessel would not exceed 110 percent of the P/T limits of the existing ASME Code, Section XI, Appendix G. This approach results in a safety factor of 1.8 on pressure. All other factors, including assumed

flaw size and fracture toughness, remain the same. Although this methodology would reduce the safety factor on pressure, the margin with respect to toughness for LTOP transients are acceptable. Thus, applying Code Case N-514 will satisfy the underlying purpose of 10 CFR 50.60 for fracture toughness requirements. Further, by relieving the operational restrictions, the potential for undesirable lifting of the PORV would be reduced, thereby improving plant safety.

V.

For the foregoing reasons, the NRC staff has concluded that the licensee's proposed use of the alternate methodology in determining the acceptable setpoint for LTOP events will not present an undue risk to public health and safety and is consistent with the common defense and security. The NRC staff has determined that there are special circumstances present, as specified in 10 CFR 50.12(a)(2)(ii), in that application of 10 CFR 50.60 is not necessary in order to achieve the underlying purpose of this regulation.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), an exemption is authorized by law, will not endanger life or property or common defense and security, and is otherwise in the public interest. Therefore, the Commission hereby grants an exemption from the requirements of 10 CFR 50.60 such that in determining the setpoint for LTOP events, the Appendix G curves for P/T limits are not exceeded by more than 10 percent.

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 (62 FR 28907).

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Original signed by

Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland,
this 3rd day of July 1997

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